ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

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DIVISION OF GAME
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ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES

PART II. BISON, CARIBOU, MOOSE AND MUSKOXEN

Edited and Compiled by
Robert A. Hinman, Deputy Director

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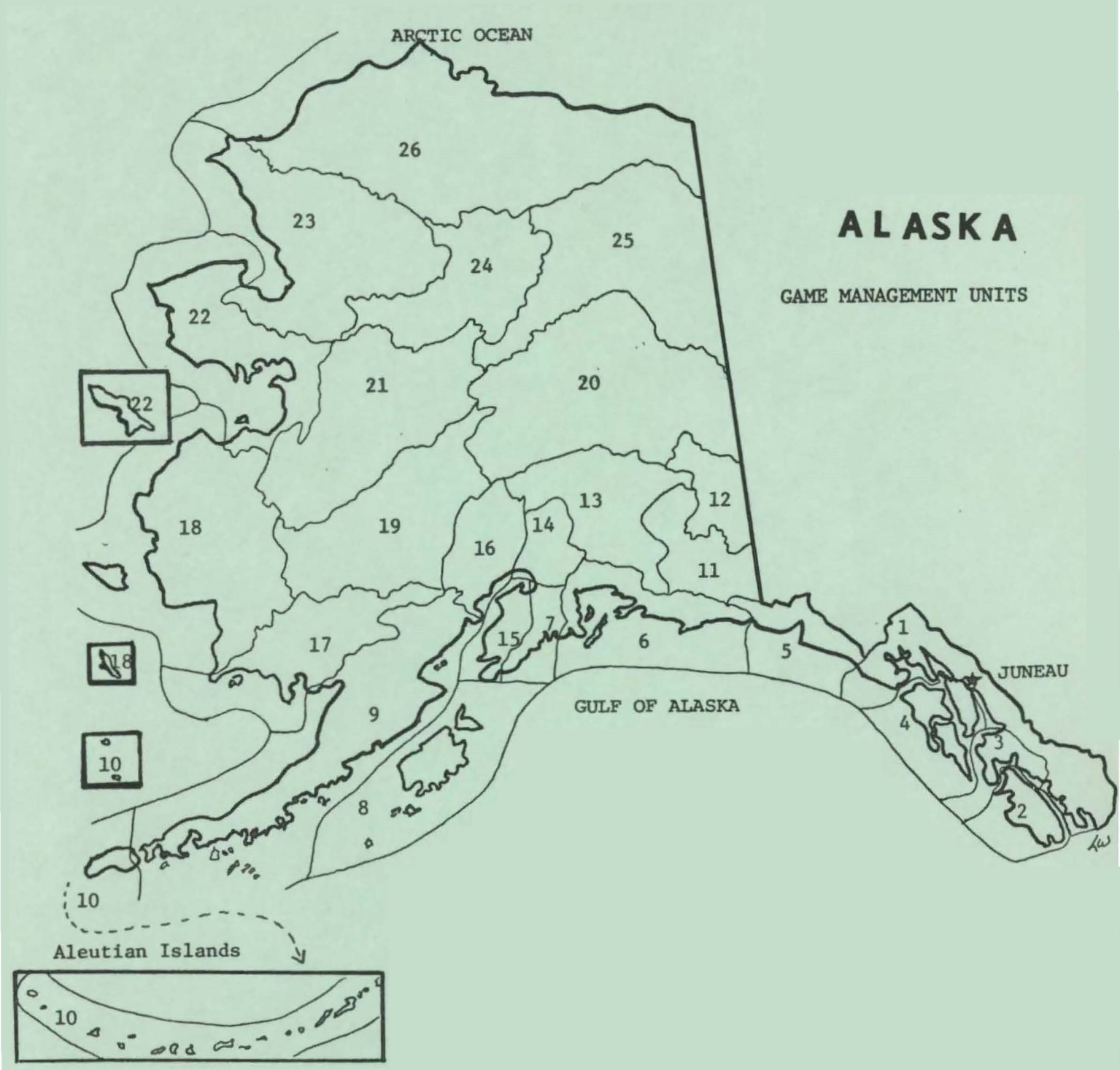
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STATEWIDE HARVESTS AND POPULATION STATUS

Bison

The 1978-79 harvest was 85 bison; 51 from the Delta Herd, 15 from the Copper River Herd, 13 from Farewell and 6 from Chitina. All four herds are healthy with good calf production and survival.

Caribou

The total reported caribou harvest in 1978-79 was 1408 animals, but an estimated additional 4773 animals were taken for a total statewide estimated harvest of 6181 caribou. Most of this harvest was taken from the two large herds in northern Alaska; the Western Arctic Herd (est. harvest 3,600 animals) and the Porcupine Herd (est. harvest 700 animals).

Status of Alaska's caribou varies considerably between herds. Some herds, like the Fortymile and Delta herds, have experienced poor calf production in recent years. Most other herds are stable or increasing in numbers. Hunting regulations are adjusted annually, depending on herd status.

Moose

The statewide reported moose harvest for 1978-79 was 4785 animals and the overall reported and estimated harvest was 5946 moose. This represents an increased harvest of 801 animals or 16 percent over that of the previous year. Major increases in harvests occurred in Units 16 and 21.

Conservative season lengths and generally moderate winter conditions contributed to recovery of some moose populations. In other areas, especially in Central and west-Central Alaska, high predator populations may be impeding moose population recovery despite favorable winters. Continuing deterioration of moose ranges on the Alaska Peninsula, Kenai Peninsula and east-Central Alaska promised no respite for declining moose numbers in these areas.

Muskoxen

Muskoxen can be legally hunted only on Nunivak Island. During the 1978-79 fall and spring hunting seasons, 23 bulls were harvested on Nunivak Island. One of five applicants for a cow permit hunted, but did not harvest an animal.

Transplanted herds in Units 22, 23 and 26 are still growing; the population of muskoxen on the Arctic Slope (Unit 26C) reached 112 animals by spring 1979.

STATEWIDE MOOSE HARVEST

Unit	Bulls	Cows	Unknown	Total
1B	21	13		34
1C	31			31
1D	44*			44*
1D	55**			55**
5A	27			27
5B	12			12
6A	13	5		18
6B	23			23
6C	29	31		60
7	55	1	1	57
9	215	19		234
11	40			40
12	98			98
13	846	1	16	863
14A	329	52	2	383
14B	61	29	1	91
14C	18			18
15A	163	1		164
15B	20			20
15C	118		2	120
16	617	180	6	803
17	63		2	65
18	48*			48*
18	72**			72**
19	332			332
20	245			245
21	353*			353*
21	1059**			1059**
22	65	97		162
23	189	24		213
24	97			97
25	84*			84*
25	504**			504**
26	46	—	—	46
Totals	4202*	453	30	4758*
	5463**			5946**

* Reported Harvest
** Estimated Harvest

CONTENTS

BISON

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 11 - Chitina River Herd

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Fifteen permits were issued in 1978 and six bison were killed. No nonresident hunters participated in the 1978 hunt. Harvest data for the Chitina River herd from 1976 through 1978 are presented in Appendix I.

Composition and Productivity

The Chitina River bison herd was relatively stable from 1964 through 1972, but increased during the period 1973 through 1976. Maximum numbers of bison observed during aerial counts from 1962 through 1978 are shown in Appendix II.

The highest number of bison recorded was 52 (including calves), observed on 31 August 1976. The 31 August 1978 survey count was 46 bison (39 adults and 7 calves). The percentage of calves in the herd was 15.2, down from 26.5 recorded in 1977.

Management Summary and Conclusions

The total harvest of Chitina River bison since 1976 has been 22 animals. The 1978 count of 46 bison was six less than the record 1976 count. After the 1978 harvest of six animals, the overwintering population of 33 adults approached the management goal of 30 animals. Calf production appears adequate to maintain populations. It is unknown whether any movements occur between the Copper River and Chitina herds.

Recommendations

1. Continue hunting under a permit system to maintain low hunter density and desired harvest.
2. Maintain a check station at Glennallen office only.
3. Initiate habitat studies to evaluate range condition.

PREPARED BY:

Robert Tobey
Game Biologist II

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Harvest data for the Chitina River bison herd, Unit 11.

Regulatory years	No. of permits issued	No. harvested		Percent males in harvest	Number of bison less than 5 years of age		
		total	No. of males		Males	Females	Sample
1976-1977[a]	8	9	6	67%	4	3	9
1977-78	9	7	3	43%	2	3	7
1978-79	14	6	3	50%	1	2	5

a 1976 was the first year the Chitina River bison were legally hunted, (season September 1 through October 1).

PREPARED BY: Robert Tobey, Game Biologist II

Appendix II. Maximum numbers of bison observed during aerial surveys of the Chitina River bison herd, Unit 11.

Year	Total	Calves	Adults
1962	35 [a]	0	35
1963	28	--	--
1964	12	5	7
1965	No Data	--	--
1966	9	--	9
1967	12	2	10
1968	16	2	14
1969	15	--	--
1970	16	2	14
1971	16	3	13
1972	16	--	16
1973	23[b]	4	19
1974	32	6	26
1975	35	--	--
1976	52	9	43
1977	49	13	36
1978	46	7	39

a Original transplant from the National Bison Range in Moiese, Montana to Delta in 1928; in 1962, 29 cows and 6 bulls were transplanted from Delta to May Creek.

b One large bull was found dead during this year.

PREPARED BY: Robert Tobey, Game Biologist II.

BISON

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 11 - Copper River Herd

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Fifteen bison were harvested during the 51 day hunting season in 1978. Harvest data for the Copper River bison herd since 1964 are shown in Appendix I.

A total of 121 hunters participated in this registration permit hunt. Data on hunter residency and transportation means since 1973 are shown in Appendix II.

Composition and Productivity

Maximum numbers of bison observed in the Copper River herd in 1950, and from 1961 through 1978 are shown in Appendix III. Ninety-four bison were seen in the 1978 aerial survey (77 adults and 17 calves), four more than observed in the 1977 count.

Composition data from the 1978 count are as follows: 45 cows, 16 bulls (2 years and older), 16 yearlings, 17 calves and 1 unknown sex.

Management Summary and Conclusions

The total number of hunters in the field was the second highest on record and was sufficient to attain the desired harvest of 15 bison. The opportunity for a high quality hunt was maintained by limiting mechanized access during the first 15 days of the season.

The 1978 survey indicates a stable Copper River bison population. The calf crop of 17 was only one less than the previous year. The harvest of 15 animals brings the wintering adult population to within two animals of the proposed management objective of 60 overwintering adults.

Recommendations

1. Maintain a 21 September-10 November season subject to emergency closure if the desired harvest is attained.

2. Maintain a check station at the Glennallen office.

3. Maintain limitations on use of mechanized vehciles.

PREPARED BY:

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James B. Faro
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APPENDIX I. Harvest data for the Copper River bison herd.

Regulatory Year	Number of registered hunters	No. harvested Total	No. harvested Males	Percent males in harvest	Number and percent of bison through 4 years of age[a]. Males	Females	Sample
1964-65	43	14	10	71			
1965-66	42	11	9	82			
1966-67	No open season						
1967-68	No open season						
1968-69	74	13	6	46	1(8%)	4(33%)	12
1969-70	74	16	7	44	4(27%)	4(27%)	15
1970-71	96	13	6	46	1(8%)	5(38%)	13
1971-72	No open season						
1972-73	No open season						
1973-74	101	16	7	44	1(6%)	3(19%)	16
1974-75	94	22	11	50	7(30%)	5(20%)	22
1975-76	56	8	4	50	3(38%)	1(13%)	8
1976-77	100	9	5	56	2(22%)	3(33%)	9
1977-78	149	6	6	100	2(33%)		6
1978-79	121	15	8	53	3(20%)	6(40%)	15

a. Bison ages were determined by tooth replacement techniques developed by Fuller, 1959.

Prepared by: Robert Tobey, Game Biologist II

APPENDIX II . Residence and transportation means used by all hunters during the 1973 through 1977 Copper River bison hunts.

	1973		1974		1975	
	No.	%	No.	%	No.	%
Residence						
Anchorage vicinity:	68	(67%)	39	(41%)	23	(41%)
Fairbanks vicinity:	8	(8%)	8	(9%)	0	(-)
Copper River Valley:	19	(19%)	27	(29%)	33	(59%)
Other Locations:	6	(6%)	20	(21%)	0	(-)
Unknown:	0	(-)	0	(-)	0	(-)
Transportation Means [a.]						
Aircraft:	52	(55%)	52	(55%)	28	(56%)
Boat:	40	(42%)	39	(41%)	22	(44%)
Off-Road Vehicle:	3	(3%)	0	(-)	0	(-)
Horses:	0	(-)	3	(3%)	0	(-)
Unknown:	7	(-)	0	(-)	6	(-)

	1976		1977		1978	
	No.	%	No.	%	No.	%
Residence						
Anchorage vicinity:	34	(35%)	59	(40%)	44	(36%)
Fairbanks vicinity:	0	(-)	5	(3%)	5	(4%)
Copper River Valley:	56	(58%)	76	(51%)	65	(54%)
Other Locations:	7	(7%)	4	(3%)	6	(5%)
Unknown:	3	(-)	4	(3%)	1	(1%)
Nonres.:			1	(-)	0	(-)
Transportation Means [a.]						
Aircraft:	33	(38%)	52	(35%)	47	(39%)
Boat:	48	(56%)	62	(42%)	60	(50%)
Off-Road Vehicle:	4	(5%)	2	(1%)	0	(-)
Horses:	1	(1%)	2	(1%)	4	(3%)
Unknown:	14	(-)	31	(21%)	10	(8%)

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

Prepared by: Robert Tobey, Game Biologist II

APPENDIX III. Maximum number of calves and adults observed during aerial surveys of the Copper River bison herd.

Year	Total	Calves	Adults[a]
1950[b]	17	0	17
1961	29	--	--
1962	74	13	61
1963	No Data		
1964	97	17	80
1965	84	19	65
1966	79	7	72
1967	51	14	37
1968	102	19	83
1969	100	18	82
1970	119	21	98
1971	87	11	76
1972	82	12	70
1973	97	18	79
1974	111	14	97
1975	89	13	76[c]
1976	78	14	64
1977	90	18	72
1978	94	17	77

a. The adult category includes yearling and older bison.

b. The Copper River herd resulted from a transplant of 17 bison in the Nabesna Road vicinity during 1950. By 1961, they had become established in their present home range.

c. An additional group of about 20 adults was reported from a different location by another observer.

Prepared by Robert Tobey, Game Biologist II

BISON

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 19 - Farewell Herd

Seasons and Bag Limits

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

Population Status and Trend

An aerial survey of the Farewell Bison Herd was conducted on June 5, 1979. This count revealed that 94 adults and 29 calves were present on the South Fork of the Kuskokwim. This year's calf production established a record for the Farewell Herd. Increased production may be related to the excellent survival of young bison over the past 6 years.

Comparison of the 1978 and 1979 adult and yearling counts suggests that herd growth may be leveling off; however, unless a larger harvest is achieved in 1979, this year's calf crop may boost the number of overwintering bison to well over 100. This would not be desirable unless the surplus animals established themselves on other drainages, which is an unlikely occurrence.

A maximum of 80-90 overwintering bison is probably within the long-term capacity of the South Fork range. Herd management should be directed toward maintaining this balance.

Population Composition

Herd composition studies have not been conducted at Farewell. An aerial survey on June 5, 1979 provided a count of 123 bison, of which 29 were calves and 94 were yearlings or older.

Mortality

Hunting is the main mortality factor affecting the Farewell Herd. Other suspected, but unconfirmed, sources of mortality include drowning of calves, death by injury, and perhaps predation by bears or wolves.

The 1978 Farewell bison season opened August 10 and was to have closed October 10, but the season was extended until November 30 because too few bison were taken during the scheduled season. Thirty-three hunters spent an average of 4.9 days in the field and took nine bulls and four cows (one from the original transplant, number 7608-09) for a total of 13 animals.

Management Summary and Recommendations

The use of permit drawing hunts has failed to accomplish the management goal of herd reduction in the Farewell area. The reasons for these failures are many, but are largely related to the herd's inaccessibility. Continued harassment by aircraft also causes the bison to move off the river bars and into the woods where they are not vulnerable to hunting. A registration hunt over an extended hunt period of 6 months (October 1 through March 31) has been approved for 1979-80. The season will be closed when 30 bison have been taken. This option should allow the harvest to increase to the desired level.

PREPARED BY:

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SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

BISON

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 20A and 20D - Delta Junction

Seasons and Bag Limits

Sept. 11-Sept. 29 Oct. 2-Nov. 12	One bison by permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The fall 1978 (pre-hunt) population was 328 bison. The herd appeared to remain in good physical condition throughout winter 1978-79, but, despite good survival to yearling age, the spring 1979 population was lower than that of 1978. Sport hunting continued to be the main factor controlling the size of the Delta Herd.

Population Composition

Prior to the 1978 season, composition of the 328 bison comprising the Delta Herd was as follows: 50 calves:100 cows, 71 bulls:100 cows, and 50 yearlings:100 cows. Composition counts were conducted early in November 1978 following removal of 31 bulls and 20 cows by hunters. Two hundred and seventy-seven bison were classified, which accounted for approximately 95 percent of the estimated population. Herd composition of bison observed during these counts was as follows: 102 adult cows, 58 adult bulls (57 bulls:100 cows), 28 yearling bulls and 29 yearling cows (56 yearlings:100 cows), and 60 calves (59 calves:100 cows).

Mortality

From 3,555 applicants, 50 hunters were randomly selected for the Delta bison hunts. During the 1978 season 51 bison (31 bulls and 20 cows) were harvested (Table 1). Thirty-six bison (26 bulls and 10 cows) were taken during the accompanied hunt September 4 through September 29. One bull was wounded and lost during this hunt.

Table 1. Known mortality within the Delta bison herd, July 1978-June 1979.

	Bull			Cow			
		2-3			2-3		
	Yrlg	Yr-Old	Adult	Yrlg	Yr-Old	Adult	Total
Accompanied hunt	2	15	9	1	1	7	35
Unaccompanied hunt	1	1	3		1	9	15
Wounding loss						1	1
Other mortality			3			4	7
Total	3	16	15	1	2	21	58

The 15 hunters who drew permits for the unaccompanied hunt were divided into three groups of five hunters each, and each group had a 2-week period in which to take bison. Fifteen bison (5 bulls and 10 cows) were killed during the unaccompanied hunt October 2 through November 12. No wounding loss was reported during the unaccompanied hunt.

During 1978 the accompanied bison hunt opened a week earlier than planned. This technique aimed at reducing depredations on local farm crops was successful, although it may have made bison wary and more difficult to hunt. Eight of the 35 accompanied hunters required 2 days rather than 1 day to locate and kill a bison. The 1978 hunt was marked with conflicts involving certain landowners who either initially prevented hunting or restricted access after the hunt was in progress. The same landowners who prevented access to guided hunts allowed access to unaccompanied hunters. The ill feelings that resulted will probably continue and adversely affect future hunts where guiding by Department personnel is involved.

Known mortality (other than hunting) totaled seven bison (4 cows and 3 bulls). All of these were road kills with the exception of one bull that was illegally shot.

Management Summary and Recommendations

The Delta bison herd appeared in good physical condition during spring 1979 but numbers were lower than during spring 1978. It will be necessary to take 25 bison (15 bulls and 10 cows) during the 1979 season to maintain the stated management goal of 275 to 300 bison. To accomplish this harvest and to further the practice of unaccompanied hunting, the guided portion of the Delta hunt should be discontinued. The hunt should occur from mid-September through mid-November.

Bison harvests should be directed toward young bulls (2- to 3-year-olds) and a random selection of females.

Beginning in June and continuing through August a total of 1,500 pounds of salt was used to delay the movement of bison from bars along the Delta River to the Clearwater farming area. In past years bison had usually crossed the Delta River by the first week of August and arrived in the farming area during the peak of grain harvest. Since the salting program was initiated bison have generally remained away from the farming area until the last week of August. This program should continue in 1979.

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

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 7 and 15 - Kenai Peninsula Caribou Herds

Seasons and Bag Limits

Unit 7	Aug. 10-Oct. 31	One caribou by permit only. 100 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 15	No open season	

Harvest and Hunting Pressure

One hundred permit holders harvested 30 caribou in Unit 7 during the 1978 fall season. The harvest was comprised of 19 (63%) males and 11 (37%) females. Hunter success rate was 41 percent (Appendices I and III) with 27 percent of the permit holders not hunting.

Seventy-four percent of the 1978 harvest occurred from 10-31 August (Appendix II). Twenty-three percent of the harvest occurred during September and 3 percent (one caribou) during October.

Three hundred and fifty-four applications were received for the 100 permits in 1978.

Composition and Productivity

Funds were not available to conduct complete sex and age surveys in Unit 7 during 1978. Minimal data were collected and are shown in Table 1. Since surveys were not completed during spring 1978, only speculations can be made concerning the low percentage of calves observed during fall 1978. However, the percentage of calves in the herd during fall of 1974 compared to fall of 1978 suggests a possible decline in caribou productivity.

Fifty-nine of the caribou in Unit 15 were located during an aerial survey on 22 June 1979. This group of caribou was comprised of 15 (25.4%) calves, 15 (25.4%) recognizable bulls and 29 (49.2%) young bulls and cows. Since young bulls were classified with cows, a true calf:cow ratio could not be calculated. However, a minimum ratio of 52 calves:100 cows (15/29) existed, indicating high calf production.

Management Summary and Conclusion

The harvest of 30 caribou in Unit 7 during 1978 represents 14 percent of the pre-season survey count of 208 caribou, or 10 percent of the highest number observed (292) in 1974. However, a complete spring and fall census has never been conducted on this caribou herd to accurately estimate the total population.

Table 1. Spring and fall sex and age composition data for Caribou in Unit 7, 1974 and 1978.

Date	Total bulls per 100 cows	Yrlg. per 100 cows	Calves per 100 cows	Yrlg. % in herd	Calf % in herd	Cow % in herd	Bull % in herd	Sample size
11/19/74[1]	73.2	22.0	43.9	9.2% (18)	18.4% (36)	41.8% (82)	30.6% (60)	196
10/28/78[2]					14.6% (26)			178
6/22/79[2]					23.2% (29)			125

Remarks: [1] Survey conducted from helicopter.
[2] Survey conducted from PA-18 (Super Cub).

PREPARED BY: Ted H. Spraker, Game Biologist III

Data from Table 1 show that only 14.6 percent of the fall 1978 population was calves, indicating low fall calf recruitment. Considering the annual harvests by sport hunting, predation and natural mortality this recruitment rate is probably inadequate to allow the population to increase beyond its current level.

Recommendation

Reduce the number of permits issued in Unit 7 to 75 to maintain an annual harvest below 25 caribou.

Establish a permit drawing season in Unit 15.

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SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Caribou seasons, permits issued, harvest by sex and hunter success in Game Management Unit 7.

Year	Season	Permits issued	Harvest MM	Harvest FF	Total	Percent successful
1972-73	Aug. 10-Nov. 30	20	6	0	6	30
1973-74	Aug. 10-Nov. 30	100	10	1	11	11
1973-74	Jan. 1-Jan. 31	50	1	0	1	2
1973-74	Feb. 1-Feb. 28	50	0	0	0	0
1973-74	Mar. 1-Mar. 31	50	0	0	0	0
Total 73-74		250	11	1	12	5
1974-75	Aug. 10-Nov. 30					
	Jan. 1-Mar. 31	573[1]	30	14	44	8[2]
1975-76	Aug. 10-Nov. 30					
	Jan. 1-Mar. 31[3]	869[1]	38	49	87	10
1976-77	Aug. 10-Mar. 31[4]	457[1]	22	27	49	33[5]
1977	Aug. 10-Oct. 31	100	11	15	26	44[5]
1978	Aug. 10-Oct. 31	100	19	11	30	41

1 Unlimited permits.
2 Unknown number of hunters did not hunt.
3 Closed by emergency order 1/12/76.
4 Closed by emergency order 8/29.76.
5 Based on the number of hunters who actually hunted.

PREPARED BY: Ted H. Spraker, Game Biologist III

APPENDIX II. Caribou harvest chronology in Game Management Unit 7, 1977 and 1978.

Date	1977 M	1977 F	1977 Total	1977 Percent total	1978 M	1978 F	1978 Total	1978 Percent total
Aug. 10-20	9	10	19	73	7	1	8	27
Aug. 21-31	0	3	3	11	5	9	14	47
Sept. 1-10	0	1	1	4	3	1	4	13
Sept. 11-20	0	1	1	4	0	0	0	0
Sept. 21-30	2	0	2	8	3	0	3	10
Oct. 1-10	0	0	0	0	0	0	0	0
Oct. 11-20	0	0	0	0	0	0	0	0
Oct. 21-31	0	0	0	0	1	0	1	3

APPENDIX III. Caribou seasons and permit data, Game Management Unit 7.

Year	Season	Harvest	Permits issued	Hunted	Hunted successful	Did not hunt	Did not report	Percent successful
76-77[1]	Aug. 10-Mar. 31	49	457	149	29	287	21	33
1977	Aug. 10-Oct. 31	26	100	59	26	41	--	44
1978	Aug. 10-Oct. 31	30	100	73	30	27	--	41

1 Season closed on 8/29/76 by emergency order.

PREPARED BY: Ted H. Spraker, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 9 - Alaska Peninsula Herd

Seasons and Bag Limits

Units 9C, 9D (except Nagai Island) and 9E	Aug. 10-Mar. 31	Four antlered caribou, provided that not more than one caribou may be taken from Aug. 10-Oct. 31.
Unit 9D, Nagai Island	No open season	

Harvest and Hunting Pressure

Both hunting pressure and harvest declined during the 1977-78 season. An estimated 1,000 caribou were harvested during the August to October portion of the season. An extended period of storms from October through January virtually eliminated hunting during this period. Conditions improved during February and March, and an additional harvest of approximately 250 caribou was taken. Harvest estimates take into consideration that residents of remote areas show a low compliance with harvest reporting requirements.

The final 1978-79 harvest as determined from the harvest report summary shows 618 hunters harvested 663 caribou from the Alaska Peninsula caribou herd. Of these, 516 (78.3%) were males, 143 (21.6%) were females, and the remaining 4 (0.6%) were of unspecified sex.

Composition and Productivity

An attempt to photo-census post-calving aggregations was unsuccessful because they failed to occur.

Calving occurred throughout the Peninsula. Cows and newborn calves were observed in late May in every bay along the Pacific Coast from the southern boundary of Katmai National Monument to Cold Bay. Calving success, estimated during the pre-census reconnaissance flights, exceeded 60 calves: 100 cows. This is a higher level than observed in 1977, but approximately equal to the level estimated for 1976.

A ground composition survey was conducted in October of rutting groups found north of Becharof Lake. This survey revealed 48.3 bulls and 55.2 calves:100 cows.

Management Summary and Conclusions

The Alaska Peninsula caribou herd has experienced high calving success for the past 4 years. Summer mortality of calves, based on

spring calving estimates of 60 calves:100 cows and the fall composition survey showing 55 calves:100 cows, was believed low. There has been no appreciable change from the summer mortality rate of 4.5 calves:100 cows observed during the 1975 composition surveys. Yearlings in the herd were recorded at 17.4:100 cows during the fall 1978 composition survey, however, this figure may be low as some male yearlings may not have been included.

Restrictive seasons and weather have combined to maintain a light caribou harvest for the past 3 years; less than 1,500 caribou are harvested annually. The high reproductive success and low mortality indicates the herd is expanding. This is also supported by several other factors. The bull:cow ratio has increased from 33 bulls per:100 cows in 1975 to 48 in fall 1978. The frequency of mature trophy class bulls has also increased dramatically since 1975; at least 12 bulls harvested during fall 1978, probably met the minimum requirements for entry into the Boone and Crocket Trophy Records. Erratic movement patterns and timing, reported since 1976, continued during this reporting period. Observations of cows with newborn calves throughout the bays along the Pacific Coast could indicate abandonment of traditional calving areas and expansion into new range. Additionally, a large number of caribou are reported to have wintered south of Port Heiden in the vicinity of Sandy Lake. This is the first indication of large numbers of caribou wintering in this area may indicate the development of distinct subpopulations within the Alaska Peninsula caribou herd.

Recommendations

1. A photo-census with accompanying composition count is needed for all caribou ranging south of the Naknek River. This census is necessary to establish the present size of the Alaska Peninsula caribou herd, its composition and its reproductive rate.

2. No changes in seasons or bag limits are recommended.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 9A, 9B, 16, 17 and 19 - Mulchatna Caribou Herd

Seasons and Bag Limits

Aug. 10-Sept. 10	Two caribou, provided that not more than one may be taken per day, nor may more than one caribou be taken from Aug. 10-Sept. 10
Jan. 1-Feb. 28	

Harvest and Hunting Pressure

Hunting pressure and harvest on Mulchatna caribou remained light for the second consecutive year. The hunting season closure, 11 September through 31 December and the month of March, encouraged many hunters to seek alternate hunting areas. Returned harvest reports indicate that 292 hunters harvested 208 caribou from the Mulchatna caribou herd in 1978-79. One hundred and thirty-two were harvested in Unit 17, 17 were harvested in Unit 9 and the remaining 59 were harvested in Units 16 and 19. The harvest was 80.4 percent males, 19.5 percent females, and 0.5 percent sex unknown. The total estimated 1978-79 harvest was 500 caribou, the same as for 1977-78.

At the time the 1977-78 S&I report was submitted, the final harvest report data were not available. The final data showed 473 caribou were harvested from the Mulchatna caribou herd, 331 from Unit 17, 61 from Unit 9, 50 from Unit 19, and 31 from Unit 16.

Composition and Productivity

A photo-census of post-calving aggregations located near Telaquana, Snipe, Fish Trap and Caribou Lakes, was accomplished on 10 July 1978. Photographs showed 5,808 caribou, with an additional 532 visually counted, for a total of 6,340 caribou. A composition survey of 1,006 caribou on 18 July revealed 32.1 bulls and 49.5 calves:100 cows. The fall composition surveys revealed 50.3 bulls and 64.5 calves:100 cows, for a population estimate of 7,503 caribou.

At the time the photo-census was conducted no peripheral areas were surveyed for additional caribou. A check of some of these areas 3 days after the photo-census showed approximately 1,500 caribou located 10-15 miles west of the group photographed at Caribou Lake. It is not known if these animals were included in the photo-census, and because their status is questionable, they were not included in the population estimate. Thus, the above herd size is a conservative estimate.

Management Summary and Conclusions

Estimated harvests include animals believed taken by residents of villages located on the edge of the caribou range. These villagers have historically shown a reluctance to comply with the requirements of the harvest report system. Their success varies depending on winter travel conditions and the location of wintering caribou. In winter 1977-78 the caribou wintered in the more remote areas of their range and poor snow accumulations restricted overland access. The majority of the harvest was accomplished by non-local residents; the reported harvest was probably fairly complete. Winter 1978-79 afforded village residents a greater opportunity to harvest caribou. The herd's wanderings near several villages, plus improved snow conditions, provided an opportunity for increased harvest by local residents and a less accurate reported harvest.

The number of caribou located during photo-censusing has declined continuously over the past 4 years. In 1974, 13,079 caribou were located compared with 9,097 in 1976 and 6,340 in 1978. The cause, or causes, for this decline are speculative.

The decline is not believed to be related to either poor reproductive success or hunter harvest. Comparison surveys in 1974 and 1978 show relatively high calving success. Flights over portions of the caribou range during years between 1974 and 1978 revealed abundant numbers of calves. Accurate hunter harvest data are not available, but it has never been estimated to exceed 2,000 caribou in a year. The total harvest estimate for the last two seasons has been 500 caribou annually.

Emigration or poor census techniques are the most likely causes of the noted decline. The herd abandoned its traditional range in spring 1977, and did not return until late summer; where it spent the summer months is unknown. Some animals could have joined groups that the Mulchatna Herd contacted during its wanderings. Financial limitations have restricted the extent of reconnaisence surveys both prior to and during the last two photo-census efforts. Additional caribou probably could have been located if more extensive surveys could have been conducted.

Recommendations

A photo-census, with accompanying composition count, is needed on the Mulchatna caribou herd in 1979. The census would help establish the validity of the 1978 survey and determine the true herd size, composition, and reproductive status.

No change in seasons or bag limits is recommended.

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CARIBOU

SURVEY-INVENTORY PROGESS REPORT - 1978-79

Game Management Unit 10 - Unimak Island Herd

Seasons and Bag Limits

Aug. 10-Mar. 31 Four caribou

Harvest and Hunting Pressure

Unimak Island is part of the Aleutian Islands National Wildlife Refuge with access controlled by the U.S. Fish and Wildlife Service. Aircraft landings are restricted to established runways, water surfaces and beaches below mean high tide. Additionally, no mechanized equipment is authorized off the existing road system. Because of this limited access, hunting pressure and harvest are very light. Residents of Cold Bay and False Pass are believed responsible for the majority of the caribou harvest. Harvest tickets are not required for hunting caribou on Unimak Island. The harvest is estimated at less than 100 caribou.

Composition and Productivity

No data were available.

Management Summary and Conclusions

The limited access makes it extremely difficult and costly for all but local residents to hunt on the island. Because of the limited hunting pressure it is doubtful that hunting has any effect upon this caribou population.

Recommendations

No changes in season or bag limits are recommended.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 10 - Adak Island Herd

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Hunting on Adak Island is almost entirely the result of recreational efforts by military and civilian personnel stationed there. The management goal is to keep the herd at approximately 150 animals.

Seventy-four caribou were killed on Adak Island during the 1978-79 season (Appendix I).

During February and March, access to hunting areas was limited by inclement weather. During those months the US Naval tugboat used to transport caribou hunters was not in operation.

Composition and Productivity

On 19 October 1978, Mr. John Martin, USFWS Refuge Manager, conducted an aerial caribou survey on Adak Island. During that survey, 233 caribou were counted. Although most of the island was surveyed, there may have been additional caribou that were not observed during that flight.

Management Summary and Conclusions

Thirty caribou were harvested prior to, and 44 were harvested after the 10 October aerial survey. Subtracting 44 caribou would leave a minimum population of 189 caribou after the hunting season closed (31 March 1979). Since it is difficult to obtain a total caribou count on Adak Island, it is reasonable to assume that the post-season population was approximately 200 animals.

Recommendations

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

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

To maintain the Adak caribou population at the desired level, approximately 100 animals should be removed during the 1979-80 hunting season.

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APPENDIX I

Adak caribou herd, population and mortality 1962-1978

Year	Winter population	Natural mortality*	Hunting mortality*
1962	36	0	0
1963	43	0	0
1964**	65	1	4
1965**	87	8	2
1966**	106	3	18
1967**	126	1	24
1968**	163	3	55
1969**	167	0	51
1970**	214	0	53
1971**	230	3	45
1972**	347	1	98
1973**	230 (est. post hunting pop.)	0	108
1974**	264 (est. post hunting pop.)	0	93
1975**	270 (est. post hunting pop.)	0	104
1976**	250 (est. post hunting pop.)	0	106
1977**	200 (est. post hunting pop.)	0	67
1978**	200 (est. pop.) hunting pop.)	0	74

* Essentially, all natural mortality was due to entanglement in wire prior to 1969.

** Allowable harvest: 1964 - 10; 1965 - 30; 1967 - 50; 1968 - 50; 1969 - 50; 1970 - 50; 1971 - 50 plus 20 more; 1972 - 50 plus 97 more; 1973 - 140; 1974 - 70 plus 48 more; 1975 - 90 plus 47 more; 1976 - 100 plus 40 more; 1977 - 150; 1978 - 100.

PREPARED BY: Jerome J. Sexton, Game Biologist II

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 11 - Mentasta Caribou Herd

Seasons and Bag Limits

Aug. 10-Sept. 30	One caribou by permit only. 350 permits will be issued.

Seasons and bag limits from 1968 through 1978 are shown in Appendix I. Earlier seasons and bag limits for the Mentasta Herd corresponded with those for the Nelchina caribou herd (see report for Game Management Unit 13, Appendix I). The 1978-79 season in Unit 11 was 20 days longer than in Unit 13 (20 August through 20 September).

Harvest and Hunting Pressure

The 1978 hunting season for the Mentasta caribou herd was by permit only. A total of 363 permit applications were received and 350 permits issued, 200 more than in 1977. The reported harvest was 149 caribou (Appendix I). With an estimated herd size of 2,239 caribou, a harvest of 149 animals represents 6.6 percent of the population. In the past, hunters have selectively harvested bulls and continue to do so under permits. Seventy-six percent of the 1978-79 harvest was bulls.

Appendix II shows that successful caribou hunters used aircraft more than any other method of transportation.

Herd Size, Composition and Productivity

A photo-census of the Mentasta herd in post-calving aggregations was obtained on 8 July 1978. A total count of 1,765 adults and 513 calves was obtained. Calves constituted 22.5 percent of the herd, a 20 percent increase over 1977.

Seasonal Movements

The Mentasta caribou herd utilized the area around Suslota Lake to the Nabesna Road in the foothills of the Mentasta Mountains during winter 1977-78. A large concentration estimated at 5,000 to 6,000 caribou was located from the Copper River to Boulder Creek. A majority of these caribou were believed to be part of the Nelchina herd wintering in Unit 11 (because numerous trails lead from Unit 13C in the Chistochina, Indian River area). Beginning in late March, Mentasta caribou could be found moving west to their calving grounds while Nelchina caribou moved down Boulder Creek and out of Unit 11. During 1978 the majority of the Mentasta herd calved on the western slopes of Mt. Sanford, north of the Sanford River. A few cows with calves were noted in the Drop Creek area, the previous traditional calving area.

Post-calving aggregations of cows, calves, and small bulls were located between Boulder Creek and the Sanford River during June. Caribou remained scattered from the Cheshnina River to the Sanford River during July and August.

Caribou concentrated for the fall breeding pause in the higher elevations along the north bank of the Sanford River. Following the breeding pause until January 1979, most of the Mentasta caribou were again found in the foothills of the Mentasta Mountains.

Management Summary and Conclusions

Population estimates for the Mentasta caribou herd have remained quite stable over a long period. Harvests have been relatively low and comprised primarily of mature bulls. Increased competition for winter range with a large number of animals from the Nelchina caribou herd has become more significant each year. Competition for winter range could be a contributing factor to population stabilization.

Recommendations

1. The Mentasta caribou herd should continue to be hunted by permit only.

2. Season length and bag limit should remain the same.

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APPENDIX I

Mentasta caribou herd seasons, bag limits, harvests, sex composition of the harvests, and abundance estimates, 1968-69 through 1978.

Year	Season	Bag Limit	Harvest		Males Reported in Harvest, Number (%)[b.]	Estimated Total Adult Caribou Population[c.]
			Known	Estimated[a.]		
1968-69	Aug. 10 - Mar. 31	3 Caribou	304	---	122 (74%)	----
1969-70	Aug. 10 - Mar. 31	3 Caribou	288	414	203 (71%)	1,892
1970-71	Aug. 10 - Sept. 30 Nov. 1 - Mar. 31	3 Caribou	846	1,317	519 (62%)	2,047
1971-72	Aug. 10 - Mar. 31	3 Caribou	1,693	2,006	742 (45%)	----
1972	Aug. 10 - Sept. 21	1 Caribou	89	---	60 (69%)	----
1973	Aug. 10 - Sept. 30	1 Caribou	81	99	65 (82%)	2,202
1974	Aug. 10 - Sept. 30	1 Caribou	90	105	66 (76%)	----
1975	Aug. 10 - Sept. 30	1 Caribou	143	162	101 (72%)	1,978
1976	Aug. 10 - Sept. 30	1 Caribou	236	250	175 (76%)	1,226
1977	Aug. 10 - Sept. 30	1 Caribou	52	---	39 (75%)	1,855
1978	Aug. 10 - Sept. 30	1 Caribou	149	---	111 (76%)	1,899

a. Estimated harvests were based on extrapolation formulas.

b. Male percentage in the harvest during 1968-69 was based on a sample size of 164. Percentages are based only on reports where sex of kill was specified.

c. Skoog tallied 2,305 caribou in the Mentasta herd during February 1962 (Bos, 1974). Maximum total estimates made during post calving aggregations of subsequent years are listed. Abundance estimates during 1970 and 1971 were accumulated estimates of group sizes made from a fixed wing aircraft. The 1973 value of 2,202 was corrected census estimate obtained from direct summer counts corrected for fall composition values. The 1975, 1976 and 1977 values were photocensus counts of all adults found during June.

PREPARED BY: Robert Tobey, Game Biologist II

APPENDIX II. A comparison of percentage of resident hunters, hunter success and transportation means for the Mentasta caribou head, 1960-70 through 1978.

Year	Number (%)[a]	Number (%) 0	1	2+	Average Kill Per Hunter	Successful Hunters, Percent[b] A	H	B	S	O	F	Sample
1969-70	114 (68%)	102 (35%)	122 (42%)	67 (23%)	0.99	----------Not Available-------						
1970-71	389 (85%)	118 (19%)	250 (41%)	241 (40%)	1.39	----------Not Available-------						
1971-72	827 (89%)	457 (32%)	474 (33%)	492 (35%)	1.19	----------Not Available-------						
1972	50 (69%)	342 (82%)	63 (15%)	11 (3%)	0.22	31%	7%	2%	17%	25%	18%	84
1973	53 (66%)	172 (68%)	81 (32%)	-- --	0.32	75%	12%	--	--	5%	7%	73
1974	51 (59%)	107 (54%)	90 (46%)	-- --	0.46	64%	18%	1%	--	10%	7%	84
1975	83 (61%)	110 (43%)	143 (57%)	-- --	0.57	80%	10%	2%	--	6%	2%	133
1976	167 (72%)	186 (44%)	236 (56%)	-- --	0.56	63%	8%	4%	--	11%	17%	230
1977		41 (44%)	52 (56%)	-- --	0.56	71.2%	7.7%	--	--	15.4%	1.9%	52
1978		68 (31%)	149 (69%)	-- --	0.69	68.9%	2.7%	--	--	18.9%	8.1%	149

a. Percentage calculated by: (residents/residents & nonresidents) x 100.

b. Symbols for transportation means: A = airplane, H = horse, B boat, S = snowmachine, O = off-road vehicles (including trail bikes) and F = afoot and/or highway vehicle, Sample = sample size. Because some hunters do not report the type of transportation used and other hunters report several types, the sample size does not represent all hunters, but this data is useful for trend comparisons.

PREPARED BY: Robert Tobey, Game Biologist II

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 12 - Chisana Herd

Seasons and Bag Limits

Sept. 1-Sept. 15 — One caribou

Population Status and Trend

The Chisana Herd probably contained less than 1,000 caribou, and calf survival during this reporting period was lower than in the past. Available data are insufficient to detect any population trend.

Population Composition

Results of a sex and age composition survey (ground count) are summarized in Table 1.

Table 1. Results of a composition survey of the Chisana Caribou Herd, Beaver Lake vicinity, Nutzotin Mountains, October 1978.

Bulls: 100 Cows	Yrlgs: 100 Cows	Calves: 100 Cows	Percent Yrlgs in Sample	Percent Calves in Sample	Percent Cows in Sample	Percent Bulls in Sample	Sample Size
33.9	9.7	17.7	6	11	62	21	100

Yearling survival to 17 months and calf survival to 5 months were lower than during 1977 when 11 yearlings:100 cows and 44 calves:100 cows were observed. The bull/cow ratio was lower than the 41:100 observed during 1977.

The percentage of calves observed during October 1978 was the same as June 1978.

Mortality

Wolves and grizzly bears are common within the range of the Chisana Herd, but little is known about the effects of predation on this herd.

The 1978 reported harvest consisted of 24 bulls (68%), 9 cows (26%), and 2 (6%) of unknown gender. The harvest was distributed nearly equally between residents (53%) and nonresidents (47%). Overall hunter success was 84 percent with only seven hunters failing to take a caribou. The 1978 harvest was lower than the 1977 harvest (48 caribou) because of reduced hunting pressure.

Management Summary and Recommendations

Reduced calf production and/or survival during 1978 resulted in a reduction of the bag limit to one bull for the 1979 season. A portion of the Chisana Herd ranges outside the boundary of the newly established Wrangell-St. Elias National Monument. Nevertheless, hunting pressure exerted on the herd should decrease as a result of aircraft restrictions pertaining to the Monument. If the area is designated as a National Park Preserve, aircraft access to the herd may be allowed. Therefore, fall composition counts should be continued as time and money permit.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 13 and 14 except 14C - Nelchina Caribou Herd

Seasons and Bag Limits

Sept. 1-Sept. 20	One caribou by permit only. 1000 permits will be issued.

Harvest and Hunting Pressure

During 1978, 1,000 hunters received permits to hunt caribou. A total of 747 permittees reported hunting and 539 caribou were reported killed. A total of 2,775 caribou permit applications were received. Appendix I shows harvests and hunting pressures since 1972.

Composition and Productivity

Sex and age composition counts were conducted in July and October 1978. During these counts, 50 and 48 calves:100 cows, respectively, were recorded. Appendix II shows the results of caribou sex and age composition surveys since 1972.

Seasonal Movements

Caribou calved in the traditional calving areas in and around the Kosina Creek Valley and spent the remainder of the year in the Talkeetna Mountains. Most caribou summered south of the Susitna River as in the previous year.

In early fall, caribou moved through the Lake Louise flats and into the Alphabet Hills. During mid-October, caribou left the Alphabet Hills, and spent the majority of the rutting period on the Lake Louise flats east of Lake Louise. By early November, approximately half of the Nelchina herd had moved eastward, across the Trans-Alaska Pipeline, Richardson Highway and Copper River into the Wrangell Mountains where they remained throughout the winter.

Other caribou remained in the Lake Louise flats, wintering as far south as the Tazlina and Nelchina Rivers and along the Lake Louise Road. Migrations from the wintering areas occurred in mid-May, somewhat later than in other recent years, possibly because of deep snow which persisted until that time.

Small bands of caribou were observed throughout the year in the Talkeetna River, Chunilna Hills, the Alaska Range, and in the Watana Creek Hills. These bands did not use the Kosina Creek area as a calving ground.

Population Estimate

Population estimates for the Nelchina herd were obtained using the photoextrapolation - direct count technique. A total of 16,800 caribou were observed in early July during the post-calving census. October sex and age composition surveys revealed additional bulls in the population. After the cow base was adjusted for hunter harvest and October composition data were applied to the cow base, a 1978 population estimate of 18,981 was obtained.

Management Summary and Conclusions

Higher census figures and good calf production in the Nelchina caribou population reveal that this herd continues to increase. The extrapolated 1978 figures, however, may be slightly misleading in that the bull:cow ratio obtained during the composition count was considerably higher than in previous years. If this ratio was in error, the population may be smaller than the extrapolated figures indicate. Even so, the observed numbers of caribou indicate an apparently increasing population.

Recommendations

1. Increase the number of permits to allow a 5 percent harvest of adult caribou.

2. Continue to monitor populations and harvest levels.

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NELCHINA HERD

Appendix I. Reported Unit 13 caribou harvest by sex, residency of hunter, success ratios, and total extrapolated harvest, 1972-1978.

Year	Total reported harvest	Total extr. harvest	Number reported hunters	Success ratio	Number males	(Percent)	Number females	(Percent)	Resident harvest No.	Resident harvest %	Nonresident harvest No.	Nonresident harvest %
1972	555	N/A	1,586	34%	388	(72%)	153	(28%)	301	(56%)	237	(44%)
1973	629	810	1,982	32%	411	(67%)	203	(33%)	401	(68%)	187	(32%)
1974	1,036	1,192	2,550	41%	656	(66%)	343	(34%)	820	(82%)	181	(18%)
1975	669	806	1,991	34%	441	(69%)	201	(31%)	515	(80%)	126	(20%)
1976	776	822	1,807	43%	560	(74%)	201	(26%)	642	(85%)	117	(15%)
1977	360	--	580	62%	275	(78%)	77	(22%)	--	--	--	--
1978	539	--	747	72%	416	(79%)	111	(21%)	510	(95%)	25	(4%)

PREPARED BY: Sterling Eide, Game Biologist III

NELCHINA HERD

Appendix II. Survival of calves from birth to following year. Sex and age composition data, 1972-1978, Nelchina caribou.

*Birth year	Summer Calves/100 females	(%)	Fall Calves/100 females	(%)	Fall Bulls/100 females	(%)	Spring Calves/100 females	(%)
1972	38	(23%)	30	(18%)	34	(21%)	25	(17%)
1973	53	(30%)	38	(23%)	27	(16%)	42	(17%)
1974	34	(23%)	--	--	--	--	34	(21%)
1975	44	(31%)	--	--	--	--	31	(21%)
1976	47	(27%)	29	(18%)	33	(21%)	30	(21%)
1977	60	(32%)	47	(26%)	38	(21%)	52	(28%)
1978	50	(30%)	48	(25%)	45	(23%)	--	--

* Spring sex and age composition counts are completed on subsewuent calendar year.

Appendix III. Nelchina herd population estimates, 1972-1978.

Year	No. caribou in post-calving census	Post-calving cow base	No. females in harvest**	No. females after harvest	No. calves	No. bulls	Fall population estimate
1972	8.342	4,955*	155	4,800	1,420	1,622	7,842
1973	8,757	4,913	267	4,646	1,779	1,268	7,693
1974	10,245	--	405	--	--	--	--
1975	--	--	250	--	--	--	--
1976	8,832	5,193	214	4,979	1,439	1,663	8,081
1977	14,000	7,588	79	7,509	3,559	2,868	13,936
1978	16,800	9,979	113	9,866	4,686	4,429	18,981

* October 1972 cow base recalculated from 1973 Nelchina caribou report (8,342 x 59.4% cows = 4,955).

** Number females in harvest is calculated by percent females reported x extrapolated harvest.

PREPARED BY: Sterling Eide, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 13 and 20C - McKinley Herd

Seasons and Bag Limits

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

Population Status and Trend

In cooperation with the Department, Will Troyer, National Park Service (NPS) biologist, initiated a movement and population study of the McKinley Caribou Herd in 1976. Since then all population data have been obtained by the NPS. There is some indication that after the protracted decline of the herd, it has stabilized at a very low level of about 1,000 animals. Troyer (1977, 1978, 1979) estimated that the herd numbered 900-1,200 in 1976, 900-1,200 in 1977, and 1,200-1,500 in 1978. The apparent increase in 1978 was related to good calf survival. Therefore, the reproductive portion of the herd has not increased significantly, and real population growth will depend on recruitment to the reproductive cohorts.

Population Composition

All composition surveys in 1978 were done by the NPS or University of Alaska graduate student Rodney Boerdje (Troyer 1979). A survey following the peak of calving in late May 1978 revealed 48 calves:100 females (yearlings and older). Subsequent surveys in early June indicated minimal calf loss had occurred, as 41 calves:100 females (yearling and older) were observed. Composition surveys in July and August were more refined, as attempts were made to classify yearlings. Calf survival was relatively high (43 calves:100 cows), although recruitment, as judged by yearlings present, was low (12 yearlings:100 cows).

Surveys conducted in November 1978 on a small sample (257 caribou) indicated a high level of calf survival to 6 months of age (39 calves:100 cows), while only 8 yearlings:100 females were observed.

Mortality

Observations of non-hunting mortality were made incidental to composition surveys and from monitoring radio-collared animals. Although

grizzly bears, wolves, and eagles are numerous within the range of the McKinley Herd, Park Service personnel observed only one calf loss to predation. Eight radio-collared cows were monitored during the calving period; two either did not produce viable calves, or lost them immediately after calving. The remaining six had viable calves. However, by September four of these had lost their calves. Although meaningful conclusions cannot be drawn from this small sample, it appears that calf mortality associated with marked animals or the animals classified during the composition counts may not be representative of the population. Adult mortality since July 1976 appears to be minimal, based upon the results of monitoring radio-collared animals. Although the small sample (28 animals collared over a 3-year period) may not represent the adult segment of the population, 64 percent of the animals were alive as of December 1978, 29 percent shed collars or died as a result of handling, and 7 percent could not be located.

Management Summary and Recommendations

Reasons for the poor recruitment of calves from 1974 through 1977 and the slight improvement in 1978, at least through fall, remain obscure. A movement study of 28 radio-collared caribou provided little insight into the poor productivity of the herd. Likewise, little has been learned regarding mortality factors.

Federal land withdrawals involving additions to McKinley Park will afford further habitat protection to this herd. However, impacts from past development have been minimal and probably have not been a major factor in the herd's decline. Predation is likely retarding growth of the herd, so enhanced habitat protection will be of little short-term aid. Since goals for this herd include a substantial population increase, additional habitat protection will be beneficial in the long run. It is doubtful the former herd size of 20,000 to 30,000 will be attained in the near future.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 18 - Andreafsky and Kiseralik Lake Herds

Seasons and Bag Limits

Feb. 1-Mar. 31 — One Caribou

Population Status, Trend, and Composition

Andreafsky Herd - No surveys have been conducted in this area by the Department, however, reports from local residents and charter pilots provide some indication of the herd's size and seasonal distributions. A herd composed of 200-300 animals has been observed between the north fork and east fork of the Andreafsky River near Needle Mountain during June, July, and August. Herds have been observed on the west side of the north fork of the Andreafsky River during the winter. It is generally felt that this herd contains less than 500 animals.

Kiseralik Lake Herd - The Kiseralik Lake herd is probably an extension of Unit 17's herd traveling thru numerous passes between Aniak Lake pass and the Kiseralik and Kagati Lakes area. Surveys have not been flown in the area by Department personnel, however, several pilots reported trails all through these passes during March without sighting any animals. Local residents report that this herd has grown steadily for the last 4 or 5 years and they felt it had reached around 100-200 animals during winter 1978-79. A portion of the herd was sighted above the Security Cove area about 5 June when 32 caribou were seen.

Mortality

Andreafsky Herd - A harvest ticket is not required for caribou in Unit 18 so it is difficult to assess hunting pressure. An estimated 90 caribou were harvested during the 1979 spring season in the Andreafsky drainage. This estimate is based on reports from local hunters indicating that 30 animals were taken by Mt. Village and Marshall, respectively, and approximately another 30 animals were harvested by hunters from the remaining four lower Yukon villages: Pitka's Point, Pilot Station, St. Mary's, and Russian Mission.

On the basis of information provided by residents of St. Mary's, it is felt that the recent take of caribou from this area is greater than the long-term average. Although this year was the first legal winter season, lower Yukon residents have been hunting by snow machine in this area for several years. The extent of their efforts appears to be a function of weather, snow conditions, and the degree of success they had moose hunting in the fall. During the last 2 years the area has been characterized by relatively warm temperatures; perfect for traveling and hunting by snow machine.

Kiseralik Lake Herd - Traveling conditions were also excellent south of the Kuskokwim River this past winter. This, coupled with the new winter season, encouraged a great deal of hunting pressure in this area by local residents. The villages of Eek, Quinhagak, and Kwethluk heavily used the area with one hunter in Eek boasting that he took 20 caribou. An estimated 75 caribou were harvested during the February - March season. Very few animals have been observed using the area this summer, however, the status of the herd may best be evaluated this coming winter.

Management Summary and Conclusion

Hunting pressure on these herds is almost entirely from Unit 18 residents. Local residents traveling by snow machines have easy access to these herds during spring, which may prove detrimental to the Kiseralik herd in particular. Shortening the spring season in this area may be appropriate.

With increasing interest in these herds, annual spring surveys should be conducted to evaluate their status.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 19 and 21 - Including the Mulchatna Herd, the Beaver Mountains Herd, and other groups found in the Kuskokwim Mountains and the north slope of the Alaska Range

Seasons and Bag Limits

Units 19A and 19B	Aug. 10-Mar. 31	Two caribou, provided that not more than one may be taken per day, nor may more than one caribou be taken from Aug. 10-Oct. 31.
Unit 19C	Aug. 10-Oct. 31	One caribou
Unit 19D and 21	Aug. 10-Sept. 30	One caribou

Population Status and Trend

During the last 5 years, caribou numbers in all portions of Units 19 and 21 have remained unchanged, with the exception of the Beaver Mountains Herd. This herd was estimated at 1,000 animals which suggests a significant decline from the 1974 estimate of 2,000.

The range of the Mulchatna Herd appears to be changing. During the past few years caribou, presumed to be from this herd, have become more common in eastern Unit 18 and western portions of Subunit 19A.

Population Composition

On October 27-28, 1978, Region II personnel conducted a sex and age composition survey of Mulchatna Herd caribou in Subunit 19B. Results were presented in the 1977-78 Survey and Inventory Report. These data suggest that the herd is presently productive and healthy.

In contrast, occasional observations such as those made of the Beaver Mountains Herd in May and June 1978 indicated poor initial calf production and/or subsequent survival. In most herds where better data are available, initial production has been good but survival poor. During the June 1978 aerial count, only 24 calves were seen in a group totaling over 600 animals. Calves composed only 11 percent of the herd during early summer 1979.

Calves comprised 17 percent of the caribou seen during an aerial count of caribou in the Cloudy-Sunshine Mountains Herd in late October 1978. This is the best summer through fall calf survival recorded for this group during the past 6 years.

No composition data were available for the groups occurring on the north slope of the Alaska Range or the Kuskokwim Mountains.

Mortality

Hunters reported harvesting 79 caribou (71 bulls and 8 cows) in Subunits 19A and 19B. These are assumed to be from the Mulchatna Herd. This harvest is slightly larger than the 1977-78 harvest, but is probably smaller than harvests in the early 1970's. The reported caribou harvest from the Alaska Range area (91 bulls and 7 cows) suggests a larger kill than in 1977-78, but may merely represent better compliance with reporting requirements. Hunters took six caribou from the Beaver Mountains Herd and one caribou from the Cloudy-Sunshine Mountains group. The total reported harvest for Unit 19 was 171 caribou. Residents of villages along the Kuskokwim River possibly took 30 to 40 additional caribou.

Management Summary and Recommendations

Caribou harvests in Units 19 and 21 continued to be low. Moreover, a trend toward selecting bulls was evident from harvest data. This suggests that most hunters were either looking for larger meat animals or trophies. Consequently, caribou are only lightly impacted at present by hunting in Units 19 and 21. Further restrictions in season lengths and bag limits will be necessary only if recruitment declines, if harvests increase substantially, or if declines in some of the smaller isolated groups continue.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 20 - Fortymile Herd

Seasons and Bag Limits

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

Population Status and Trend

In the 1950's the Fortymile Caribou Herd was estimated at 50,000 animals. Although some biologists have questioned this estimate, the techniques and assumptions used appear in Davis et al. (1978), citing Skoog (1956). The most recent photo-census of the herd was conducted in 1975, and produced a minimum population estimate of 4,000 (range 4,000-6,000). Since 1975, recruitment has been low and was probably exceeded annually by mortality. This has resulted in a slow, steady decline in numbers from 1975 to the present.

Population Composition

A post-parturition survey was conducted on June 14, 1978 from a Helio Courier 250 aircraft. Of about 2,000 caribou observed in the vicinity of the forks of the Charley River, 479 were classified. The sample contained 35 calves:100 cows (26% calves). If these data are representative of the herd, initial calf survival was fair.

Fall sex and age composition surveys were conducted near Sixtymile Butte and Mt. Fairplay on October 19 and 20. Survey conditions were fair on the 19th and good on the 20th. The following data were obtained from a sample of 748 caribou:

Bulls: 100 Cows	Yrlgs: 100 Cows	Calves: 100 Cows	Yrlg Percent in Sample	Calf Percent in Sample	Cow Percent in Sample	Bull Percent in Sample
39	14	26	7.8	14.6	56.0	21.6

Calf and long yearling survival were only fair; calf survival was considerably below the previous year's figure of 45:100 cows. If these figures accurately represent herd composition, it must be concluded that the population continued to decline.

On June 8, 1979 a post-parturition survey was conducted in the Charley River drainage from a PA-18 aircraft. In four groups that were small enough to be accurately counted, 70 calves:100 older caribou were counted (n=168). An additional group of approximately 250 caribou older than calves was estimated to contain about 90 calves:100 older caribou. If these data are representative of the entire herd, production and initial survival during 1979 were excellent.

Mortality

According to harvest ticket returns, 16 caribou (10 males and 6 females) were harvested during the September 1-15 hunting season. An equal number was likely taken by Taylor Highway area residents but not reported. Most of the reported harvest occurred away from the road system.

Residents accounted for the entire harvest. A total of 60 individuals reported hunting caribou from the Fortymile Herd, however, this figure is probably very conservative.

Other sources of mortality were unidentified or are poorly understood. Predation by wolves and grizzly bears is believed primarily responsible for the continued low survival rate of calves. At times, poaching may also represent a significant mortality source.

Management Summary and Recommendations

The Fortymile caribou population is low and probably declining. Despite good calf survival from birth through October 1977, subsequent survival to yearling age class was low, resulting in no increase to the herd. Recent studies suggest that a natural mortality rate of 7 to 13 percent can be expected in herds with predator densities comparable to those in the range of the Fortymile Herd (Bergerud 1978).

Casual observations suggest that the range is in good condition and is unlikely to be limiting herd size at present. Predation by wolves and grizzly bears is the probable cause of continued low recruitment into the reproductive age classes. Until a significant predator control program is initiated, it is unlikely that the Fortymile Herd will increase. As evidenced by the population trends of other small herds, such as the Delta and McKinley Herds, a hunting closure without a predator control program will probably not result in a population increase.

Literature Cited

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 20A and part of 20C - Delta Herd

Seasons and Bag Limits

No open season (closure of the Delta Herd to sport hunting, effective July 9, 1974, continued through the 1978-79 season).

Population Status and Trend

Recruitment within the Delta Caribou Herd was consistently low during the period 1972-78. As a result, the herd declined to approximately 2,000 animals. During this reporting period the downward trend was reversed as a result of increased calf survival. A photo-census was conducted in 1979, but results are not yet available.

Population Composition

Ground composition counts of 725 caribou were conducted on October 26, 1978. Results of this classification indicated relatively good survival to 5 months of age (39 calves:100 cows). Previously, a mid-June survey had revealed only 24 calves:100 cows. Variations in the age and sex composition of caribou aggregations surveyed, and possibly errors in classification, may have produced this discrepancy. Fall bull/cow ratios (75:100) showed a substantial increase from 1977 when 33 bulls:100 cows were observed, which further complicated data interpretation. Yearling recruitment remained poor, as percent long yearlings in the herd and long yearlings:100 cows were 5 and 10, respectively, in fall 1978.

In 1979 most calving occurred in the vicinity of Delta Creek, although calving was noted over a large area between Dry Creek and the Little Delta River. Counts conducted immediately following the peak of calving indicated excellent initial production and survival (63 calves:100 animals older than calves).

By mid-June most of the calving segment (1,200-1,400 animals) had coalesced and was located at the headwaters of Newman Creek. Composition surveys conducted on June 23, 1979 revealed good calf survival (45 calves:100 cows) and improved yearling recruitment (18 yearlings:100 cows). Of 738 caribou classified, there were 49 bulls, 424 cows, 189 calves, and 76 yearlings. Cows were classified as to the presence or absence of distended udders. This provided an index to initial production and calf survival to 4 weeks following birth. One hundred and ninety-one cows (45% of the adult females classified) had distended udders, and 189 cows were accompanied by calves. Since distended udders should be observable for about 2 weeks after the last nursing, calf loss immedi-

ately prior to the survey was judged to be low. However, these data greatly underestimated initial calf production because observations on the calving ground in late May revealed that 98 percent of the adult females had distended udders in contrast to the 45 percent in this survey.

Mortality

Radio collars were placed on 25 caribou calves in January 1979 (several more were collared in March) to document mortality within this age class. As of June 30, 1979, predation by wolves is suspected in the loss of two calves, and the status of seven calves remains unknown. The relatively low incidence of overwinter loss of collared calves substantiates the improved survival noted during June surveys. Reduced wolf density as a result of the Department's rehabilitation program undoubtedly lessened mortality from predation. Limited observations by biologists who spent 4 days on the calving ground in late May indicated that predation was responsible for some loss of newborn calves. The biologists found evidence of six calves wholly or partially consumed by predators. Eagles were judged to have eaten four calves (two of these were undoubtedly killed by eagles, one was probably killed by eagles, and one had been dead too long for examination to be diagnostic). Wolves killed one of the six calves and consumed another for which the cause of death could not be determined. Although only one grizzly bear was seen by the ground crew, grizzlies are frequently observed from the air in the vicinity of calving caribou. Their contribution to adult and calf mortality is unknown.

Management Summary and Recommendations

Chronic (and acute) recruitment failures which occurred annually since 1971 have been offset by good initial production and yearling survival during this reporting period. The rate of recruitment has finally exceeded natural losses, and the herd has increased to about 2,000 animals. The Department's removal of 151 wolves over a 4-year period may have substantially reduced the major impediment to population growth.

The Department's long-term management goal for this herd is to restore it to its former level of approximately 5,000 caribou. Maintaining low predator densities through aerial hunting of wolves and liberal hunting seasons for grizzly bears will contribute toward achievement of this goal. Hunting female caribou in this herd should not occur until the goal is achieved, or it can be demonstrated that the cannot be restored and maintained at a higher level. However, since the bull/cow ratio exceeds that necessary to insure conception and there is an outlook for continued herd growth, a limited harvest of bulls may be justified. A portion of the older age segment of the population could be harvested without reducing the herd's reproductive potential.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 20D - Macomb Herd

Seasons and Bag Limits

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

Population Status and Trend

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

Population Composition

A fixed-wing aircraft was used on October 26 and November 14 to classify 234 caribou from the air. Of these, 28 (12%) were calves. A similar sample from 1977 contained 17 percent calves, which suggests reduced calf production and/or survival. Due to budget constraints, no attempt to determine yearling recruitment was made in 1978.

Mortality

Implementation of a bulls-only permit system in 1978 resulted in a harvest of 16 bulls. This was an 83 percent reduction in harvest from that reported for 1977 when either sex could be taken and permits were not required. Of the 70 hunters drawing permits to hunt caribou in Unit 20D in 1978, 22 (31%) did not hunt. The 16 successful hunters constituted 23 percent of those issued permits and 34 percent of those who actually hunted. Twenty-four hunters failed to voluntarily check out, but were later contacted to obtain harvest data.

Since this was the first year for the bulls-only permit system, considerable field effort was expended to monitor the hunt. Hunters were observed to pass up small bulls where sex identification was difficult and to avoid shooting into concentrations of caribou. No instances of shooting female caribou by mistake were noted. These findings suggest that the bulls-only Macomb Herd hunt was successful, and that this system may be a workable management technique for other caribou herds.

Management Summary and Recommendations

Long-term management recommendations for the Macomb Caribou Herd include maintaining a low harvest until production and survival show a marked increase. It appears that the bulls-only permit system is an excellent means to achieve this and yet allow some hunting.

Wolf predation is suspected to be the main cause of the persistently low recruitment to the Macomb Herd, as well as to the local moose population. Proposals to initiate wolf control in the area should be continued.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Units 22, 23, 24, 26 - Western Arctic Herd (WAH)

Season and Bag Limit

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

Population Status and Trend

The most recent and detailed survey of the WAH was conducted in July 1978 (Davis et al. 1979) and employed the aerial photo-direct count extrapolation technique. A population of 106,635 caribou was estimated. In conjunction with that survey, a less detailed survey consisting of a visual census of cows on the calving grounds indicated an estimated population of 93,800.

Due to severe budget restrictions in FY 80, a photo-census was not conducted in 1979. However, a considerably less expensive and less precise calving grounds visual census (Table 1) was accomplished in June 1979 which revealed an estimated population of 116,000 caribou. Comparisons of this survey with the 1978 visual survey should be done with great caution. Unlike the June 1979 census, the July 1978 census was of the post-calving aggregation, which is composed of slightly different percentages of sex and age groups than are present in the calving aggregation.

Counts of adult caribou on the calving grounds during aerial surveys were made on June 14 and 15. Composition counts of these caribou from the ground were conducted from June 9 to 17. Survey conditions were considered good. Using the data obtained by the combined ground and aerial surveys, the following estimates of the herd's composition were obtained:

Table 1. Results of composition surveys of the Western Arctic Herd, June 9-17, 1979.

Date/ Location	Total Bulls /100 cows	Yrlgs per 100 cows	Calves per 100 cows	Yrlg % in herd	(Total yrlg)	Calf % in herd	(Total calves)	Cow % in herd	(Total cows)	Bull % in herd	(Total bulls)	Sample Size
Aerial Surveys												
6/14/79[1/]	-	-	84.5	-	-	44.0	(9,101)	52.0	(10,770)	-	-	20,694
6/14/79[2/]	-	-	84.5	-	-	44.0	(8,216)	52.0	(9,723)	-	-	18,683
6/15/79[3/]	-	-	39.6	-	-	21.7	(3,937)	54.9	(9,941)	-	-	18,121
6/15/79[4/]	-	-	25.0	-	-	11.1	(118)	44.4	(471)	-	-	1,060
6/15/79[5/]	-	-	39.6	-	-	21.7	(7,274)	54.9	(18,368)	-	-	33,476
6/15/79[6/]	-	-	25.0	-	-	11.1	(408)	44.4	(1,633)	-	-	3,674
Total							29,054		50,906			95,708
Ground & Air Composition Counts												
6/9-15/79[7/]	0.2	7.4	85.4	3.8	(299)	44.2	(3,452)	51.8	(4,041)	0.1	(10)	7,802
6/15/79[8/]	-	17.0	30.2	11.6	(52)	20.5	(92)	67.9	(305)	-	-	449
6/15/79[9/]	-	22.9	30.0	18.5	(67)	18.8	(68)	62.7	(227)	-	-	362
6/16/79[10/]	25.3	23.1	5.6	22.3	(134)	3.3	(20)	59.3	(356)	15.0	(90)	600
6/17/79[11/]	14.7	23.4	39.6	13.2	(266)	22.3	(450)	56.3	(1,137)	8.3	(167)	2,020
Estimated mean		23.4[12/]	57.1[13/]	10.5		25.5		44.7		[14/]		

1/ Location was west and south of Utukok. Counted by Grauvogel/Hechtel.
2/ North of Utukok and south of Carbon. (Valkenburg/Smith).
3/ West and south of Utukok. (Grauvogel/Hechtel).
4/ East of Utukok and south of Carbon. (Valkenburg/Magoun).
5/ West of Kokolik and north of Poko. (Grauvogel/Hechtel).
6/ East of Utukok and south of Carbon. (Valkenburg/Magoun).
7/ Utukok River. (Joe Want/Joe Elliott; Valkenburg/Reynolds).
8/ West of Kokolik and Utukok; north side Poko and Igloo. (Grauvogel/Hechtel).
9/ West of Kokolik and north of Poko and Igloo. (Valkenburg/Kelso).
10/ Kukpowruk River. (Valkenburg/Grauvogel).
11/ Kukpowruk River. (Valkenburg/Grauvogel).
12/ From Kukpowruk River count only. This area contained the most representative herd sample.
13/ Represents the ratio of total calves seen (29,054) to total cows seen (50,906).
14/ Determined in fall surveys.

Number of cows	50,900
Number of bulls	24,200
Number of yearlings	11,900
Number of calves	29,000
Total	116,000

While cows and calves were directly counted, the number of yearlings and bulls in the herd was computed and, thus, should be considered gross estimates. The number of yearlings was calculated from ground composition counts at one strategic locality. The number of bulls was calculated by multiplying the most recent (fall 1978) bull to cow ratio with the total June 1979 cow count.

In general, the 1979 surveys indicated that the population has not significantly declined and may, in fact, be increasing slightly.

Productivity in the WAH may be influenced by brucellosis which has been detected in the herd. A sample of 1,394 cows with 668 calves in June 1979 revealed four retained placentas, three cows with bloody posteriors, and one incompletely born calf, which are symptoms indicative of brucellosis. The incidence of brucellosis-like symptoms appears to have declined since the 1960's.

In addition to the June 1979 population survey, flights were periodically conducted from September 1978 to April 1979 to assess winter distribution and abundance of the WAH in GMU 23. The winter of 1978-79 was relatively mild, with most of the caribou wintering in the area between Selawik Hills and Buckland River. An estimated 6,300 caribou were seen near Selawik River in October. Groups of 7,600 and 3,600 were seen in the Selawik and Buckland River drainages in December. In January, 7,200 caribou were seen in the Buckland River drainage. The largest concentration (17,000) was seen in the Selawik Flats and Purcell Mountains in March. In April, 3,500 were seen between the Tagagavik River and Buckland village. Small groups of 10-400 were seen wintering in the area between Point Hope and Cape Krusenstern. In Unit 26, several thousand caribou overwintered in the area from Teshekpuk Lake to Point Lay.

Mortality

During this report period, regulations governing the issuance of permits were modified to allow village agents in the WAH range to distribute permits. Despite the greater distribution and unlimited numbers of permits available at all ADF&G offices and 24 different villages, the 2,490 permits issued were less than were issued last year

(2,883). During the fall season, 2,193 permits were issued and 2,025 hunters (93%) returned their reports following extensive local news spots, reminder letters, personal contacts by Department representatives and particularly the efforts of Division of Fish and Wildlife Protection personnel. The total reported harvest during the fall season was 777 caribou (Table 2). However, Department biologists estimate that approximately 2,000 caribou were actually taken by village residents (Table 3). No Department estimate of caribou actually taken by other Alaska residents and nonresidents was available.

Permit return data indicate that villagers in GMU's 23, 24 and 26 took 81 percent of the reported fall harvest. The remainder of the reported kill was taken by Alaska residents from other GMU's and nonresidents. Hunters in GMU 23 took the majority of the reported fall kill (369 caribou, 47%), probably due to a relatively high human population base (approximately 5,836) and access to concentrations of caribou crossing the Noatak and Kobuk Rivers. The village reporting the greatest take during the fall was Barrow (151 caribou, 19%). Barrow residents (approximately 2,715) had access to herds that remained on the North Slope throughout the winter.

Reported hunter success during the fall season was approximately 69 percent. Male hunters killed 71 percent of the reported fall harvest. Female hunters harvested fewer caribou, but reported a 10 percent greater success rate. Slightly more than half (55%) of the reported kill in the fall in GMU's 23, 24, and 26 occurred less than 50 miles from the hunter's village. The majority (51%) of the reported kill in the fall occurred in September with the remainder being taken in the latter part of August and the first half of October.

During the spring season there were slightly more permittees (2,490). However, reminder letters and the intensive personal contact with the permittees was not maintained and only 42 percent returned their hunter reports. The reported kill in the spring was only 374 caribou (Table 4). Department biologists estimated the spring harvest by village residents to be approximately 1,600 caribou.

Villagers in GMU's 23, 24 and 26 took 95 percent of the reported spring harvest. As, in fall, people in GMU 23 took the majority (69%) of the reported kill during the spring. Kotzebue hunters reported harvesting the greatest number of caribou in the spring (14%).

Hunter success during the spring season was reported to be 68 percent. No breakdown by sex, distance of kill from village or date of kill was available.

Table 2. Summary of the Fall 1978-1979 Western Arctic Herd Permit Hunt.

Village	# permits returned	# and (%) permits returned	# returned & (%) successful	unsuccessful	Did not hunt
GMU 22					
Elim	0	0	0	0	0
Koyuk	4	4	1	0	3
Nome	6	6	2	0	4
Shaktoolik	0	0	0	0	0
Unalakleet	0	0	0	0	0
Subtotal	10	10	3	0	7
GMU 23					
Ambler	119	117	84	12	21
Buckland	0	0	0	0	0
Deering	1	1	0	0	1
Kiana	158	158	79	33	46
Kivalina	11	11	3	4	4
Kobuk	21	21	8	3	10
Kotzebue	361	345	95	90	160
Noatak	101	99	48	10	41
Point Hope	8	7	0	2	5
Noorvik	51	50	21	8	21
Selawik	47	44	4	16	24
Shungnak	79	79	27	20	32
Subtotal	957	932	369	202	361
GMU 24					
Alatna	0	0	0	0	0
Allakaket	0	0	0	0	0
Bettles	24	24	5	7	12
Hughes	31	21	0	4	17
Huslia	0	0	0	0	0
Subtotal	55	45	5	11	29
GMU 26					
Anaktuvuk Pass	66	56	31	8	17
Atkasook	0	0	0	0	0
Barrow	496	433	151	48	234
Nuiqsut	83	45	34	3	8
Point Lay	4	4	3	0	1
Wainwright	60	58	39	5	14
Subtotal	709	596	258	64	274
Areas south of Yukon River					
Fairbanks	193	180	35	37	108
Others in Alaska and Unknown	213	262[1/]	107[1/]	43[1/]	112[1/]
Out of State	59				
Subtotal	465	442	142	80	220
Total	2,196	2,025 (92)	777 (38)	357 (17)	891 (45)

1/ A combination of Others in Alaska and Unknown, and Out of State. No further breakdown available.

Table 3. Village population estimates are compared with harvest permit return data and Department harvest estimates. Caribou per person is calculated by dividing the Department's estimate by village population estimates. Some calculated caribou per person fractions seem to be underestimated.

Village	Village Population CRA[1]	Village Population IRA[2]	Reported Kill Fall	Reported Kill Spring	Dept. Est. Fall	Dept. Est. Spring	Caribou per person CRA	Caribou per person IRA
GMU 22								
Elim	288		0	1	0		-	-
Koyuk	160		1	0	1		0	-
Nome	2,892	4/	2	0	2	15-30	0	-
Shaktoolik	163		0	0	0		0	-
Unalakleet	632		0	0	0		0	-
Subtotal	4,135		3	1	3	15-30		
GMU 23								
Ambler	273	186	84	43	100	150	0.92	1.34
Buckland	176	169	0	6	0	50	0.28	0.30
Deering	117	4/	0	7	0	10	0.09	-
Kiana	331	311	79	35	110	80	0.57	0.61
Kivalina	227	245	3	1	50	100	0.66	0.61
Kobuk	176	62	8	3	10	10	0.11	0.32
Kotzebue	2,526	4/	95	53	150	100	0.10	-
Noatak[3]	-	270	48	16	60	40	-	0.37
Point Hope	464	-	0	0	100	150	0.54	-
Noorvik	524	515	21	29	80	120	0.38	0.39
Selawik	554	536	4	41	50	250	0.54	0.56
Shungnak	198	217	27	25	50	50	0.50	0.46
Subtotal	5,386	5,618	369	259	760	1,110		
GMU 24								
Alatna[3]	-		0	0	0	0	-	-
Allakaket	216		0	0	0	0	0	0
Bettles[3]	-	4/	5	0	5	0	-	-
Hughes	98		0	0	0	0	0	-
Huslia	216		0	0	0	10	0.04	-
Subtotal	530		5	0	5	10		
GMU 26								
Anaktuvuk	173		31	15	81	40	0.70	-
Atkasook[3]	-		0	0	39	33	-	-
Barrow	2,715	4/	151	47	741	221	0.35	-
Nuiqsut	182		34	14	62	47	0.60	-
Point Lay[3]	-		3	2	43	29	-	-
Wainwright	429		39	17	279	97	0.88	-
Subtotal	3,499		258	95	1,245	467		
Others in Alaska, Unknown, and Out of State	-	-	142	19	4/	4/	-	-
Total min.	14,000		777	374	2,013	1,617		

1/ 1978 Community and Regional Affairs revenue sharing data. Due to the Native Land Claims Act register, people may register with the village but actually live somewhere else.

2/ 1978 Indian Reorganization Act Tribal Rolls, from Mauneluk Association. These population figures are more accurate than CRA's.

3/ Unincorporated cities. No CRA data available.

4/ No information available.

Table 4. Summary of the spring 1978-1979 Western Arctic Herd Permit Hunt.

Village	# permits returned	# and (%) permits returned	# returned & (%) successful[1/]	Did not hunt
GMU 22				
Elim	1	1	1	0
Koyuk	7	1	0	0
Nome	9	3	0	2
Shaktoolik	0	0	0	0
Unalakleet	0	0	0	0
Subtotal	17	5	1	2
GMU 23				
Ambler	119	54	43	17
Buckland	15	5	6	1
Deering	9	7	7	3
Kiana	160	78	35	42
Kivalina	15	4	1	0
Kobuk	26	3	3	0
Kotzebue	418	176	53	111
Noatak	102	30	16	16
Point Hope	19	5	0	4
Noorvik	72	33	29	13
Selawik	90	40	41	16
Shungnak	84	22	25	4
Subtotal	1,129	457	259	227
GMU 24				
Alatna	0	0	0	0
Allakaket	0	0	0	0
Bettles	36	11	0	5
Hughes	31	3	0	3
Huslia	0	0	0	0
Subtotal	67	14	0	8
GMU 26				
Anaktuvuk Pass	66	54	15	30
Atkasook	0	0	0	0
Barrow	525	189	47	134
Nuiqsut	83	59	14	27
Point Lay	4	2	2	1
Wainwright	66	28	17	11
Subtotal	744	332	95	202
Areas south of Yukon River				
Fairbanks	236	111	13	84
All others in Alaska & unknown	240	120[2/]	6[2/]	102[2/]
Out of State	57			
Subtotal	533	231	19	186
Total	2,490	1,039 (42)	374 (36)	626 (60)

1/ Column actually represents number killed, rather than success of each hunter. The number of unsuccessful hunters cannot be determined due to insufficient data categorization. Spring hunters were allowed 1 or 2 caribou, depending upon their fall take. Of the 40% stating they hunted, it is not known what proportion of the kill was divided among successful hunters with 1 kill, successful hunters with 2 kills and the unsuccessful.

2/ No further breakdown available.

The 1978-79 total reported caribou harvest by the permit system (1,151) was greater than the previous year's reported kill (672) due to increased bag limits (Table 5) and more compliance with reporting requirements, especially during the fall. Total Department estimated harvest by villages during 1978-79 (3,600) is the greatest since the permit system began in 1976-77. However, an estimated 3,600 caribou killed is still greatly below harvest levels (around 25,000) prior to the 1976 herd decline.

When considering permit return data or Department harvest estimates, it should be remembered that these numbers are usually estimates. Permit data are suspect because not all hunters obtain permits, some of those obtaining permits do not return them without sustained reminders, and permits returned may not accurately reflect the number or sex of caribou taken. Department estimates are suspect because the biologist has to rely on "gut feelings" or intuitive guesses based on his observations during the course of the year.

Consider the calculated caribou per person in Table 3. When Department harvest estimates are divided by village population estimates from IRA tribal rolls, figures ranging from 0.3 to 1.3 caribou per person per year in the NANA region are obtained. These figures seem too conservative. For example, in 1972 Buckland residents harvested 150 caribou (NANA 1974). Assuming the human population has not grown substantially, that equals 0.9 or about one caribou per person per year. This latter figure is more realistic than the 0.3 figure obtained using Department estimates.

Winter conditions during 1978-79 were moderate, enhancing overwinter survival. Light snow in the Brooks Range allowed access to food for those caribou overwintering in that portion of GMU 26. Deep snow was reported in the Koyukuk area (GMU 24). Snow in the Selawik Hills and Buckland River drainage was also deep, but prevailing winds kept the windward slopes cleared, increasing food availability. There is some concern that windward slopes received intense use.

Management Summary and Recommendations

The WAH appears to be increasing in numbers, due to moderate winters, low predation levels and decreased harvest. The herd recovery could be easily reversed with any significant changes in these factors. Overwinter calf survival is particularly important to the herd. Survival of the moderate 1979 calf crop during the 1979-80 winter should be monitored.

A reported harvest of 1,151 and a Department estimated harvest by village residents of 3,600 is the largest harvest since the advent of the permit system in 1976-77, but well below previous years' harvests (25,000+). The WAH can safely sustain the Department's conservatively estimated harvest of three percent.

Table 5. Historical harvest of the Western Arctic Herd.

Year	Season	Limit	GMU	Permits Issued	Permits Returned	Total Reported Kill	ADFG Kill Estimate
1978-79	8/10-10/15	2 bulls	22	17	5	4	18-33
	2/15-4/15	(5000 bulls)	23	1,129	457	628	1,870
			24	67	14	5	15
			26	744	332	353	1,712
			other	533	231	161	unknown
				2,490	1,039	1,151[4]	3,615 minimum
1977-78	9/1-10/5	1 bull	22	39	2	1	-
	3/15-4/15	(3000 bulls)	23	1,214	624	413	430
			24	298	98	78	35
			26	1,162	158	133	350
			other	170	128	47	37
				2,883	1,010	672	852[1]
1976-77		3 in GMU 22	22	-	-	-	-
		1 in GMU's 23,	23	1,329	1,054	576	724
		24, 26	24	-	-	-	-
			26	1,005	546	524	963
			other	-	-	-	-
				2,334	1,600	1,100	2,700-3,500[2]
1975-76		No limit	22	-	-	-	500[3]
			23	-	-	-	11,711-11,961[1]
			24	-	-	-	1,130[1]
			26	-	-	-	3,700-3,950[1]
			other	-	-	-	-
							21,900[1]
1974-75		No limit					"Below normal" where normal = 25,000
1973-74		No limit					Above normal
1972-73		No limit					Above normal

1/ Harvest just during season.
2/ Total years harvest.
3/ Harvest during January-April.
4/ Permittees were allowed 2 bulls.

Of concern is the accuracy of the presently utilized methods of ascertaining harvest of the WAH. According to permit returns, approximately one percent of the herd was harvested; the Department estimates approximately three percent was harvested. The Department harvest estimate seems too low when considering the nutritional and cultural needs of the residents within the range of the WAH. While the data the permit system generates are suspect, the system does provide increased contact between biologists and hunters. Perhaps the Department's public relations efforts could be conducted in a less costly and more effective manner, however.

The key to gathering accurate harvest data lies in the degree of cooperation offered by local residents. Cooperation can only be achieved by educating local residents of the intent of management programs. The need for management education has been known for at least a decade (Hemming 1970). Departmental public relations programs should be continued and enhanced.

Recent creation of national monuments will affect the management scheme of the WAH because of federal regulations prohibiting the use of aircraft for hunting and trapping in monuments. Hunter pressure from those who use aircraft in the Noatak and lower Kobuk River drainages is likely to shift to crossings in the upper Kobuk River drainage, an area outside monument boundaries. This redistribution of hunting effort will intensify use of a smaller area and lead to conflicts between hunters using different methods of transportation. Predation by wolves and grizzly bears on the WAH will probably increase. We feel that trappers utilizing aircraft make the greatest impact on controlling predators by affecting a wider area. Federal legislation, which now mandates that all trapping in monuments be conducted by means of ground transportation only, will definitely decrease control of predators and thus increase incidence of wolf predation on the WAH. Bear hunter pressure will shift to areas outside monuments, causing bear numbers to increase inside the monuments. This may cause an increase in bear predation on the WAH inside monuments. As demonstrated in GMU 13 bear research programs, bears may adversely affect ungulate populations by preying on calves during their first six weeks of life.

Reindeer/caribou conflicts in the Selawik Hills, a major WAH overwintering area, will affect the management scheme. NANA presently holds a BLM grazing lease for reindeer in the Selawik Hills, but cannot utilize the range due to the presence of caribou. Reindeer migrate with caribou, and to prevent this loss, herders try to keep the two species separate.

If the Selawik Hills are converted to reindeer range, caribou will be forced to overwinter on an alternative range, which may or may not offer comparable forage. If alternative range is adjacent to timber, or other sources of cover, predation on the WAH may increase. Alternative overwintering range would affect human accessibility and possibly change winter hunting success.

Northwestern Alaska's increasing economic development will affect the management scheme of the WAH because of disturbance to traditional caribou use areas. For example, possible development of a mineral exploration site near the upper Wulik River would necessitate construction of a transportation corridor. Few caribou regularly pass through the mining area itself, but occasionally a significant portion of the herd migrates across the proposed transportation route. An active transportation corridor might disturb caribou movements. More importantly, the additional people brought in to mine would cause an increase in harvest levels.

In addition to mining activity, oil and gas development, timber harvests and a coal hauling road are among the many proposals which have been suggested to enhance northwestern Alaska's economic situation. Game managers should continue to communicate regularly with the Habitat Section and others who review development proposals to better anticipate forthcoming socioeconomic impacts on the WAH.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1979-79

Game Management Units 25 and 26C - Porcupine Herd

Population Status and Trend

The Porcupine Herd has remained stable at about 100,000 animals over the past 10 years. A 1964 estimate of 140,000 was not based on rigorous sampling, and current estimates probably do not indicate a general decline. A recent decrease in the number of adult cows is a possibility; however, the extent of that change is difficult to quantify due to differences in 1972 and 1977 sampling and censusing techniques.

Population Composition

In general, bulls and yearlings are not well represented in post-calving aggregations; thus, only the calf:cow ratios may be reliable. Fall counts by the Department were done in the Junjek, east fork of the Chandalar and Christian River drainages. All ADF&G counts were from helicopters. Past experience has shown that fall composition estimates obtained from small samples or geographic isolates of a herd may not be representative of the entire herd. Therefore, the close agreement between fall composition and the combined summer counts may be coincidental. In particular, the bull:cow ratio is unreasonably low for the entire herd. Because of delayed migration into Canada and an unusual northward distribution, Canadian biologists were unable to complete fall counts in the Yukon Territory. All factors indicate excellent calf production, but yearling recruitment may well be an underestimate.

Mortality

The rate of natural mortality of the Porcupine Herd is unknown. Annual harvest (U.S. and Canada) has previously been estimated to be less than 5,000. The 1978-79 open season in Alaska was July 1-March 31, with a bag limit of five caribou, no more than two of which could be transported out of Units 25 or 26C.

Arctic caribou harvest tickets were required for such transport; four hundred and seventy-seven tickets were issued, presumably to "out-of-Unit" sport hunters. Of 252 people returning tickets, 178 did not hunt, 28 hunted but were unsuccessful, 37 were successful and 5 actually hunted outside of these Units, in the range of the Western Arctic Herd. Forty-three people reported hunting in Unit 25. Of 25 successful hunters, 16 took one caribou each and 9 took two caribou each for a total kill of 34. Twenty people reported hunting in Unit 26C. Twelve were successful, 10 taking one caribou each and 2 taking two caribou each for a total kill of 14.

Residents not transporting caribou out of these Units were not required to report harvest. USFWS officials estimate that Kaktovik residents took 75-90 caribou and Arctic Village residents took 300-600 caribou. These estimates may be somewhat low, but it is improbable that Kaktovik residents killed more than 100 caribou or that Arctic Village residents took more than 700 caribou. The level of compliance with the five caribou limit is unknown.

Porcupine caribou did not winter close to villages in the Yukon or Northwest Territories and the total Canadian harvest was no more than a few hundred (John Russell, pers. comm.).

Management Summary and Recommendations

Sport hunting of the Porcupine Herd remained minimal and was probably an insignificant mortality factor. Local subsistence take depends on availability of caribou. Summer (July-August) availability to both Kaktovik and Arctic Village was poor, but both villages had caribou available throughout the winter. Porcupine Herd caribou were also available during winter to residents of Venetie, Chalkyitsik, Eagle and possibly Fort Yukon. Harvests by residents of those villages are unknown. Total take was still lower than in most years past. No changes in season or bag limit are recommended.

A treaty between the U.S. and Canada for joint management of the Porcupine Herd (and possibly others) is currently being negotiated. If the treaty is ratified future management of the Porcupine Herd will be largely determined by international committees established under the treaty.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 26B - Central Arctic Herd

Population Status and Trend

The Central Arctic Herd (CAH) was identified as a separate subpopulation in 1974. Since that time its numbers have been relatively stable or increasing and is estimated to contain about 5,000 to 6,000 caribou. Prior to the early 1970's, large yearly influxes of caribou from the Western Arctic (WAH) and/or Porcupine herds confounded the separate identity of the CAH. Consequently, early data on trends and productivity are not available.

Population Composition

Sex and age composition of the CAH have been determined two to three times per year since 1976. All counts were from helicopters or ground observation. Data obtained through May 1979 are summarized in Appendix I.

Productivity and survival have been excellent for the past 3 years, with annual recruitment perhaps as high as 15 percent. The high bull:cow ratio (most reliable in fall surveys) is particularly striking. This sexual imbalance may have resulted from a disproportionately high number of bulls remaining with the CAH after the large summer influxes into the Prudhoe Bay area ceased around 1971.

Mortality

Natural mortality is unknown. Wolves have been relatively common in the Central Arctic compared to the Western Arctic. Numerous instances of wolf predation were noted from 1974 through 1977, although effect on herd productivity was never assessed. Wolves have recently been greatly reduced through legal and illegal hunting and trapping; only 2-3 wolves remained in 1978 and spring 1979 in the area along the Haul Road between Galbraith and Prudhoe Bay in an area which was formerly occupied by at least three active packs.

Between Statehood and 1975 there was no closed season or bag limit on caribou in the CAH, although big game hunting has been prohibited in the Prudhoe Bay oil field since 1973 and within 5 miles of the Trans-Alaska Pipeline (TAP) since 1975. Since 1976 the CAH has been included under the WAH permit hunt system. Harvest has always been low, probably never exceeding 50, and during the past 2 or 3 years annual harvest of the herd is estimated to be less than 20 caribou.

No native villages are within the range of the CAH, although Nuiqsut is on the periphery, and Kaktovik and Anaktuvuk Pass may have occasional access to some CAH caribou. The local subsistence harvest has been minimal, even at Nuiqsut since most villagers hunt within the range of the WAH.

Management Summary and Recommendations

The CAH is a small herd with short seasonal migrations. To date, hunting has been a negligible mortality factor due to the remoteness of this herd (discounting haul road access, currently closed to the public).

Construction and operation of the Prudhoe Bay oil field and Trans-Alaska Pipeline have been the major concerns for the welfare of the herd. Displacement from traditional calving and summer range has been well documented, as has some disruption of daily and seasonal movements, but no direct effects on productivity or survival have been documented. The herd is thought to be at low density relative to available range, however, and future trends are still of concern. Intensive research on the responses of the CAH to petroleum-related development has been in progress since 1974 and will continue. No changes in current management status are recommended (i.e. remain under WAH permit system).

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Appendix I. Summary of sex/age composition of the Central Arctic Herd, 1976-78

Year	Cohort and Season	Cows		Calves			Yearlings			Bulls			Total
		No.	%	No.	%	/100C	No.	%	/100C	No.	%	/100C	
1976	Post-calv.(July)	572	41	247	18	43	77	6	13	493	35	86	1386
	Rut (Oct)	440	36	204	17	46	40	3	9	539	44	125	1223
	Spring (May)	430	48	138	16	32	-[1]	-	-	321	36	75	889
1977	Post-calv.(July)	1585	41	886	23	56	227	6	14	1149	30	72	3847
	Rut (Oct)	198	32	127	20	64	64	10	32	239	38	121	628
	Spring (May)	198	56	80	23	40	-	-	-	73	21	37	351
1978	Post-calv.(July)	1831	45	997	25	54	302	7	16	913	23	50	4043
	Rut (Oct)	293	36	187	23	64	56	7	19	280	34	96	816
	Spring (May)	201	40	121	24	60	-	-	-	177	35	88	499

1 "Long" yearlings classified as adult cows or bulls in May surveys.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 1A and 1B - Southeast Mainland from Cape Fanshaw to the Canadian Border

Seasons and Bag Limits

Units 1A and 1B, Stikine River drainages only.	Sept. 15-Oct. 15	One bull
Remainder of Unit 1B	Oct. 1-Oct. 31	One bull, provided the use of motorized land vehicles is prohibited for the hunting of moose; however, such vehicles may be used to retrieve moose after 12:00 noon.

Population Status and Trend

Since population data are not collected in Unit 1A, the status of moose in this unit is not fully known.

Moose populations in Unit 1B have been fairly stable for the past 4 years in conjunction with low calf production.

Population Composition

No counts were conducted in Subunit 1A.

In the Stikine River area 59 moose were counted on December 16, 1978, 11 (19%), of which were calves. On March 27, 1979, 37 moose were observed, 7 (19%) of which were calves. No counts were conducted by the Department in the Thomas Bay area. However, the U.S. Forest Service conducted some counts there in conjunction with tracking radio-collared moose. The average number of moose and the percentage of calves in the herd were 29 and 30, respectively.

Of 21 bulls harvested in Subunit 1B for which jaws were available for aging, 57 percent were yearlings compared to 33 percent yearlings in 1977.

Mortality

The 1978 harvest ticket data indicate three moose were taken in Subunit 1A, one more than in 1977. All three were taken from the Unuk River drainage.

The reported harvest in Subunit 1B was 34 in 1978, an increase of 79 percent over 1977. Of the 34 moose taken, 25 were from the Stikine, 8 from Thomas Bay, and 1 from Crittenden Creek.

Chronology of the harvest in Subunit 1A showed one moose taken in September and two in October. In Subunit 1B, 15 moose were taken in September, and 19 in October. Two hunters did not specify date of harvest.

Three successful hunters in Subunit 1A hunted an average of 4.0 days to kill a moose. The 13 unsuccessful hunters averaged 6.5 days of hunting. In Subunit 1B, 30 successful hunters spent 261 days pursuing moose for an average of 8.7 days per hunter. One hundred and sixty unsuccessful hunters hunted a total of 1369 days for an average of 8.6 days per hunter.

The Stikine River and Thomas Bay harvests were monitored in the field by contacting hunters and it was estimated that 29 and 14 moose, respectively, were taken.

Management Summary and Recommendations

While the 1978 harvest in Subunit 1A remained about the same as in 1977 and 1976, the hunting pressure increased substantially over 1977 but was nearly equal to 1976.

The 57 percent yearling bulls in the harvest was a substantial increase over the 33 percent occurring in 1977. This increase may indicate hunting pressure is affecting the age structure of bulls in the population. However, both total kill and percentage of yearlings in the harvest have fluctuated widely in past years. Population levels of moose appear to be static in Subunit 1B in conjunction with low calf production.

No season or bag limit changes are recommended for Subunit 1A or 1B.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 1C - Southeast Mainland

Seasons and Bag Limits

Unit 1C except Berners Bay.	Sept. 15-Oct. 15	One bull
Unit 1C Berners Bay drainages only.	Sept. 15-Oct.15	One bull by permit; 20 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The results of the 1978 aerial survey of the Taku River moose herd are shown in Appendices I and II. This survey was one of the most complete and extensive in recent years and is, thus, not totally comparable to other surveys. However, the "typical" Taku moose herd composition situation appears to be maintaining itself. More than twice the number of moose were seen in Canada than in the U.S., 101 versus 49. The U.S. portion tends to have proportionately fewer large bulls and a generally higher level of calf production, 31 percent versus 24 percent. Although there is an apparent difference in habitat type (the Canadian habitat is more typical of "interior" moose country) it appears that hunting has kept the herd on the American side younger and more productive than on the Canadian side of the border.

Two aerial surveys were flown in the Berners Bay drainages, one on 21 December 1978 and the other on 28 March 1979 (Appendices III and IV). During the December survey, 120 moose were counted, the highest ever counted; the second highest was the previous year with 92. This was the first year of harvest following several years of total closure to hunting. It must be noted that 12 bulls were taken in the fall 1978 hunt so the total pre-season population was 132 animals, an increase of 43 percent over the previous year's count. The herd had a post-season bulls:100 cows ratio of 29, a high proportion of large to small bulls (17:3), and 26 percent calves in herd, plus 45 calves per 100 cows, the highest figures in recent years.

The March survey totalled just half (61) of the December count, but break-up was well underway and the animals had begun dispersing off the winter range. There was evidence the moose had started to use some of the more heavily timbered habitat. The percentage of calves in the herd was nearly the same for both surveys, 26 percent in December and 25 percent in March. This indicates that the herd wintered well in 1978-79 as it has for the past 3 to 4 relatively mild winters.

Population Composition

Based on the results of the Taku River surveys, the bulls per 100 cows ratio was 9.9:100 for the American side and 24.2:100 for the Canadian side. Both the calves per 100 cows and twins per 100 cows with calves was higher on the American side than on the Canadian side, 49.9 to 38.7 and 27.3 to 4.3, respectively. The percentage of calves in the herd was 30.6 for the American side and 23.8 for the Canadian.

Results of the two Berners Bay surveys show 29 males per 100 females, 45 calves per 100 females and 26 percent calves in the herd.

Mortality

The reported harvest for the Taku drainage in 1978 was 31 bulls, all taken by Alaska residents. Approximately 60-70 hunters, predominantly from Juneau, hunt the Taku each year. For 1978 the reported success ratio was roughly 48 percent. Access was almost entirely by boat.

For the Berners Bay drawing permit hunt, 19 of the 20 permittees hunted and 12 were successful for a success rate of 63 percent. All hunters averaged 3.7 days of hunting, while successful hunters averaged 2.5 and unsuccessful hunters averaged 5.4. Six of the moose were taken in the first 2 days. Antler spread ranged from 32 to 55 inches and averaged 44.5 inches in a sample of 12. Cementum age (sample of 10) averaged 4.5 years. Fifteen of the hunters hunted by river boat, two by air boat, one by plane and one by a combination of plane and boat.

Management Summary and Recommendations

The Taku herd appears to be relatively stable and has supported a fairly heavy harvest. There are no indications of population decline and thus no changes in seasons or bag limits are recommended.

In the Berners system, based on limited winter range, a total over-winter population of 80-90 animals is desired over the long-term. The pre-season count of 132 animals and post-season count of 120 animals is too high. Also, the past 4 winters have been relatively mild, allowing for this over-population without undue mortality. During the March 1979 survey the willow stands appeared overbrowsed and many observed animals appeared malnourished. Two dead animals were spotted from the air. During a subsequent short flight into the area via helicopter, one of the dead moose was inspected. The marrow was jello-like and low in fat content, an indication of starvation. Also, several spot checks of willow stands showed overbrowsing as evidenced by extensive clubbing. It is recommended that an increased number of bulls be taken and that a cow permit system be initiated to bring the herd down to 80-90 overwintering animals with a bull:cow ratio of 20:100.

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APPENDIX I. Moose Sex and Age Composition - Taku River - Unit 1C

11/20/78	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Total Sample	Time
U.S.	1	2	3	19	8	3	30	33	1	15	49	3.4
Canada	10	5	15	39	22	1	62	77		24	101	1.3
Total	11	7	18	58	30	4	92	110	1	39	150	4.7

APPENDIX II. Moose Sex and Age Ratios - Taku River - Unit 1C

	Total MM/100 FF	Small MM/100 FF	Small MM/ 100 Lg MM	Small MM % of Herd	Small MM/ 100 MM Calf	Calves/ 100 FF	Twins/100 FF w/Calf	Calf % in Herd	Animals /Hour	Total Sample
U.S.	9.9	6.6	200	4.0	26.6	49.9	27.3	30.6	14.3	49
Canada	24.2	8.1	50	4.9	41.6	38.7	4.3	23.8	77.6	101
Total	19.6	7.6	63.6	4.6	35.9	42.4	11.8	26.0	31.9	150

APPENDIX III. Moose Sex and Age Composition - Berners Bay - Unit 1C

Date	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Counts Time-Hrs.
12/17/62	12		12				6	18		2		20	1.5
2/4/64*					2	3	5		0	8	12	25	1.3
1/28/66*					6	3	9		1	13	15	37	1.0
12/11/68	1	7	8	16	11	7	34	42	0	25	0	67	2.6
11/22/69	5	0	5	43	8	1	52	57	0	10	0	67	0.8
11/19/70	2	1	3	57	5	2	64	67	0	9	0	76	3.1
11/22/71	2	1	3	22	19	1	42	45	1	22	0	67	2.5
12/6-7/72	3	8	11	37	13	5	55	66	1	25	0	91	2.7
12/5-7/73	5	3	8	39	17	2	58	66	1	22	0	88	2.6
12/6/74	1	4	5	19	10	0	29	34	1	11	0	45	1.9
11/28/75	7	4	11	33	2	4	39	50	0	10	0	60	3.2
1976**													
12/23/77	15	7	22		12	2		76	0	16		92	2.2
12/21/78	17	3	20	40	28	1	69	89	1	31	0	120	2.2
3/28/79					12	1			1	15	33	61	2.5

* Not sufficient data
**No data collected

PREPARED BY: Nathan P. Johnson

PPENDIX IV. BERNERS BAY MOOSE STATUS

te	Survey Date	Size Sample	MM/ 100 FF	Calves/ 100 FF	Calves % in Herd	Harvest M	F	T	Hunter Success	Season
60		8			50					None
61		17			6					None
62	12/17/62	20			10					None
63	2/ 4/63	25			32	3		3		Bull
64						6		6		Bull
65	1/28/65	37			35	11		11	16	Bull
66						10		10		Bull
67						18		18		Bull
68	12/11/68	67	24	74	37	21		21		Bull
69	11/22/69	67	10	20	15	14		14		Bull
70	11/19/70	76	5	14	12	10		10		Bull
71	12/22/71	67	7	52	33	3	20	23	82	Either Sex
72	12/ 7/72	91	20	46	28	5	17	22	63	Either Sex
73	12/ 7/73	88	14	38	25	15	18	33	79	Either Sex
74	12/ 6/74	45	17	38	24	9	11	20	48	Either Sex
75	11/28/75	60	28	26	17					None
76										None
77	12/23/77	92			17					None
78	12/21/78	120	29	45	26	12	0	12	60	Bull-Drawing

EPARED BY: Nathan P. Johnson

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 1D - Haines and Skagway

Season and Bag Limit

Sept. 15-30 One bull

Population Status and Trend

One aerial survey was flown in the Haines area on 4 and 5 December, 1978. The survey showed a count of 29 bulls, 125 cows and 37 calves (Appendices I and II). The number of bulls counted was essentially the same as the 30 counted in the 1977 survey. However, the number of cows sighted was down 33 percent from the 186 counted in 1977. Similarly, the number of calves counted was down 48 percent from the 71 counted in 1977. The number of small males per 100 large males dropped from 131 in 1977 to 38 in 1978. This apparent shift in population structure may be due to a relative increase in the number of bulls in the herd, a drop in the actual numbers of cows and calves in the herd, or differential observability of moose during the two counts. Observability was excellent during the 1977 survey, but snow cover was spotty in the lower river valleys and flats to 300-400 feet in elevation which significantly reduced the observability of moose in 1978. The drop in the total animals counted in 1978 of 192 compared to 287 in 1977 may be due in part to this same change in observability. The drop from 50 moose observed per hour of flying in 1977 to 26 in 1978 is probably due to the poorer counting conditions, a decrease in the total moose population or a slightly intensified effort to count moose in the lower river valleys where the poor counting conditions prevailed. In summary, there has possibly been a small reduction in moose numbers in Unit 1D, with an accompanying small relative increase in the bull segment of the population.

Population Composition

As stated above, there was an apparent increase in the relative numbers of bulls in the population. The number of bulls per 100 females rose from 16.1 (1977) to 23.2 (1978). On the other hand, the percent calves in the herd dropped from 24.7 to 19.3 from 1977 to 1978, but is substantially no different than the long-term average of 21. Again, these apparent changes could be due to differential observability between years.

Mortality

No check station was operated in Haines in 1978. Harvest report

returns from the 1978 Haines moose hunt show a harvest of 44 bulls and one cow taken illegally, all by resident hunters. The estimated kill was 50-55 bulls. Unsuccessful hunters numbered 245 for a total hunting population of 293. Thus, the success rate was 15 percent. Only three nonresidents hunted the area and all were unsuccessful. Of the hunters reporting means of transportation, 57 percent of the successful hunters used boats and 35 percent used some type of highway or off-highway vehicle. The reverse was true for unsuccessful hunters: 38 percent used boats and 58 percent used highway or off-highway vehicles. Seventy-five percent of the successful hunters, 68 percent of the unsuccessful and 69 percent of the total hunters resided in the Haines area.

Management Summary and Recommendations

Available survey information indicates a possible slight decline in herd size for 1978. The harvest level has remained relatively stable with no dramatic fluctuations. A roadside check station should be run annually to monitor the hunt and gather kill information on this intensive, short-season hunt. Currently, no changes in season or bag limit are recommended.

PREPARED BY:

Nathan P. Johnson
Region I Research/Management Coordinator

SUBMITTED BY:

Jack W. Lentfer
Region I Supervisor

APPENDIX I. Moose Sex and Age Composition - Haines - Unit 1D

Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid.Sex & Age	Total Sample	Count Time (Hrs)
12/18/62	8		8				134	142		39		181	
11/4/63										36	157	193	
11/20/66	24	22	46	60	61	17	138	184	0	95	16	295	2.1
11/30-12/1/67	28	22	50	106	61	6	173	223	2	75	0	298	2.8
12/6-7/68	24	25	49	191	57	5	253	302	5	72	1	374	4.4
11/22/69	23	0	23	63	25	3	91	114	0	31	0	145	2.1
11/9-10-12-19/71	12	15	27	139	28	3	170	197	0	34	0	231	4.9
11/27-29/72	25	8	33	128	45	5	178	211	1	56	0	267	6.4
12/13-14-15/73	21	9	30	150	35	4	189	219	2	45	0	264	4.4
12/3-4/74	12	18	30	97	35	3	135	165	0	41	0	206	6.2
12/20-21/75								151	0	30	0	181	4.2
11/17/77	13	17	30	121	59	6	186	216	0	71	0	287	5.8
12/4-5/78	21	8	29	92	30	3	125	154	1	37	1	192	7.5

PREPARED BY: Nathan P. Johnson

APPENDIX II. Moose Sex and Age Ratios - Haines - Unit 1D

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1962	5.9					29.1		21.5		181
1963								18.7		193
1964*										
1965	41.2	15.5	60.5	6.6	63.0	49.3	19.2	20.9	116	349
1966	33.3	15.9	91.7	7.5	46.3	68.8	21.8	32.2	140	295
1967	28.9	12.7	78.6	7.4	58.7	43.4	8.9	25.2	106	298
1968	19.4	9.9	104.2	6.7	69.4	28.5	8.1	19.2	85	374
1969	25.3	0.0	0.0	0.0	0.0	34.1	10.7	21.4	69	145
1970*										
1971	15.9	8.8	125.0	6.5	88.2	20.0	9.7	14.7	47	231
1972	18.5	4.5	32.0	3.0	28.6	31.5	10.0	20.9	42	267
1973	15.9	4.8	42.9	4.7	40.0	23.8	10.3	17.0	60	264
1974	22.2	13.3	150.0	8.7	87.8	30.4	7.9	19.9	33	206
1975								16.6	43	181
1976**										
1977	16.1	9.1	130.8	5.9	47.9	38.2	9.2	24.7	50	287
1978	23.2	6.4	38.1	4.2	43.2	29.6	19.2	19.3	26	192

* Not sufficient data
** No data

PREPARED BY: Nathan P. Johnson

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 5A - Yakutat Forelands, Nunatak Benchlands, Gulf of Alaska

Seasons and Bag Limit

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

*Season subject to closure by emergency order.

Population Status and Trend

Recent aerial surveys in Unit 5A indicate that the moose populations on both the Yakutat Forelands and the Nunatak Benchlands are stable and that the Yakutat Forelands population has been increasing gradually in recent years, aided greatly by mild winters and a 4-year closure of sport harvest.

Population Composition

Winter herd composition counts were conducted on the Yakutat Forelands between the Situk and Italio Rivers on December 4, 1978 and between the Italio River and the Alsek River on December 5, 1978. Overall, surveying conditions were good, with good light and fresh snow on both days, but many of the moose observed were lying down and/or in heavy brush, making observations difficult. A total of 229 moose were observed in 7.4 hours (30.9 moose per hour). Herd composition is shown in Table 1.

The calf:cow ratio observed during the winter surveys was 24 calves per 100 cows. An interesting observation was that the ratio observed for the 17 cows with visual identification collars was almost double (47%) that observed overall (24%) during the survey. But, since only 39.5 percent of the 42 moose originally collared were observed, it is assumed that this figure was erroneously high and that the actual calf survival for the collared segment of the population was not really different from the remainder of the herd, emphasizing further the need for a large sample size for accurate survival estimates.

Two spring parturition survey flights were conducted over the Yakutat Forelands on May 28 and 30, 1979. Two additional flights were attempted. One, on May 20, 1979, was discontinued because none of the nine females observed had calves accompanying them. Another, on May 29, 1979, was aborted due to poor weather conditions.

Table 1. Herd composition of the Yakutat Forelands Moose Population as Determined by aerial surveys on December 4 and 5, 1978.

Date	No. Bulls	No. Cows w/no calf	No. Cows w/1 calf	No. Cows w/2 calves	Yearlings	Sex/Age Unknown	Total
Dec. 4	27	59	5	6	4	4	122
Dec. 5	23	50	13	1	3	2	107
Totals	50	109	18	7	7	6	229
Ratios	37 bulls:100 cows		17 calves:100 adults		24 calves:100 females		

This year's parturition survey followed the usual trend of past surveys in that the sample size of females observed was very small (34), making accurate production computations impossible. This small sample size was due primarily to poor observation conditions (encountered annually because calving seems to coincide very closely with the leaf emergence on the deciduous vegetation). Usually, the surveys are also complicated by heavy spring precipitation, which makes flying impossible. The survey results are shown in Table 2.

Table 2. Results of the May 28 and 30, 1979 moose parturition surveys on the Yakutat Forelands between Situk River and Ustay River.

Date	No. Cows w/no calf	No. Cows w/1 calf	No. Cows w/2 calves	No. Calves	No. Bulls
5-28-79	17	3	5	13	15
5-30-79	4	5	0	5	15
Totals	21	8	5	18	30

A winter herd composition survey was also conducted on the Nunatak Bench, between the Varigated and Hanging Glaciers, on February 12, 1978. Survey conditions were only fair due to poor lighting and old snow. A total of 33 moose (30 adults, 3 calves) was observed in 79 minutes. Adults and short yearlings were the only age class distinction made and no sex differentiation was attempted.

Mortality

The 1978 special registration hunt was the first legal sport harvest of moose on the Yakutat Forelands (Unit 5A) since the season was closed in 1974. Hunting mortality totaled 27 bulls harvested in 3.5 days, with the kill being fairly evenly distributed across the Forelands. A total of 165 persons registered for the hunt; hunter success was 16.4 percent; 16 persons (9.7%) did not hunt; 96 persons were unsuccessful (58%); and 24 persons (14.5%) did not return their permits.

The average cementum age of 26 of the harvested bulls was 4.7 years (range 2.5 to 12.5 years). Interestingly enough, these data do not correspond to the average cementum age (10.1 years; range 2.5 years to 12.5 years) of 42 females captured for a physiology and productivity study in the same area during spring 1978. It is possible that the age of the hunter harvested moose was skewed toward younger, more susceptible, animals while that of the helicopter-captured females may have been a more random sample. On the other hand, the females showed an almost total absence of animals age 4, 5, and 6 years old while the males had a 42 percent (11 bulls 5, 3, and 3 moose, respectively) showing of these age classes in the harvest.

Non-hunting mortality on the Yakutat Forelands included at least two deaths of undetermined cause that wolves were observed feeding upon.

Non-hunting mortality included three deaths of known cause observed from the air on the Yakutat Forelands, two of which wolves were observed feeding upon. One additional moose carcass observed on the Nunatak Bench was being eaten by two wolverines.

Management Summary and Recommendations

The Yakutat Forelands moose population appears to be slowly increasing from its low of the early 70's, aided by several recent mild winters and a 4-year closure on sport hunting. The current estimated population of 600 moose can withstand a limited harvest, but hunting pressure should be closely monitored, maintaining the option to convert the hunting from special registration to a drawing type hunt if pressure becomes greater than can be controlled by using the emergency closure method of management. Efforts should also be made to direct and distribute hunting pressure into areas that have moose available but are not hunted for one reason or another, possibly by increasing the number of moose that can be legally harvested by restricting the additional harvest to designated areas.

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SUBMITTED BY:

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Region I Research/Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 5B - Malaspina Forelands

Seasons and Bag Limit

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

Population Status and Trend

The moose population on the Malaspina Forelands appears to be stable. Winter conditions are generally less severe than on the Yakutat side of the bay and wolf density is low. Although data collected over recent years are sketchy, the trend appears to be steady, indicating a stable population.

Population Composition

Only a partial survey of Unit 5B was conducted from Point Bancas to Sitkagi Bluffs on February 12, 1979. Due to rough, windy conditions, animals were not classified by age. A total of 47 moose were observed in 1.8 hours flying (26.1 moose/hr). The results compared favorably with previous surveys for the same area and the number of moose observed per hour has remained fairly consistent over the years.

Mortality

The Unit 5B moose season was conducted as a bulls-only special registration hunt with a total of 69 hunters registering. Of those registered, 27 did not hunt; 22 were unsuccessful; and 12 hunters harvested moose. Eight additional hunters did not report. Successful hunters averaged 3.6 days hunting time in the field and the unsuccessful hunters spent an average of 3.9 days in the field for an overall average hunting time of 3.75 days per hunter.

Cementum ages were determined for nine of the 12 moose harvested. The average age was 3.1 with a range of 2.5 to 4.5 years.

Harvest figures for the Malaspina Forelands declined starting in 1969 but have held fairly constant since 1974, the last year of either-sex hunting. Since then, the bull harvest has averaged 14.4 animals per year. This low harvest is probably more of a reflection of low hunter effort than a declining moose population since the hunter success rate has averaged 34.8 percent over the past 5 years with a range from 23 to 41 percent.

Management Summary and Recommendations

Overall, the moose population in Unit 5B appears to be stable. While hunting pressure has declined slightly since the last either-sex hunting season in 1974, hunter success has remained fairly consistent. However, if an increase in harvest is desired to bring the annual kill up to the allowable 25 bulls per year, access to the area will have to be improved through continued airstrip maintenance on the bush strips to encourage hunters to participate in the hunt.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 6A - Katalla to Icy Bay

Seasons and Bag Limits

Sept. 1-Nov. 30*	One moose by permit; up to 20 antlerless moose may be taken. See 5 AAC 81.055 and separate hunt supplement.

* Season subject to closure by field announcement.

The conditions outlined in the 1978-79 Permit Hunt Supplement were:

Moose Hunt 950

1. Permits could be obtained at the Cordova Fish and Game office from 1 August 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 Department personnel located at the Cordova Fish and Game office.

Harvest and Hunting Pressure

The 1978 harvest in Unit 6A was 13 bulls and 5 cows; all were taken from the Bering River-Controller Bay portion of Unit 6A.

The season was allowed to run full length (3 months) because the desired quota was not reached for either sex.

Actual hunting pressure was unknown. A total of 99 permits was issued. This was a 21 percent increase over the previous year. Eighteen moose were harvested, 61 percent (11) of which were taken by Unit 6 residents (Appendix I).

Composition and Productivity

No composition and productivity data were collected during fall 1978. A midwinter reconnaissance flight indicated a good calf crop; 21 of 62 moose observed were calves.

Management Summary and Conclusions

The 1978 harvest of 18 moose was the largest harvest to occur in Unit 6A. Even so, the harvest was well below the desired level of 40 animals. Hunter interest in this remote herd appears to be increasing,

judging by the number of permits issued, composition, and magnitude of the harvest. Permits issued to persons outside Unit 6 increased from 12 in 1977 to 27 in 1978.

The status of this herd is unknown due to the lack of a fall sex and age composition survey. Judging by the relatively mild winter of 1977-78, the total animals harvested, the high percent of calves seen in mid-winter (February 1979), and the early spring in 1979, this herd is expected to increase.

Recommendations

Retain the current season and bag limit. Either-sex hunting is biologically justifiable and desirable to entice hunters to utilize this remote moose herd.

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SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Moose harvest - Unit 6(A)

Year	Bull	Cow	Unid.	Total
1971*			3	3
1972*				0
1973				0
1974	1			1
1975*	5	3		8
1976*	3			3
1977*	10	1		11
1978*	13	5		18

* Years with either sex season.

NOTE: No moose have been harvested east of Suckling Hills in Unit 6(A).

PREPARED BY: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 6B - Martin River Area

Seasons and Bag Limits

Aug. 20-Nov. 30*	One moose by permit. See 5 AAC 81.055 and separate permit hunt supplement[1/]

* Season subject to closure by field announcement.

The conditions outlined in the 1978-79 Permit Hunt Supplement were:

Moose Hunt 951

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

2. Harvest was restricted to 20 bulls.

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

Harvest and Hunting Pressure

The 1978 moose harvest in Unit 6B was 23 bulls. The season was terminated 1 September after 13 days of hunting.

The actual hunting effort was unknown, but 241 permits were issued in 1978 compared to 248 in 1977. Eighty-eight percent (213) of the permits were issued to Unit 6 residents.

The major method of transportation used by successful hunters was airboats (18); the remaining successful hunters used airplanes (5).

Composition and Productivity

No composition and productivity data were collected during fall 1978. A late winter survey flown in April 1979 revealed a sample of 115 moose.

Calf percentage in the herd was 22.6 indicating a good calf crop the previous year and good survival through winter 1978-79.

The age composition of 21 moose harvested as determined by cementum age method was: 12 at 1 1/2, 4 at 2 1/2, 3 at 3 1/2, and 2 at 4 1/2 years.

1/ The Alaska Department of Fish and Game hunting regulations No. 19, effective 1 July 1978 through 30 June 1979, incorrectly stated that "up to 20 antlerless moose may be taken." Antlerless moose could not legally be taken in Unit 6(B) during the 1978-79 season.

Management Summary and Conclusions

The harvest of approximately 20 bull moose in Unit 6B has been the standard quota for the past six hunting seasons. The 1978 harvest of 23 bulls was slightly higher than previous bull-only harvests (Appendix I).

Status of this herd is unknown due to the lack of a fall sex and age composition survey. The late winter survey revealed an adequate sample size, a good calf percentage in the herd and spring-like conditions on the major wintering area. This herd should be at, or above, the desired herd size of 150-175 animals.

Recommendations

Retain the current season and allow for the taking of approximately 20 bulls and 20 cows to maintain the herd at the desired size.

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APPENDIX I

Moose harvest - Martin River area - Unit 6(B)

Year	Bulls	Cows	Unid.	Total
1965	8	0	0	8
1966	3	0	0	3
1967	14	0	0	14
1968	15	0	0	15
1969	27	7*	0	34
1970	75**	26*	0	101
1971	39*	37*	0	76
1972	34*	32*	0	66
1973	17*	0	0	17
1974	18*	0	0	18
1975	19*	12*	0	31
1976	20*	0	0	20
1977	20*	23*	0	43
1978	23*	0	0	23

* Number reported to Cordova Fish and Game office by permit hunters.
** Estimated harvest. Harvest report data indicated 23 bulls.

PREPARED BY: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 6C - West Copper River Delta

Seasons and Bag Limits

Sept. 9-Sept. 15*	One bull moose by permit; see 5 AAC 81.055 and separate permit hunt supplement.
Sept. 16-Sept. 30	One antlerless moose by permit; 35 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

* Season subject to closure by Emergency Order.

The following conditions were outlined in the 1978-79 Permit Hunt Supplement:

A. Moose Hunt 952. Unit 6C for antlered moose

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

2. Approximately 30 bulls could be taken (the permit hunt supplement incorrectly stated 20 bulls could be taken).

3. Boats, airboats or ATV's could not be used to hunt moose but could be used to retrieve an animal after 10:00 a.m.

4. Successful hunters were required to report their kill the same day the kill was made to Fish and Game personnel in Cordova.

B. Moose Hunt 901. Unit 6C for antlerless moose

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

2. Permit drawing was held 20 July.

3. Thirty-five antlerless permits were issued.

4. Successful hunters had to report their kill to the Cordova Fish and Game office within 5 days.

5. Unsuccessful hunters had to return a completed report within 15 days of the close of the season. The permit hunt supplement incorrectly stated that boats, airboats or ATV's could not be used to hunt moose.

Harvest and Hunting Pressure

The Unit 6C moose harvest was 29 bulls and 31 cows. The bull moose season was closed by field announcement at midnight, 9 September after 1 day of hunting. The 1978 harvest of 60 moose was the largest harvest ever taken from this herd (Appendix I).

Actual hunting pressure exerted during the bull moose hunt is unknown but was estimated at 175 hunters. A total of 240 registration permits were issued, 94 percent to residents of Unit 6. A total of 363 applications were received for the 35 antlerless moose permits. All 35 permit holders hunted with 89 percent hunter success.

Weather was good during the 1-day bull moose season and generally good during the 15-day cow season.

Composition and Productivity

A sex and age composition survey flown 11 December 1978, yielded a poor sample, and data were skewed to bulls and cows without calves. Thus, useful composition and productivity data were not collected.

Table 1 shows the cementum age composition obtained on 59 of 60 harvested moose.

Table 1.

Sex	Number of moose killed by age group											Total
	Calf	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5+	
Male	0	11	7	5	3	2	0	0	0	0	0	28
Female	2	11	5	3	3	0	1	0	3	1	2	31
Total	2	22	12	8	6	2	1	0	3	1	2	59

Management Summary and Conclusions

The 1978 harvest of 60 moose from West Copper River Delta was the largest kill since hunting was initiated in 1960. The ages of harvested moose indicate a herd with good age distribution for both sexes. Unfortunately, reliable composition and productivity data were not obtained during the fall survey. However, the available data [(1) abundance of animals observed in 1977, (2) hunter success, (3) reproductive history, and (4) mild winters of 1977-78 and 1978-79] indicate that another liberal harvest can be allowed in 1979.

Both permit hunts worked well and were readily accepted by the public. The only change necessary is to restrict the hours per day of hunting during the bull season to maintain control of the harvest.

Recommendations

Retain the current seasons, bag limits, and permit systems.

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SUBMITTED BY:

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Regional Management Coordinator

APPENDIX I

Moose harvest - West Copper River Delta - Unit 6(C)

Year	Bulls	Cows	Unid.	Total
1960*	25	0	0	25
1961	N O O P E N S E A S O N			
1962	25	0	0	25
1963	15	2	0	17
1964	15	0	0	15
1965	20	0	0	20
1966	20	1	0	21
1967	23	0	0	23
1968	28	8	0	36
1969	30**	12	0	42**
1970	14	32	0	46
1971	12	27	0	39
1972	24	23	0	47
1973	18	0	0	18
1974	12	28	0	40
1975	16	0	0	16
1976	20	19	0	39
1977	19	16	0	35
1978	29	31	0	60

* First harvest since introduction of moose to Unit 6.
** Estimated.

PREPARED BY: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 7 - Seward

Seasons and Bag Limits

Unit 7, Placer River drainage only	No Open Season	
Remainder of Unit 7	Sept. 1-Sept. 15	One bull

Harvest and Hunting Pressure

Harvest report returns indicated that 57 moose were killed and 359 hunters were afield in Unit 7 during the 1978, 15-day fall season. These figures indicate that 15.9 percent of the hunters were successful (Appendix I).

The number of hunters in 1978 was the lowest recorded since 1965 for Unit 7. Since 1965, the number of hunters each year has averaged 511 with a maximum of 780 in 1972.

Eighty-four percent of the harvest occurred during the first 10 days of the season and 43 percent of the bulls taken were yearlings.

Composition and Productivity

Moose composition surveys were flown in part of Unit 7 during November 1978 and a total of 422 moose were counted (Appendix II). The proportion of bulls observed remained unchanged from the 1977 ratio of 14 bulls:100 cows. This ratio is only slightly lower than the average of 16 bulls:100 cows observed since 1962.

The 25 calves:100 cows ratio observed during 1978 represents a break in a 3-year downward trend in productivity. However, the ratio of twins:100 cows with calves dropped from 8 in 1977 to 3 in 1978 suggesting poor survival of calves.

The number of moose observed per hour of flight time (an indicator of population trend) has shown a steady decline since the late 1960's.

Management Summary and Conclusions

Data from harvest reports indicate a steady decline in hunter success between 1968 and 1974, followed by a slight upward trend to 1978. This upward trend should not be interpreted as indicating an improving moose population as the number of moose observed per hour of aerial survey has declined, suggesting a downward trend in population size. The probable causes of this suspected decline include the 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 Unit 7. Preliminary results have shown that controlled burning is an effective management tool to retard plant community succession thereby benefiting the moose population. However, until this management tool is more widely used and wolves are managed, the ability of the moose population in Unit 7 to increase will remain limited.

Recommendations

No changes in seasons or bag limits are recommended.

PREPARED BY:

Ted Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose Harvest and Hunting Pressure, Game Management Unit 7, Seward.

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success	Season Dates
1965	1st	-	-	-	-	-	-	Aug. 20-Sept. 30
	2nd	-	-	-	-			Nov. 1-Nov. 20
	Comb.	60	1	0	61	-	-	
1966	1st	-	-	0	-			Aug. 20-Sept. 30
	2nd	-	-	0	-			Nov. 1-Nov. 20
	Comb.	112	1	0	113	445	25.4	
1967	1st	-	-	-	-			Aug. 20-Sept. 30
	2nd	-	-	-	-			Nov. 1-Nov. 20
	Comb.	123	1	1	125	414	30.0	
1968	1st	140	1	0	141			Aug. 20-Sept. 30
	2nd	19	0	0	19			Nov. 1-Nov. 20
	Comb.	160[2]	1	3	164[2]	481	34.1	
1969	1st	-	-	-	-	-	-	Aug. 20-Sept. 30
	2nd	-	-	-	-	-	-	Nov. 1-Nov. 20
	Comb.	174	4	1	179	557	32.1	
1970	1st	104	0	1	105			Aug. 20-Sept. 30
	2nd	23	0	1	24			Nov. 1-Nov. 20
	Ant.[1]	0	14[3]	0	14			
	Comb.	152[2]	14[3]	2	168[2]	520	32.3	
1971	1st	110	14	2	126			Aug. 20-Sept. 30
	2nd	25	0	0	25			Nov. 1-Nov. 20
	Comb.	153[2]	14	2	169[2]	563	30.0	
1972	1st	111	19	0	130			Aug. 20-Sept. 30
	2nd	16	0	0	16			Nov. 1-Nov. 20
	Comb.	154[2]	22[2]	0	176[2]	780	22.6	
1973		114	47[3]	0	161	779	20.6[4]	Aug. 20-Sept. 10
1974		59	2	3	64	492	13.0	Sept. 1-Sept. 10
1975		66	0	0	66	462	14.3	Sept. 1-Sept. 10
1976		71	0	6	77	490	15.7	Sept. 1-Sept. 10
1977[5]		91	0	4	95	607	15.7	Sept. 1-Sept. 15
1978		55	1	1	57	359	15.9	Sept. 1-Sept. 15

[1]Anterless season held December 2-6.
[2]Total exceeds summation of various seasons because of kills for which data were not given.
[3]Data from permit returns.
[4]Computed using four additional cows shown from permit returns.
[5]Extrapolation figures since reminder letters were not sent.

Prepared by: Ted H. Spraker, Game Biologist III

Appendix II. Moose sex and age ratios, Game Management Unit 7, Seward.

Date	Tot. ♂ per 100 ♀	Sm. ♂ per 100 ♀	Sm. ♂ per 100 lg. ♂	Sm. ♂ % in herd	Sm. ♂ per 100 ♂ calves	Calves per 100 ♀	Incidence of twins per 100 ♀ w/calf	Calf % in herd	Animals per hour	Total sample	Count time (hrs.)
1962	23	15	192	10	54	29	23	19	-	229	-
1963	-	-	-	-	-	-	9	31	45	1389	-
1964	-	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	8	19	61	565	11
1966	17	5	36	3	35	27	9	18	-	656	
1967	28	11	59	6	59	36	12	22	87	297	3
1968	14	5	60	3	31	34	5	22	54	792	15
1969	10	3	41	2	18	33	18	23	52	430	8
1970	20	7	60	5	61	24	6	17	88	1090	12
1971	22	9	64	6	82	21	9	15	89	1393	16
1972	12	2	23	2	15	29	8	21	64	942	15
1973a	14	3	23	2	19	28	4	20	63	866	14
1973b	14	3	32	2	23	29	4	20	59	1321	22
1974	-	-	-	-	-	-	-	34	-	29	-
1975	3	1	100	1	7	43	4	30	49	98	2
1976	11	5	87	3	28	36	1	24	79	377	5
1977	14	3	31	2	31	20	8	15	35	1005	29
1978c	14	6	75	4	46	26	3	19	31	422	14

Note: 1973a includes 11/27-30/73, 1973b includes 11/27/73 through 12/4/73.
1978c does not include all count areas in Unit 7.

PREPARED BY: Ted H. Spraker, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 9 - Alaska Peninsula

Seasons and Bag Limits

Unit 9A	Sept. 10-Sept. 30	One bull
Unit 9B & 9C	Sept. 10-Sept. 30 Dec. 1-Dec. 31	One moose, provided that antlerless moose may be taken only between Dec. 1-Dec. 31.
Unit 9D	No open season	
Unit 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 the 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.

Harvest and Hunting Pressure

Reports received from 486 hunters indicated a harvest of 205 bull moose in 1978. Sealing data revealed an additional harvest of nine bulls in Subunit 9E and one bull in Subunit 9C, for which no Hunter Reports were submitted. Thus, the total known bull kill for Unit 9 was 215 (Appendix I).

During the December antlerless season, 19 cow moose were reported taken in Unit 9. The majority of the cow kill was in Subunit 9C, especially the Naknek drainage.

Table 1 shows the harvest location breakdown for both sexes :

Table 1.

Location of moose kill by Subunit	Bulls	Cows	Total
9A (Cook Inlet drainages)	10	0	10
9B (Kvichak River drainage)	35	4	39
9C (Alagnak and Naknek River drainages)	66	12	78
9E (Egegik Bay to Port Moller)	100	3	103
	211*	19	230

* The harvest location of the remaining four bulls is unknown.

Hunter effort and success paralleled the previous 2 years' values. A total of 352 residents and 121 nonresidents reported hunting in Unit 9. Residents harvested 132 moose, yielding a success rate of 37.5 percent and nonresidents took 89 moose yielding a success rate of 73.6 percent. The combined, unitwide success rate was 47.2 percent.

Within Subunit 9E, where special restrictions on antler size are in effect, hunter numbers were lower and the success rate was higher. Of the 84 resident hunters, 36 (42.9%) were successful, and of the 73 nonresidents, 62 (84.9%) were successful. The combined success rate in this Subunit was 62.3 percent.

Composition and Productivity

Four post-parturition surveys were flown in May and June to assess calf production and survival in the central Peninsula region. The results of these surveys indicate continuing low levels of calf production (33.9 to 51.6 calves:100 cows) or significant neo-natal mortality (Appendix II). No additional data were available on causes of mortality.

Fall sex and age composition surveys were limited due to a lack of snow cover throughout much of Unit 9. Two traditional areas, Katmai and Flats B, were covered and a new area, Branch River, was established and surveyed (Appendix III). Conditions were not good for any of these counts, and data are not readily comparable with former years, but several general patterns appear to be stable. Bull:cow ratios in the three areas reflected the intensity of hunting, with Katmai's being highest and Flats B's lowest. Calf:cow ratios remained relatively low throughout the area and did not indicate any significant improvement over the past 8 years (Appendix IV).

Management Summary and Conclusions

Management of moose in the northern half of Unit 9 continues to be directed toward allowing a conservative harvest of animals from a population believed to be relatively stable. The harvest of moose in Subunits 9A, B and C is adequate to meet recreational and sustenance demands without adversely affecting total numbers or hunting aesthetics. Although wolves and bears occur throughout northern Unit 9, no areas of direct conflict or competition for moose between the predator and man have been identified.

Management of moose in Subunit 9E continues to be directed at maintaining the opportunity for recreational hunters to harvest large antlered bulls under aesthetic conditions, as well as providing for domestic needs. Bulls taken in Subunit 9E must have antlers with a spread of at least 50 inches or with three or more brow tines on one side. Cows may be harvested in December.

Results of the past three seasons hunting under the 50-inch antler restrictions are presented in Appendix V and have been discussed at length elsewhere (Smith et al. 1979). This management approach has reduced the harvest of young bulls; nearly 70 percent of the animals taken have been 5 or more years old. Hunters have been able to recognize

legal targets in most cases as less than 4 percent of the bulls presented for sealing have been sub-legal. Very few bulls have been shot and abandoned. Total numbers taken, mean ages, and antler sizes of the harvested bulls have remained relatively stable although fewer bulls over 5 years of age were killed in 1978. This may indicate that a harvest of 80 to 100 bulls in Subunit 9E is sufficient to curtail recruitment of males beyond age 5. Additional data will be necessary to evaluate this possibility.

Presidential action under the Antiquities Act on 1 December expanded Katmai National Monument and established Aniakchak and Lake Clark National Monuments. These areas are permanently closed to "sport" hunting and the pending regulations to ban aircraft for "subsistence" activities will eliminate this type of hunting as well. This action will force a redistribution of hunting effort by both local and non-local hunters, and several guides will be displaced. Careful monitoring of future hunting patterns will be necessary in areas such as the Branch River drainage to which individuals who previously hunted the new park areas may turn.

Recommendations

The current seasons and bag limits are satisfying the needs of all user groups and are keeping harvests in line with the population's productivity and should not be changed. Addition of a registration permit system for the antlerless moose hunt in the Naknek drainage would facilitate monitoring of this hunt and prevent excess local harvest without imposing undue hardship on local hunters. Such a permit system should be proposed to the Board of Game.

Literature Cited

Smith, C. A., J. B. Faro, and N. C. Steen. 1979. An evaluation of trophy moose management on the Alaska Peninsula. 15th N. Amer. Moose Conf. (in press).

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SUBMITTED BY:

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Regional Management Coordinator

APPENDIX I

Moose harvest and hunting pressure - Alaska Peninsula - Unit 9

Year	Bulls	Cows	Unid.	Total	Hunters	% success
1964	185	64	0	249	-	-
1965	213	68	4	285	-	-
1966	240	75	8	323	519	62.2
1967	301	68	9	378	509	74.3
1968	366	72	5	443	583	76.0
1969	317	70	6	393	527	74.6
1970	266	84	2	352	457	77.0
1971	317	116	7	440	591	74.5
1972	454	91	11	556	773	71.9
1973	607	206	26	839	1,175	71.4
1974	520	167	18	705	1,072	65.8
1975	222	0	10	232	436	53.2
1976	194	44	10	248	533	46.5
1977	212	0	0	212	435*	48.7
1978	215	19	0	234	496	47.2

* Extrapolated estimate ($\pm$ 28, P = 0.05), actual number reporting - 386.

APPENDIX II

Moose productivity in Flats B area, Alaska Peninsula - Unit 9

Date	Calves per 100 cows	Calves per 100 cows & yearlings	Percent cows with calves	Twins per 100 cows with calves	Total sample*
May 26	33.9(30.8)	28.4	21.0(15.4)	61.5	95(15)
May 30	51.6(50.0)	47.8	32.3(37.5)	40.0	99(12)
June 2	34.2(16.7)	31.0	20.1(16.7)	62.5	55 (7)
June 8	40.9(0)	36.7	29.5(0)	38.5	67 (8)

Data in parentheses for collared moose.

* Cows + calves + yearling females.

PREPARED BY: Christian A. Smith, Game Biologist III

APPENDIX III

Moose sex and age ratios, fall - 1977 - Alaska Peninsula - Unit 9

Trend area	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 large MM	Small MM % in herd	Small MM per 100 MM calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in herd	Moose per hour	Total sample
Katmai*	56.0	7.7	15.9	4.6	127	12.1	10.0	7.2	85	153
Flats B	10.4	3.2	44.4	2.5	40.0	16.0	33.3	12.7	105	158
Branch R.	40.4	6.4	18.8	3.1	54.6	23.4	0	11.2	65	98

* Trend area in Katmai National Monument, no hunting allowed.

PREPARED BY: Christian A. Smith, Game Biologist III

APPENDIX IV

Moose sex and age ratios - Alaska Peninsula - Unit 9

Date	Total males per 100 females	Small males per 100 females	Small males per 100 lg. males	Small male % in herd	Small males per 100 male calves	Calves per 100 females	Incidence twins per 100 females w/calf	Calf % in herd	Animals per hour	Total sample
11/62	99.4	19.0	23.6	8.2	115	33.0	24.4	14.2	91	1,113
4/63*	--	--	--	--	--	--	20.0	16.7	71	574
11/63	78.4	15.0	23.7	7.2	98	30.8	17.4	14.7	104**	1,646
11/64	58.7	10.2	21.2	5.9	138	14.9	9.9	8.6	146	1,423
1965	N O C O U N T S M A D E									
11/66	73.5	13.9	23.3	6.6	86	32.4	16.4	15.4	96	786
10/9-13/67	75.6	14.3	23.4	7.2	121	23.7	15.1	11.9	89	1,447
10/68	61.3	8.7	16.6	4.8	83	21.2	20.4	11.6	166	1,629
11/14-30/69	53.9	18.7	52.9	10.4	149	25.1	14.7	14.0	65	620
11/16,29 & 12/5,6/70	44.9	14.7	48.7	9.4	238	12.4	11.3	7.9	93	1,016
10/24-11/21-27/71	46.8	11.2	31.6	7.2	220	10.2	4.4	6.5	106	1,091
11-12/1972	51.0	11.8	30.1	7.1	170	13.9	6.9	8.4	92	954
12/7-14/73	30.4	5.1	20.3	3.7	119	8.6	11.1	6.2	65	677
11/15-20/74	23.0	5.7	32.6	4.1	83	13.5	5.3	9.9	91	1,402
11/11-30/75	36.0	7.6	27.0	5.1	116	13.2	13.7	8.9	72	938
11/2-4/76	28.9	5.8	25.2	4.1	83	14.0	5.6	9.8	85	786
11/16,30/77	31.7	9.1	40.5	6.3	136	13.4	15.0	9.2	139	747
12/3, 15/78	31.6	5.3	20.2	3.6	67	16.0	16.7	10.8	85	409

* Area not specified in 1963.
** Raw data not available to check for accuracy.

PREPARED BY: Christian A. Smith, Game Biologist III

APPENDIX V

Moose antler sealing data, 1976-1978 - Subunit 9(E)

Season	Mean age	Mean spread of residents' moose	Mean spread of nonresidents' moose	Mean spead 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

* Sample size in parentheses.

PREPARED BY: Christian A. Smith, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 11 - Chitina Valley and the eastern half of Copper River Basin

Season and Bag Limits

Sept. 1 - Sept. 20	One bull

Harvest and Hunting Pressure

Forty moose were reportedly harvested in Unit 11 with 157 hunters afield during 1978 (Appendix I). This harvest figure approximates the previous 4-year average of 41 moose. The harvest, hunting pressure, and hunter success have been stable since 1975 when the November season was eliminated and bag limits were reduced. Prior to 1975 the annual moose harvest averaged 164 animals.

Between 1966 and 1974 an average of 431 hunters reported hunting in Unit 11 each year. During the last 4 years this average declined 62 percent to 165 hunters per annum. Reported hunter success has averaged 24 percent for the last 4 years.

Composition and Productivity

No moose sex and age composition data were obtained during 1978.

Management Summary and Conclusions

The moose harvest in Unit 11 has been stable since the reductions in season length and bag limit in 1975. There has been little change in the yearly number of hunters and success ratio since that time.

The creation of the Wrangell-St. Elias National Monument in 1978 will apparently place most Unit 11 off limits to sport hunting.

Recommendations

Count areas should be established and consistently counted to allow collection of meaningful survey and inventory data.

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Regional Management Coordinator

APPENDIX I. Moose harvest and hunting pressure - Unit 11

Year	Harvest				Hunters	Percentage success
	Male	Female	Unid.	Total		
1963	86	37	0	123		
1964	89	38	0	127		
1965	116	70	2	188		
1966	89	69	5	163	263	62%
1967	108	70	2	180	317	57%
1968	99	34	8	141	293	48%
1969	101	59	2	162	378	43%
1970	126	115	1	242	562	43%
1971	90	89	2	181	546	33%
1972	86	55	5	146	525	28%
1973	105	77	5	187	594	32%
1974	79	43	1	123	397	31%
1975	38	0	2	40	164	24%
1976	48	0	0	48	196	24%
1977	34	0	1	35	146	24%
(1977)	43*	0	0	43*	231**	19%
1978	40	0	0	40	157	25%

* Corrected for absense of reminder letters ($\pm$ 15, P = 0.05) (r^2 = 0.99)
** Corrected for absense of reminder letters ($\pm$ 61, P = 0.05) (r^2 = 0.99)

PREPARED BY: Robert Tobey, Game Biologist II.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 12 - Upper Tanana and White Rivers

Seasons and Bag Limits

Unit 12, that portion along Nabesna Road east of Unit 11 which includes all drainages of Jack Lake, Jack Creek, Platinum Creek and Jacksina Creek upstream to the head of the north branch of Canyon Creek	No open season	
Remainder of Unit 12	Sept. 1-Sept. 20	One bull

Population Status and Trend

Moose densities in Unit 12 were variable but probably declined somewhat in most portions of the Unit due primarily to natural causes. Moose density was greatest in the Little Tok and Tok drainages area. Populations in the remainder of Unit 24 have remained low since declines in the early 1970's.

Population Composition

Sex and age composition surveys were flown in Unit 12 from October 16 through November 13, 1978. A summary of those surveys is presented in Table 1.

Table 1. Results of aerial moose surveys conducted in Unit 12 during fall 1978.

Area	Total M per 100 F	Small M per 100 F	Small M % in Herd	Calves per 100 F	Calf % in Herd	Moose per Hour	Total Moose
Little Tok River	20	7	5	11	8	70	230
Tok River	23	6	4	24	16	61	176
Alaska Range*	50	7	3	57	28	15	29
Nabesna River	13	7	5	20	15	10	20

* Results of this survey are not totally comparable to past surveys due to a change of pilots.

These surveys may not be representative of moose populations east of the Nabesna River where lower densities exist.

Mortality

During the 1978 moose season 98 bulls were taken in Unit 12, but the actual kill may have been greater due to an unknown level of non-reporting. The Little Tok River contributed 32 percent of the harvest, followed by the Tok River - 17 percent, the Chisana River - 12 percent, the Nabesna River - 11 percent, the Tanana River - 10 percent, and the White River and Beaver Creek and Tetlin River - 5 percent each. No location was reported for the remaining 3 percent. A total of 350 hunters reported hunting moose in Unit 12 with a 28 percent rate of success. Most successful hunters used either ATV's or aircraft for transportation.

In addition to the reported take, three moose were killed on highways, and at least two others were poached. It is estimated that at least 20 moose may be taken illegally each year, predominantly in the northeastern portion of the Unit near Northway and Tetlin. Two young bulls were taken during March on the Tok Cutoff in defense of life and property. Both were emaciated and apparently restricted (by deep snow) to private driveways.

The observed low levels of calf and yearling survival and observations by local trappers suggested that the greatest moose mortality factor was predation by wolves and grizzly and black bears. Although the magnitude of such mortality is difficult to assess accurately, Unit 12 supports dense populations of all three major predators.

Winter range conditions along the lower Tok River are deteriorating as a result of vigorous fire suppression, and the number of moose wintering in this area are at or above long-term carrying capacity. Snow depths during March 1979 averaged approximately 3 feet. Most moose were concentrated along the Tok River where browse utilization of Salix alaxensis, S. arbusculoides, and Betula papyrifera approached 100 percent frequency of available leaders. Populus balsamifera was also heavily browsed with use of such unpreferred species as Alnus tenuifolia and Salix bebbiana fairly common. Some moose were in poor condition as of March 1979. Winter conditions were the worst since 1970-71.

Management Summary and Recommendations

If the bull/cow ratio in the heavily hunted Little Tok River drainage does not improve, further harvest restrictions will be indicated for this drainage.

A program to rehabilitate the range along the lower Tok River should be undertaken immediately to guarantee viability of the wintering population. Increased logging of riparian stands of Picea glauca and prescribed fires should be considered. To reverse the moose population

decline, aerial wolf hunting should be initiated in all areas of Unit 12 except the Tok and Little Tok River drainages.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 13 - Upper Sustina, Nenana, Delta, Copper and Matanuska River drainages

Seasons and Bag Limits

Sept. 1-Sept. 20 — 1 Bull

Harvest and Hunting Pressure

The 1978 harvest of 863 moose is the largest harvest since 1971 and represents 18 percent of the total reported harvest in Alaska. The Unit 13 success rate in 1978 was 28 percent.

Appendix I shows a comparison of moose harvests and hunting pressure since 1963. A total of 3,034 hunters reported hunting in 1978, 664 fewer than the extrapolated estimate for 1977; this suggests an overestimation in the 1977 extrapolation.

Composition and Productivity

Moose sex and age composition data since 1954 are given in Appendix II. In 1978, 22 calves:100 cows were observed, slightly lower than in 1977. The 1978 bull ratio of 19 bulls:100 cows represents the third consecutive year of slight increases in bull ratios.

Management Summary and Conclusions

Since 1975, the harvest data and the sex and age composition data collected suggest a slowly increasing moose population in Unit 13. Post-hunting bull:cow ratios seem to be stable or increasing over most count areas.

Recommendations

Maintain existing seasons and bag limits, and continue intensive research studies to determine cause of calf moose mortality.

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MOOSE - GMU 13 Nelchina Basin

APPENDIX I

A comparison of Annual Moose Harvest and Hunting Pressure, 1963-1978

Year	Season	Male	Female	Unknown	Total	Hunters	Percent Success
1963	Total	1385	343	7	1735		
1964	Total	1213	394	0	1607		
1965	Total	1318	3	10	1331		
1966	Total	1336	181	36	1553	4163	37
1967	1st	1009	319				
	2nd	112	0				
	Total	1217*	319	16	1552	4027	28
1968	1st	1013	243				
	2nd	171	0				
	Total	1240*	243	29	1512	4476	34
1969	1st	817	0				
	2nd	87	7	8			
	Total	1204*	7	8	1219	2553	48
1970	1st	746	56	14			
	2nd	271	58	8			
	Total	1141*,**	220	30*	1391	3535	39
1971	1st	703	333				
	2nd	205	338				
	Total	1126*	670***	18	1814	4881	37
1972	1st	559	5	7			
	2nd	39	2	1			
	Total	689*	7*	16*	712	3199	22
1973	Total	604	4	10	618	2513	24
1974	Total	768	3	23	794	2770	29
1975	Total	690	2	23	715	2978	24
1976	Total	708	1	23	732	3122	23
1977	Total	684	1	13	698	2299	30
(1977)****	Total	855	-	--	855****	3698****	23
1978	Total	846	1	16	863	3034	28

* Moose whose date of kill is unknown are included in the total.

** Adult, antlerless bulls killed during the late antlerless season are included.

*** Data from antlerless permit returns. Harvest ticket returns indicated a female kill of 614.

**** Extrapolated results to correct for absence of reminder letters in 1977. (Total = 855 $\pm$ 133, p = .05; hunters = 3698 $\pm$ 1,080, p = .05).

PREPARED BY: Sterling Eide, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX II

Moose Population Composition Counts, Nelchina Basin, 1952 - 1978

Date	Tot. MM per 100 FF	Sm MM per 100 FF	Sm MM Per 100 Lg. MM	Sm MM % in Herd	Sm MM Per 100 M calves	Calves per 100 FF	Incidence of twins per 100 FF w/calf	Calf % in herd	Animals per hour	Total sample
1952	61	14	29	7	68	40	17	20	N/A	683
1953	107	38	56	12	86	90	17	29	N/A	1100
1954	109	28	35	10	72	79	16	27	N/A	1700
1955	93	29	45	12	107	54	10	22	N/A	2146
1956	64	12	24	7	95	26	1	14	37	1099
1957	69	16	31	8	78	42	6	20	N/A	2295
1958	66	11	20	6	60	38	4	18	115	3490
1959	NO DATA									
1960	84	20	32	8	73	56	12	23	56	1367
1961	67	22	49	10	96	46	11	22	76	2764
1962	66	18	43	9	128	27	5	14	92	2534
1963	55	14	34	7	68	40	6	21	124	2059
1964	LATE COUNT--SEX COMPOSITION NOT USABLE									
1965	46	12	36	7	93	26	2	15	82	5931
1966	40	6	19	4	48	27	2	16	60	4534
1967	38	8	29	5	61	28	3	17	68	5338
1968	30	5	19	3	29	33	4	20	63	3042
1969	27	10	60	6	61	33	5	20	57	4096
1970	30	8	38	5	60	28	8	17	52	4549
1971	24	7	41	5	61	23	7	16	53	5256
1972	18	4	26	3	41	18	3	13	45	3994
1973	20	7	50	5	80	16	4	12	43	4830
1974	17	6	53	4	41	29	7	20	42	4297
1975	15	5	42	4	61	15	5	12	41	3105
1976	16	6	54	4	56	20	5	15	41	4424
1977	17	5	44	4	39	27	9	19	50	4598
1978	19	8	64	5	70	22	5	15	53	4655

PREPARED BY: Sterling Eide, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Subunit 14A - Palmer

Seasons and Bag Limits

Sept. 1-Sept. 20	One moose, provided that antlerless may be taken by permit only. 100 permits will be issued for Unit 14A and 100 permits for Unit 14B. See 5 AAC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

A total of 383 moose was reported harvested by 1,662 hunters in Subunit 14A (Appendix I). Of these animals, 331 were taken in the bull season by 1,574 reporting hunters (21% success). In the antlerless moose season, 52 moose were harvested by 88 hunters (60% success). Subunit 14A accounted for 72 percent of the total moose harvest in Unit 14.

The 1978 bull harvest was the highest recorded since 1973, when both early and late hunts were in effect. During that 31-day season hunters took 337 bulls. In 1978, 329 bulls were taken during a 20-day season. The reported bull harvest success rate (21%) in 1978 is an increase from 1977, due primarily to an apparent decrease in hunter participation from an extrapolated 2,042 hunters in 1977 to 1,574 in 1978 and an increase in the bull take from an extrapolated 307 in 1977 to 329 in 1978.

Moose mortality from causes other than hunting is presented in Appendix II. Road kills increased from 67 in 1977 to 108 in 1978. This was due, in part, to the increased snow depths early in winter 1978-79 which caused moose to move to lower elevations earlier than normal. The information on moose road kills was obtained from the Palmer office of the Fish and Wildlife Protection Division of the Department of Public Safety.

In 1978 the Alaska Railroad tracks were walked by Alaska Department of Fish and Game biologists from the milepost 147 A.R.R. bridge on the Knik River to Talkeetna. Of 178 dead moose tallied, 12 were located within Subunit 14A.

The 1974 through 1977 moose harvests in 14A were the lowest recorded since 1965. Antlerless moose hunts proposed by the Game Division during those 4 years were cancelled or not endorsed by advisory committees.

The winter of 1978-79 was considered severe. The number of road kills was much higher than in 1977-78. This was due to increased snow depths and high numbers of moose on the Parks Highway between Fairbanks and Anchorage. The number of moose reported killed (108) by vehicles in the winter of 1978-79 was as high as in 1972-73 when 109 road-killed moose were tallied.

Composition and Productivity

In Subunit 14A, 1,174 moose were counted during the annual sex and age composition surveys on 12 and 16 December 1978 (Appendix III). Only three of eight count areas in Subunit 14A were flown. In spite of the late survey, conducted when some bulls had already dropped their antlers, bull:cow ratios observed (15 bulls:100 cows) were equivalent to the 1977 ratio of 16 bulls:100 cows.

The calf:cow ratio in 1978 was 42 calves:100 cows; this is similar to those recorded from 1973 through 1977. Calf:cow ratios may decrease in the future if antlerless hunts are not continued to relieve overbrowsing of winter range.

Management Summary and Conclusions

The moose population in Subunit 14A is increasing. Mild winters in direct combination with the lack of antlerless moose harvests, plus the restricted seasons on bulls have contributed to the increase. Concurrently, human encroachment has taken place, decreasing available habitat, particularly winter range. Although calf:cow ratios are high and survival appears excellent, reduced winter range and increases in moose numbers will lead to browse deterioration. This will eventually reduce the numbers of moose that can be supported and extensive winter kills can be expected.

Animal population dynamics are poorly understood by advisory committees and some members of the public. Attempts to maintain appropriate sex ratios and to keep the herd within the carrying capacity of its habitat have proven difficult to achieve, but this situation is improving. The local advisory committee accepted the Game Division's antlerless moose hunt proposal for the 1978 season. For 1979, a limited antlerless hunt (200 permits) for Subunit 14A has also been approved.

Range rehabilitation would improve moose habitat, but high property values and the expense of rehabilitation preclude (except for State-owned land) these solutions.

Recommendations

Antlerless moose seasons should be continued and expanded and the present bull season should be continued. Critical winter range has been identified, and a program of browse rehabilitation should be initiated in selected areas of state land.

PREPARED BY:

Jack C. Didrickson
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose harvest and hunting pressure in Alaska's Game Management Subunit 14A, 1972-1978.

Season	Bulls	Cows	Unid.	Total	Hunters	Percent success
1972						
8/20-9/20	83	1	1	85		
11/1-11/20	100	1	0	101		
9/1-9/20 antlerless	0	75	0	75		
To be announced antlerless	S E A S O N		C A N C E L L E D			
Unknown date	29	17	2	48		
Total	212	94	3	309	No data	No data
1973						
8/20-9/10	136	0	2	138		
11/1-11/10	167	0	3	170		
To be announced antlerless	S E A S O N		C A N C E L L E D			
Unknown date	34	1	3	38		
Total	337	1	8	346	1,506	23
1974						
8/20-9/20	164	0	3	167		
To be announced antlerless	S E A S O N		C A N C E L L E D			
Total	164	0	3	167	1,225	14
1975						
9/1-9/20	166	1	0	167		
To be announced antlerless	S E A S O N		C A N C E L L E D			
Total	166	1	0	167	893	19
1976						
9/1-9/20 one bull	208	0	3	211	1,395	15
1977						
9/1-9/20 one bull	229	0	4	233	1,083	22
Extrapolated data*				(307)	(2,042)	(15)
1978						
9/1-9/20 one bull	329	0	2	331	1,574	21
9/1-9/20 antlerless	0	52	0	52	88	59
Total	329	52	2	383	1,662	23

* Data were extrapolated to correct for the absence of reminder letters.

PREPARED BY: Jack D. Didrickson, Game Biologist III

Appendix II. Verified moose mortality (excluding hunting) in Alaska's Game Management Subunit 14A during the period June 1-May 31, 1972 to 1979.

Road Kill						Incidental/Train Kill						Illegal Kill						Winter Kill					
*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.
1972-73																							
4	20	6	4	2	36	0	2	0	2	1	5	3	31	2	6	7	49	0	0	0	0	0	0
1973-74																							
2	17	7	5	2	33	1	4	2	6	1	14	1	37	2	2	7	49	1	1	2	3	0	7
1974-75																							
8	28	10	13	4	63	5	16	6	7	1	35	5	24	3	3	5	40	0	0	3	4	0	7
1975-76**																							
0	20	5	3	1	29	1	2	0	1	1	5	1	8	1	0	3	13	0	1	0	0	0	1
1976-77**																							
7	28	6	15	0	56	1	4	0	1	1	7	9	6	0	0	0	15	0	1	0	1	0	2
1977-78**																							
9	34	6	17	1	67	0	1	2	0	2	5	2	2	0	0	2	6	0	1	0	0	0	1
1978-79																							
15	42	8	30	13	108	3	3	1	1	4	12	4	7	1	3	28	43	0	1	1	0	7	9

Total Confirmed Non-Hunting Kill

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
Adult Male	7	5	18	2	17	11	22
Adult Female	53	59	68	31	39	38	53
Calf Male	8	13	22	6	6	8	11
Calf Female	12	16	27	4	17	17	34
? Sex &/or Age	10	10	10	5	1	5	52
Total	90	103	145	48	80	79	172

* Ad.M=Adult Male;Ad.F=Adult Female;Calf M=Calf Male;Calf F=Calf Female; ?=Unknown Sex or Age'Tot.=Total.

** A reduced effort was made to document moose mortality these years. Mortality along the Alaska Railroad Tracks was not tallied during the springs of 1976 through 1978.

PREPARED BY: Jack C. Didrickson, Game Biologist III.

Appendix III. Moose sex and age ratios, Game Management Subunit 14A, 1968-78.

Year	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % In Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 cows w/Calf	Calf % in Herd	Moose per Hour	Total Moose
1968	16	7	71	4	28	48	7	29	54	2378
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.									
1970	9	4	72	3	18	42	8	28	49	2360
1971	10	6	135	4	29	40	3	26	35	2063
1972	9	5	153	4	26	29	2	21	28	1395
1973	6	4	144	2	16	42	6	29	46	1982
1974	12	8	196	5	38	42	7	27	38	1932
1975*	15	11	250	7	50	44	6	27	49	682
1976*	19	9	96	6	41	44	6	27	51	880
1977*	16	7	70	4	29	45	9	28	51	936
1978*	15	7	88	4	33	42	7	27	64	1174

* Only count areas 1, 5 and 8 of eight count areas in Subunit 14A were surveyed.

PREPARED BY: Jack C. Didrickson, Game Biologist III.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Subunit 14B - Willow to Talkeetna

Seasons and Bag Limits

Sept. 1-Sept. 20	One moose, provided that antlerless moose may be taken by permit only. 100 permits will be issued for 14B. See 5 AAC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

The reported moose harvest in Subunit 14B was 61 males and 29 females (Appendix I). The 1978 bull harvest was nearly double the 1977 harvest, but it remained low relative to the number of moose in 14B.

Harvest and hunter success values increased from the previous year. Reduced harvests since 1971 resulted from cancelled antlerless hunts, elimination of the November season, shortening of the early season and poor access conditions. The September moose season was shortened during 1975 to conform with seasons in adjacent Units, and remained restricted through 1978. Although the 1978 harvest nearly doubled compared to 1977, the number of moose killed by trains still exceeds the legal harvest of moose by hunters.

For the first time in 4 years, an antlerless season (1-20 Sept.) took place in Subunit 14B. Of the 100 antlerless permits issued, 98 hunter reports were returned. Eighty-six permittees reported hunting and 26 (30%) were successful. Twelve permittees did not hunt.

Verified non-hunting mortality of moose in Subunit 14B is shown in Appendix II. Moose mortality by trains during 1978-79 was much higher than the previous 6 years. The Alaska Railroad tracks were walked by Alaska Department of Fish and Game biologists from the bridge at milepost 187.1 at Willow Creek to milepost 222.5 near Talkeetna, a distance of 35.4 miles. A minimum of 171 moose kills was tallied. It is probable that the total number of moose killed by trains was higher as some dead moose were removed earlier by railroad crews. The highest areas of mortality occurred between mileposts 198-199, 203-205 and 216-217.

Composition and Productivity

Bull:cow ratios declined to a low of 11 bulls:100 cows in 1973 but apparently recovered subsequently (Appendix III). No sex and age composition surveys were made in 1976 or 1977 in Subunit 14B. Low bull:cow ratios

have been relatively consistent during the 1970's, whereas calf:cow ratios have varied. In 1978, 1,000 moose were tallied to yield an 8-year high of 43 males:100 females. The highest previous bull:cow ratio was in 1975 when 23 males:100 females were seen. An excellent ratio of 42 calves:100 females was seen in 1978.

The ratio of bulls to cows among train kills (54 males:100 females) is close to the sex and age composition counts.

Jaws from moose killed by trains were collected and aged. The mean age of bulls was 3.2 years (n=37) and of females it was 6.3 years (n=53). For both sexes, this sample was not considered to be representative of the population; the actual age structure is undoubtedly older than indicated. Young animals appear to be more susceptible to mortality from trains than older animals; of the 127 moose jaws aged, 77 (60%) were classified as 1 or 2 years of age.

Management Summary and Conclusions

Moose harvests have declined during the 1970's. Cancellation of antlerless hunts, elimination of late seasons and reduction of the length of the early season have contributed to the declining harvest. Season restrictions have resulted primarily from public pressures rather than biological considerations.

Moose abundance in 14B is uncertain because of variations in counting conditions. The apparent poor condition of browse on the valley floor does not limit moose during mild winters because they can utilize areas of higher elevation. Moose in Subunit 14B are clearly food-limited during winters with deep snows. Because recent winters have been mild, the moose population appears to be increasing. Nevertheless, available browse has been reduced by past overuse and is decreasing further due to seral changes. Management plans should include creation of additional browse in accessible areas by range rehabilitation programs. This would permit human utilization of moose that would otherwise probably starve during severe winters. The number of moose killed by trains increased greatly during the winter of 1978-79; this kill was concentrated along certain portions of the Alaska Railroad.

Recommendations

Public acceptance needs to be gained for a substantial harvest of both sexes of moose. The local advisory committee has proposed a September permit antlerless moose hunt for 1979-80, and a special antlerless hunt may be held in 14B when and if snow depths cause moose to become available from the road system. These hunts should be continued.

Lands that can be used for range rehabilitation should be obtained through dedication of public ownership. The benefit:cost ratios of

various types of range rehabilitation efforts must be evaluated. Accessible lands in large tracts will be more beneficial to hunters than remote lands in small or scattered tracts. This land should be acquired or dedicated far in advance of the spread of substantial human settlement.

Certain lands, in key moose-train conflict areas should be set aside for range rehabilitation in an attempt to intercept moose during winter movements before they reach the railroad tracks.

PREPARED BY:

Jack C. Didrickson
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose harvest and hunting pressure in Alaska's Game Management Subunit 14B, 1972-1978.

Season	Bulls	Cows	Unid.	Total	Hunters	Percent success
1972						
8/20-9/30	13	0	0	13		
11/1-11/30	12	0	0	12		
9/1-9/30 antlerless	0	16	0	16		
Unknown date	10	0	0	10		
Total	35	16*	0	51	289**	18**
1973						
8/20-9/20	28	0	1	29		
11/1-11/20	59	0	1	60		
To be announced antlerless	C A N C E L L E D					
Unknown date	6	0	1	7		
Total	93	0	3	96	395	24
1974						
8/20-9/20	36	0	0	26		
8/20-9/20 antlerless	0	18	0	18		
Unknown date	5	0	0	5		
Total	41	18	0	59	355	17
1975						
9/1-9/20 bulls only	24	0	0	24	203	12
1976						
9/1-9/20 bulls only	38	0	2	40	226	18
1977						
9/1-9/20 bulls only	25	0	0	25	147	17
9/1-9/20***				(33)	(277)	(12)
1978						
9/1-9/20 bulls only	61	3	1	65	368	18
9/1-9/20 antlerless*	0	26	0	26	86	30
Total	61	29	1	91		

* Using antlerless permit returns rather than harvest report returns.
** Using harvest report returns plus additional successful permit returnees who did not submit harvest reports.
*** Extrapolated results to correct for absence of reminder letters.

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix II. Verified moose mortality (exluding hunting) in Alaska's Game Management Subunit 14B, June 1-May 31, 1972-73 through 1978-79.

	Road Kill						Incidental/Train Kill						Illegal Kill						Winter Kill					
	*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.
1972-73	1	0	0	0	2	3	0	4	2	1	3	10	0	0	0	0	1	1	0	0	0	1	0	1
1973-74**	1	3	0	1	1	6	0	1	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0
1974-75	1	0	2	0	2	5	4	16	2	8	19	49	0	1	0	1	0	2	0	0	1	1	0	2
1975-76**	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
1976-77	1	2	3	0	1	7	0	1	0	0	1	2	0	2	0	0	0	2	0	0	0	0	0	0
1977-78	0	2	0	1	2	5	0	0	0	0	5	5	0	0	0	0	4	4	1	0	0	0	0	1
1978-79	6	16	1	10	8	41	21	39	11	9	91	171	1	4	0	0	0	5	0	0	0	0	2	2

Total Confirmed Non-Hunting Kill

	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
Adult Male	1	4	5	1	1	1	28
Adult Female	4	5	17		5	2	59
Calf Male	2	0	5		3	0	12
Calf Female	2	1	10		0	1	19
? Sex &/or Age	6	1	21	1	2	11	101
	15	9	58	2	11	15	219

* Ad. F=Adult Female; Ad. M=Adult Male; Calf M=Calf Male; Calf F=Calf Female; ?=Unknown sex or age; Tot.=Total.

** A reduced effort was made to document moose mortality this period; moose mortality along the Alaska Railroad tracks was not tallied during the spring 1973, 1975 and 1976.

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix III. Moose sex and age composition and ratios, Alaska's Game Management Subunit 14B, 1970 through 1978.

	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % In Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 cows w/calves	Calf % in Herd	Moose per Hour	Total Moose
1970	29	10	48	6	46	41	7	24	--	1,942
1971	25	8	50	5	57	30	4	19	52	1,810
1972	22	2	13	2	18	28	2	19	32	1,142
1973	11	3	38	2	16	36	6	25	22	1,075
1974*	14	6	71	4	39	29	9	20	49	550
1975**	32	4	15	3	43	20	2	13	27	426
1976	Not Flown									
1977	Not Flown									
1978	43	8	22	5	58	27	20	16	42	1,000

* Only the portion of Subunit 14B between Willow Creek and Sheep Creek was flown in 1974.
** Only portions of Subunit 14B were flown in 1975.

PREPARED BY: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Subunit 14C - Anchorage Area

Seasons and Bag Limits

Sept. 5-Sept. 20 One bull

Harvest and Hunting Pressure

In Unit 14C, 18 moose were reported taken during the 1978 season. Only 12 percent of reporting moose hunters were successful (Appendix I). Moose harvest data from 1965 through 1978 are presented in Appendix II.

Non-hunting mortality of moose from 1 June 1978 through 31 May 1979 is shown in Appendix III. One hundred and three moose were killed during this period compared to 73 during the previous reporting period. The number of moose killed by motor vehicles was the highest on record (93) and exceeded the number killed during any previous 12-month period. Deep, early snow and large concentrations of moose in lowland areas near major roadways, together with increased traffic loads, remain the major factors for continued moose mortality by motor vehicles. Although moose were killed each month, the greatest mortality occurred during January and February.

Composition and Productivity

Four hundred and thirty-four moose were observed during fall and winter surveys within the Subunit (Appendix IV). The Eagle River drainage, Bird Creek and Indian Creek were not surveyed. The overall calf ratio was 39 calves:100 cows while the bull ratio was the highest on record at 31 bulls:100 cows. However, the ratio of bulls to cows within the Twentymile River drainage, presently closed to moose hunting, remains the lowest of any area within the Subunit.

The average age of 38 road-killed cow moose was 6.9 years. All age classes were well represented.

Management Summary and Conclusions

The number of moose harvested and the percentage of successful hunters in Subunit 14C were at an all time low during 1978. Conversely, road kill mortality was at an all time high, more than five times greater than the sport harvest. Composition counts indicated that total numbers of moose have declined by 10 percent from the previous year, most likely a direct result of highway mortality. Most of the decline appears to have occurred in the Fort Richardson - Elmendorf area. Reflecting the low harvest levels, composition count data reveal the highest bull:cow ratio on record.

Given the excessive number of road-killed moose over the past 2 years coupled with the record low sport harvest (54 percent below the

1974 through 1977 mean harvest of 39) there is reason for concern over the status of the 14C moose population.

Recommendations

Fall composition counts should be flown in all 14C count areas in order to evaluate population trends.

Continued attempts at reducing moose-auto accidents should be pursued by the Departments of Transportation and Fish and Game as well as by Fort Richardson military personnel. Additional highway lighting and reduced speed limits should be considered to reduce the incidents of moose-auto accidents.

No change in season or bag limit is recommended.

PREPARED BY:

David B. Harkness
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Comparison of success among persons hunting bull moose excluding Anchorage International Airport and Fort Richardson hunts.

YEAR	BULL KILL	NO. HUNTERS	PERCENT SUCCESS
1969	92	215	43
1970	65	181	36
1971	93	226	41
1972	41	137	30
1973	78	388	20
1974	41	265	15
1975	29	197	15
1976	41	184	22
1977	32	164	20
(1977)	41*	266*	15
1978	18	155	12

* Corrected for absence of reminder letters.

PREPARED BY: David Harkness, Game Biologist III.

APPENDIX II

MOOSE HARVEST - UNIT 14C

YEAR	BULLS	COWS	UNKNOWN SEX	TOTALS
1965	246	249	2	497
1966	134	77	4	215
1967	55	1	5	61
1968	90	38	0	128
1969	92	14	2	108
1970	65	5	6	76
1971	98	38	1	137
1972	55	39	3	97
1973	93	41	3	137
1974	41	4	1	46
1975	29	0	0	29
1976	41	0	0	41
1977	32	0	0	32
(1977)	41*	-	-	41*
1978	18	0	0	18

* Corrected for absence of reminder letters.

PREPARED BY: David Harkness, Game Biologist III.

APPENDIX III

14C Moose Road Kill - Poaching fatalities, June 1, 1978 - May 31, 1978

DATE	AUTOMOBILE	POACHED	OTHER(Train etc.)	TOTAL
June 1977	1	0	0	1
July	5	0	0	5
August	8	0	0	8
September	11	1	1	13
October	7	0	0	7
November	9	1	0	10
December	8	0	0	8
Jan. 1978	19	0	1	20
February	17	0	2	19
March	4	1	3	8
April	3	0	0	3
May	1	0	0	1
	93	3	7	103

PREPARED BY: David Harkness, Game Biologist III

APPENDIX IV

Moose sex and age ratios 1966-1977 - 14C

Date	Tot. M per 100 F	Sm. M per 100 F	Sm. M per 100 Lg. M.	Sm. M % in herd	Sm. M. per 100 M Calves	Calves per 100 F	Incidence of twins per 100 F 2/calf	Calf % herd	Animals per hour	Total Sample
1966	18.2	9.9	118.8	6.3	53.5	37.0	4.5	23.7	43	300
1967	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	25	128
1968	22.9	8.4	58.3	5.6	60.9	27.7	11.5	18.4	74	376
1970	23.7	9.5	66.7	5.3	40.0	47.4	6.4	26.4	46	757
1971	21.3	11.2	112.1	7.5	86.7	26.0	2.8	17.2	61	870
1972	21.9	6.0	37.9	3.9	37.9	31.7	6.7	20.6	36	639
1973	15.8	6.2	63.6	4.0	35.2	34.2	6.2	22.9	36.5	694
1974	--	--	--	--	--	--	--	22.9	31.0	528
1975	22.3	7.2	27.7	4.6	44.7	32.2	7.0	20.8	27.1	452
1976	27.0	11.3	72.0	6.9	63.2	35.8	6.8	22.0	36.5	518
1977	21.8	7.5	52.5	4.7	40.8	37.1	5.6	23.3	38.5	655*
1978	31.3	9.0	40.4	5.3	46.5	38.8	6.9	23.0	30.0	434

* Includes 2 additional drainages for the first time.

PREPARED BY: David Harkness, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 15A - Kenai

Season and Bag Limit

Sept. 1-Sept. 20 One bull

Harvest and Hunting Pressure

Harvest report returns indicated that 164 moose were killed and 835 hunters hunted in Subunit 15A during the 1978 season (Appendix I).

Hunter effort has varied from 695 (1975), to 933 (1976), to an extrapolated estimate of 1,301 (1977), then declined to 835 (1978). Hunter success was 20 percent in 1978 compared to 14 percent (extrapolated) in 1977 and 17 percent in 1976.

Residents accounted for 99.4 percent of the moose harvest in 15A during 1978.

Composition and Productivity

Aerial surveys to determine moose composition were flown in a portion of Subunit 15A during 1978 and 824 moose were counted (Appendix II). The areas surveyed represent the best known moose habitat in Subunit 15A. The surveys were flown from late November through mid-December and revealed ratios of 14 bulls and 31 calves:100 cows, moderate increases from the 1976 and 1977 findings. However, the incidence of twins:100 cows with calves (4:100) and small bull percentage of the herd (3%) still remain critically low, indicating poor recruitment. If this low level of recruitment persists, the majority of the 15A moose population will soon be old adults. This age structure would be particularly vulnerable to wolf predation and starvation during moderate to severe winters.

Management Summary and Conclusions

The reported harvest of 164 moose by 835 hunters during 1978 represents a slight decline in harvest and a significant decline in hunting effort compared to the extrapolated figures for 1977. Thus, the relatively high hunter success in 1978 may be attributed to good calf survival during the past 3 winters.

Studies indicate that the 1947 burn has reached the end of its productive life as a provider of browse for moose. However, moose are beginning to benefit from the habitat enhancement of the 1969 burn and from the crushing program conducted by personnel from the Kenai National Moose Range. 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 efforts between the Federal and State agencies. The current level of harvest with bulls-only seasons has resulted in a low ratio of bulls to cows, however, the existing ratio has been shown by several studies to be adequate to achieve high pregnancy rates in females.

Recommendations

No change in seasons or bag limits is recommended.

PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose Harvest and Hunting Pressure, Subunit 15(A) (Harvest Ticket Return Data).

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success	Season Date
1966	1st	211	185	0	396			Aug20-Sept30
	2nd	137	0	0	137			Nov 1-Nov 20
	Combined	382[1]	185	0	567[1]	-	-	
1967	1st	185	0	0	185			Aug20-Sept30
	2nd	62	0	0	62			Nov 1-Nov 20
	Combined	247	0	0	247	1036	24	
1968	1st	166	1	0	166			Aug20-Sept20
	2nd	91	0	0	91			Nov 1-Nov 20
	Combined	268[1]	1	0	269[1]	1092	25	
1969	1st	-	-	-	-			Aug20-Sept20
	2nd	-	-	-	-			Nov 1-Nov 20
	Antlerless			NOT HELD				
	Combined	287	-	7	294			
1970	1st	134	0	3	137	-	-	Aug20-Sept20
	2nd	69	0	1	70	-	-	Nov 1-Nov 20
	Antlerless	16	191	3	209	-	-	
	Combined	291[1 2]	191	11[1]	493	918	54	
1971	1st	153	223[2]	1	376			Aug20-Sept20
	2nd	141	261[2]	0	402			Nov 1-Nov 20
	Antlerless							
	Combined	369[1]	484[2]	4	897	1637	52	
1972	1st	106	145[2]	1	236			Aug20-Sept20
	2nd	54	0[2]	0	54			Nov 1-Nov 20
	Combined	193[1 2]	145[2]	1	339[1]	1518	22	
1973	1st	156	4	2	162		19	Aug20-Sept20
	2nd	82	2	1	85			Nov 1-Nov 20
	Combined	259[1]	7[1]	4[1]	270[1]	1427		
1974		141	6	5	152	801	19	Aug20-Sept30
1975		101	0	0	101	695	14	Sept1-Sept20
1976		161	0	3	164	993	17	Sept1-Sept20
1977		144	1	6	151	762	20	Sept1-Sept20
(1977)[3]		(182)	-	-	(182)	(1301)	(14)	Sept1-Sept20
1978		163	1	0	164	835	20	Sept1-Sept20

[1]Total of 1st and 2nd season may be less than for combined season because of inclusion of animals for which date of kill was not given.
[2]These data from permit returns. Numbers include both male and female calves.
[3]Extrapolated figures: For harvest (182±51, p = .05), for hunter numbers (1301±568, p = .05).

PREPARED BY: Ted H. Spraker, Game Biologist III

Appendix II. Moose Sex and Age Composition Counts - Game Management Unit 15(A).

Date	Tot. ♂ per 100 ♀	Sm. ♂ per 100 ♀	Sm. ♂ per 100 Lg. ♂	Sm. ♂ % in Herd	Sm. ♂ per 100 ♂Calves	Calves per 100 ♀	Incidence of twins per 100 ♀ w/calf	Calf % in Herd	Animals per Hour	Total Sample
2/3-21/62[1]	17	7.9	89	4.8	36	44	14.1	27	-	1,568
1/64[1]	-	-	-	-	-	-	6.3	24	-	2,171
2/1-12/64[1]	12	3.8	46	2.7	25	30	5.1	21	-	2,480
6/65[2]	44	-	-	-	-	33	8.3	19	11	1,200
6/66[2]	51	-	-	-	-	25	3.7	14	-	795
10/3-16/67[2]	12	4.3	59	3.0	26	34	15.8	23	-	572
12/68	17	7.9	84	4.7	37	43	5.1	25	92	2,661
11/18-20/69[3]	13	3.9	42	2.4	16	48	7.2	30	-	705
11/30-12/2/70	14	5.4	59	3.7	33	32	5.9	22	58	1,589
11/8-16/71	21	7.4	53	4.8	47	31	4.4	20	50	2,029
11/27-12/5/72[4]	16	3.2	26	2.0	16	41	4.6	26	39	1,723
11/21-27/73[5]	9	1.5	19	1.0	8	37	5.4	25	45	1,677
11/20-24-74[6]	9	3.0	51	2.0	14	41	6.6	27	42	1,067
10/27-29/76	11	5.0	85	3.6	37	27	4.4	20	34	606
11/1-17/77[7]	11	5.4	95	3.9	40	27	3.5	19	24	458
11/29-12/21/78	14	4	39	3	25	31	4	21	N/A	824

[1]Varied count areas.
[2]Lowlands only
[3]9A, 11, 12A, 12B, 18A, 18B
[4]C.A. 19F was never completely covered. All of the area in Mystery Creek drainage and the area south of Mystery Creek was covered.
[5]19D not surveyed.
[6]C.A.'s 19C, 19D, 19E and 19F not covered.
[7]Above C.A.'s plus 19A not covered.

PREPARED BY: Ted H. Spraker, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 15B - Soldotna

Seasons and Bag Limits

Unit 15B West	Sept. 1-Sept. 20	One bull
Unit 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 bull by permit only. 40 permits will be issued by drawing. See 5AAC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

Harvest report returns indicated 34 bulls and one cow moose were killed and that 149 hunters hunted in Subunit 15B West; and 20 bulls killed in 15B East with 40 hunters afield during the 1978 season (Appendix I).

Hunter numbers have shown a slight downward trend in Subunit 15B West, and hunter success has varied from 13 (1975) to 23 percent (1976 and 1978).

In Subunit 15B East, 20 of 40 (50%) permit hunters were successful (Appendix I). The mean antler spread of harvested bulls was 41 inches, however, most hunters indicated that they were not trophy hunting. Successful hunters reported little difficulty in finding bulls and were generally pleased with the permit hunt.

Composition and Productivity

Moose composition surveys were flown in most of Subunit 15B East during November 1978 and 402 moose were counted. The proportion of bulls observed was 65 bulls:100 cows. Seventeen (11.6 %) of the 147 bulls observed were classified as yearlings and 100 (68.0 %) were classified as having an antler spread of greater than 45 inches. These results would be expected in a lightly hunted population.

Calf:cow ratios of 13:100 remained low in 15B East during the 1978 composition surveys (Appendix II). This level of recruitment is inadequate to replace mortality and it is probable that the majority of the moose in 15B are old adults.

Management Summary and Conclusions

Data from aerial surveys suggest a critically low level of recruitment into 15B moose populations. If low levels of recruitment are similarily found in surveys flown in 1979, remedial efforts involving habitat improvement and predator control should be pursued. Any such efforts would require the cooperation of the Kenai National Moose Range and the Bureau of Land Management. Current trends in management policy for both organizations suggest that agreements to alter plant succession or to control predators will be difficult to achieve.

Under the current restricted seasons, the impact of hunting on 15B moose populations is negligible. 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.

Recommendations

Increase the number of permits in 15B East to 50, with minimum antler size restrictions on the size of bulls which may be taken.

PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose Harvest and Hunting Pressure, Game Management Unit 15(B).

Year	Bulls	Cows	Unk. Sex	Totals	No. Hunters	Percent Success	Season Dates
1965	183[1]	193[1]	1[1]	377	-	-	-
1966	119[1]	26[1]	4[1]	149	-	-	Aug. 20-Sept. 30 Nov. 1-Nov. 20
1967	69[1]	0	1[1]	70	-	-	Aug. 20-Sept. 30 Nov. 1-Nov. 20
1968	108[1]	6[1]	2[1]	116	-	-	Aug. 20-Sept. 30 Nov. 1-Nov. 20
1969	119[1]	53[3]	2[1]	176	-	-	Aug. 20-Sept. 30 Nov. 1-Nov. 20
1970	69[1] *(15BE=50, 15BW=18) (Unk.=7)	75[1]	2[1]	146	-	-	Aug. 20-Sept. 20 Nov. 1-Nov. 20
1971	128[1]	79[2](15BE)	5[1]	212	-	-	-
1972	73[1]	11[2](15BE)	1[1]	85	-	-	Aug. 20-Sept. 30 Nov. 1-Nov. 20
1973	145[1] 15BE=82 15BW=63	116[1](15BE)	6[1]	267	877	30	Aug. 20-Sept. 30(15BE) Nov. 1-Nov. 20 Aug. 20-Sept. 20(15BW) Nov. 1-Nov. 20
1974	95[1]	1[1]	1[1]	97	313	31	Aug. 20-Sept. 30
1975[4]	24[1]	-	-	24	182	13	Sept. 1-Sept. 20
1976[4]	38	0	0	38	167	23	Sept. 1-Sept. 20
1977[5] (15BW)	25	0	0	25	162	15	Sept. 1-Sept. 20
1977[6] (15BE)	13	0	0	13	40	33	Sept. 1-Sept. 30
1978 (15BW)	34	1	0	35	149	23	Sept. 1-Sept. 20
1978[5] (15BE)	20	0	0	20	40	50	Sept. 1-Sept. 30

[1]Data derived from harvest reports.
[2]Data derived from registration permit returns.
[3]Data derived from field observations.
[4]Unit 15BE closed.
[5]Extrapolated results: For harvest (25 ± 7, $p=.05$, $r^2=1.0$), for number of hunters (162 ± 71, $p=0.05$, $r^2=0.89$). Does not include 13 moose harvested in 15B (East) under permit or the 40 permittees.
[6]Data derived from permit returns.

PREPARED BY: Ted H. Spraker, Game Biologist III

Appendix II. Moose Sex and Age Ratios, Game Management Unit 15(B).

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Animals per Hour	Total Sample
1962	43	6	16	3	33	37	8	20	-	1832
1963	NO COUNTS MADE									
1964	44	5	14	3	52	22	6	13	65	1437
1965	NO COUNTS MADE									
1966	NO COUNTS MADE									
1967	29	4	14	2	44	16	2	11	-	457
1968	NO COUNTS MADE									
1969	NO COUNTS MADE									
1970	38	3	9	2	47	15	3	9	79	817
1971	NO COUNTS MADE									
1972	31	2	7	1	15	27	2	17	61	1093
1973	36	5	15	3	30	30	4	18	43	1010
1974	23	3	14	2	16	35	6	22	59	784
1975	NO COUNTS MADE									
1976	48	6	14	3	44	28	4	16	53	644
1977	41	10	32	7	272	7	4	5	40	505
1978*	65	8	13	4	113	13	3	7	46	402

* Data from permit areas 903-907 (15BE)

PREPARED BY: Ted H. Spraker, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 15C - Homer

Season and Bag Limit

Sept. 1-Sept. 20 One bull

Harvest and Hunting Pressure

Harvest report returns indicated that 120 moose were taken and 477 hunters hunted in Unit 15C during the 1977 season (Appendix I).

The number of moose hunters remained relatively constant in Unit 15C during the 1975 (658) and 1976 (638) seasons, but increased to 780 in 1977 then decreased to 477 in 1978. Success has varied from 14 (1975), to 18 percent (1976), to 13 percent (1977), then significantly increased to 25 percent during 1978. Residents harvested 93.3 percent of the reported take of 120 animals.

Composition and Productivity

In 1978 available funds and weather conditions made it possible to only count one area (Caribou Hills-15C-21) in Subunit 15C. The Caribou Hills count area showed significant improvement in the proportion of bulls to cows (40:100) when compared to the past 3 years (average of 22 bulls:100 cows) when sample sizes were similar. The ratio of 16 calves:100 cows observed also indicated a significant improvement over the 1977 ratio (8:100) but is still too low to maintain healthy levels of annual recruitment.

The number of moose observed per hour of flight time has remained relatively constant for the past 3 years in the Caribou Hills count area indicating the population may be stabilized at this low level.

Management Summary and Conclusions

A moderate increase in harvest occurred in 1978 despite the significant decrease in hunting effort in Subunit 15C. It is suspected that the favorable weather conditions influenced the harvest during 1978, since there were no data indicating significant population growth.

Efforts to set back plant succession by burning would be desirable in 15C. However, Borough, Federal, Native selection and lands already in private ownership are so interspersed with State lands that large-scale burning may not be feasible. Predator control (wolves and black bears) offers the only other tool available to help the 15C moose population recover.

The moose population in 15C is being held at a low level. The primary reason for this is believed to be predation by wolves and bears. This is supported by data indicating continued low productivity. Current levels of hunter harvests are not preventing this population from recovering.

Recommendations

No changes in seasons or bag limits are recommended.

PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I. Moose harvest and hunting pressure, Subunit 15(C), Homer

Year	Bulls	Cows	Unk. Sex	Total	Hunters	Percent Success
1961	-	106[2]	-	-	-	-
1962	-	100[2]	-	-	-	-
1963	349[1]	147[1]	-	496	-	-
1964	470[1]	337[1]	-	807	-	-
1965	263[1]	229[1]	-	492	-	-
1966	278[1]	72[1]	-	350	-	-
1967	294[1]	-	-	294	643	46
1968	404[1]	20[1]	5[1]	429	972	44
1969	420[1]	109[3]	4[1]	533	-	-
1970	319[1]	68[1]	7[1]	394	775	51
1971	263[1]	146[2]	4[1]	413	836	49
1972	170[1]	114[2]	0[1]	284	1,041	27
1973	152[1]	143[2]	5[1]	300	1,111	27
1974	230[1]	133[2]	3[1]	366	1,240	30
1975	94[1]	-	-	94	658	14
1976	112[1]	-	1	113	638	18
1977	81[1]	-	3	84	457	18
1977	101[4]	-	-	101[4]	780[4]	13[4]
1978	118[1]	-	2	120	477	25

1 Data derived from harvest reports
2 Data derived from permit hunt reports
3 Data derived from field observations
4 Extrapolated data, for harvest ± 28 ($p = .5$, $r^2 = 1.0$), for number of hunters ± 340 ($p = .5$, $r^2 = 1.0$)

PREPARED BY: Ted H. Spraker, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 16 - West Side of Cook Inlet

Seasons and Bag Limit

Unit 16A	Sept. 1-Sept. 30	One moose, provided that antlerless moose may be taken by permit only. 150 permits will be issued.
Unit 16B	Sept. 1-Sept. 30	One moose, provided that antlerless moose may be taken only from Sept. 1-Sept. 20.

Harvest and Hunting Pressure

A total of 803 moose was reported harvested with 2,538 hunters afield in Unit 16 during the 1978 season (Appendix I). Of the 803 moose reported taken, 617 were bulls (77%), 180 were cows (22%) and 6 were of unknown sex. Of these, 9 bulls, 32 cows and 3 of unknown sex were reported taken by hunters with antlerless moose permits during the Subunit 16A permit hunt.

The 1978 harvest was 33 percent above the 1977 extrapolated harvest of 603 moose. The number of hunters afield was a 12 percent increase over the extrapolated 1977 figure. Hunter success increased from 27 percent in 1977 to 33 percent in 1978. Trend analysis indicates that both the number of hunters and the number of moose taken are increasing steadily.

Harvest chronology indicates the majority of moose were taken during the first and third weeks of the season (Appendix II). The increase in harvest during the third week was at least partially due to the increased vulnerability of bulls during the rut. The last weekend of the antlerless season in Subunit 16B also occurred during this period and probably stimulated hunting pressure.

Transportation means used by hunters are shown in Appendix III. Aircraft remain the primary means of transportation for successful hunters (59%). Boats were used by 18 percent of the successful hunters. Both have been proportionately consistent since 1976 when boat usage increased sharply in the lower portion of Subunit 16A due to an open antlerless season. Seven percent of successful hunters used ATV's while 11 percent used highway vehicles for access to Unit 16 during 1978.

A portion of Unit 16 was surveyed Labor Day weekend to determine hunting pressure. Hunting pressure was high in more accessible areas. Concentrations of hunters were noted on the upper Kahlitna River and along the lower portion of the Yentna River, particularly in the Twentymile Slough area. Off-road vehicle activity was noted along Cache Creek and Black Creek Summit. Two new mining trails, one to the north along the ridge above Dollar Creek and the other from Upper Cache Creek to Longs Creek Summit, were used by ATV's and helped disperse hunting pressure.

Composition and Productivity

Adverse weather and snow conditions resulted in fewer sex and age composition surveys completed in 1978 compared to 1977. Survey conditions were very good in Sunflower Basin, fair in the Peters Hills and very poor in the Susitna-Beluga area. A total of 1,864 moose was tallied in Unit 16 during 1978. The unitwide bull:cow ratio of 40:100 was substantially higher than in 1977. An average of 55 moose per hour was seen in 1978, the same as 1977. The calf:cow ratio was 26:100, unusually low for this Unit, but substandard survey conditions may have been partially responsible.

Kroto Creek Slough and the Peters Hills were the only areas counted in Subunit 16A during 1978. A total of 792 moose was seen, yielding a ratio of 33 calves:100 cows and 38 bulls:100 cows. The number of moose seen per hour increased from 39 in 1977 to 46 in 1978. These ratios were slightly lower in the Peters-Dutch Hills sample of 714 moose, 31.7 and 37.5, respectively (Appendix IV). The incidence of twins remained the same at 8.3:100 cows with calves, this is the highest recorded since 1973. Indications are that this population is continuing a steady increase.

Sunflower Basin and Mt. Susitna-Beluga were the only areas surveyed in Subunit 16B in fall 1978. A survey of Mt. Yenlo was attempted but the majority of moose had migrated out of the count area as a result of deep snow.

The small number of moose seen in the Susitna-Beluga area was the result of poor survey conditions (Appendix V). A total of 469 moose was seen in 12.3 hours of survey time. The number of moose per hour (38) was considerably lower than in 1977 when 62 per hour were observed. The calf:cow ratio declined from 34.1 to 22.3. Since the 1977-78 winter was mild and no other causes of mortality were suspected to have occurred in this area during 1978, the observed decline in calf:cow ratios in Susitna-Beluga was considered to have resulted from poor survey conditions.

The 1978 survey of Sunflower Basin yielded the largest sample ever obtained in this area (Appendix VI). In a sample of 603 moose, the bull:cow ratio was 43.5 and the calf:cow ratio was 19.2. Until this year, Sunflower Basin had been exhibiting a downward trend in the calf:cow ratio and an increase in the bull:cow ratio. The density of moose in

this area is probably second only to Mt. Yenlo in Unit 16. One hundred and twenty-eight moose per hour were seen during the 1978 survey. Access to this area is very difficult during the September season. Much of it has not been hunted since the November season was discontinued which accounts for the increasing number of bulls in the area.

Management Summary and Conclusions

The 1978 harvest of 803 moose was the fourth highest on record for Unit 16. All higher harvests occurred prior to the prohibition of hunting the same day airborne and closure of the November season. The harvest has steadily increased since 1975 and hunting pressure has increased at a higher rate. Subunit 16B was the only area in South-central Alaska to have an unrestricted either-sex season in September, an attraction which has a significant effect on hunting pressure. Subunit 16A was the only area in Southcentral Alaska accessible by road that was open to moose hunting from 21 September through 30 September. Hunting pressure increased in this Subunit during the last 9 days of the season.

Aircraft remain the most popular method of access throughout most of Unit 16. Use of ATV's and highway vehicles in Subunit 16A has been relatively constant. Effective use of highway vehicles for the taking of antlerless moose in 16A is restricted by the 3-mile closure along the road system.

Sex and age composition counts in Subunit 16A indicate a continuing steady growth of these populations, although they still appear to be somewhat below the level which existed prior to the severe winter of 1971. The bull:cow ratio in the Peters Hills is continuing to increase and is presently higher than previously recorded. Composition counts in Subunit 16B revealed a stable population in Sunflower Basin. The low incidence of twins and the comparatively low calf percent in the herd indicate this population may be on the verge of a decline. Counts in the Mt. Susitna-Beluga area were not considered successful in 1978 and no confident conclusions can be drawn from the data.

Recommendations

Proposed wildlife management plans identify the area of Subunit 16B between the Kahlitna and the Yentna Rivers as an area suitable for managing for trophy bulls. Access into this area is very difficult during the September season, and the feasibility of having a November permit hunt for bulls only should be explored as this population is subject to little hunting pressure during the regular season.

Browse conditions in all major wintering areas should be checked and the possibilities for browse rehabilitation should be investigated. Areas of critical winter habitat should be identified for the Matanuska-Susitna Borough prior to their selections of State lands in Unit 16 in 1979.

Surveys in selected areas of the Bachatna Flats and Mt. Yenlo should be conducted this fall to provide a more complete profile of the Unit 16 moose population for the Board and local advisory committees.

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SUBMITTED BY:

James B. Faro
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Appendix I. Moose harvest and hunting pressure in Alaska's Game Management Unit 16, west side of Cook Inlet, 1973-1978.

Season	Bulls	Cows	Unid.	Total	Total hunters	Percent success
1973						
8/20-9/20	303	128	10	441		
8/20-11/20 Yentna	9	8	0	17		
16A - 11/1-11/10 and						
16B - 11/1-11/20	265	143	5	413		
16B antlerless	C A N C E L L E D					
Unknown date	32	18	4	54		
Total	609	297	19	925	1,995	46
1974						
16A - 8/20-9/20 and						
16B - 8/20-9/30	266	95	6	367		
16B - 11/1-11/20	49	49	1	99		
16A - 8/20-9/20 antlerless	0	30	0	30		
Unknown date	21	11	0			
Total	336	185	7	528	1,580	33
1975						
16A - 9/1-9/20	43	0	0	43		
16B - 9/1-9/20	110	0	2	112		
16B - 11/1-11/10	83	0	0	83		
Antlerless	C A N C E L L E D					
Unknown date	6	0	0	6		
Total	242	0	2	244	879	28
1976						
16A - Upper - 9/1-9/20 and Lower - 9/1-9/30	65	32	1	99		
16B - 9/1-9/30	245	111	2	358		
Total	310	143	3	457	1,690	27
1977						
16A and 16B - 9/1-9/30	348	136	1	485	1,465	33
(extrapolated data)				(603)*	(2,274)**	(27)
16A antlerless - 9/1-9/20	11	31	0	44	113	39
1978						
16A - 9/1-9/30	169	1	0	170		
16A - antlerless	9	32	3	44		
16B - 9/1-9/30	439	147	3	589		
Total	617	180	6	803	2,538	32

* Plus/minus 186 moose ($p=0.05$, $r^2=0.94$)

** Plus/minus 1,545 hunters ($p=0.05$, $r^2=0.75$)

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Appendix II. Chronology of moose harvest from harvest reports in Alaska's Game Management Unit 16, 1978.

	August	September				October	November	? Date	Total
		1-7	8-15	16-23	24-30				
Male	1	201	107	150	146	2	0	19	626
Female	0	86	31	25	1	1	0	5	149
Unknown	0	0	2	0	1	0	0	0	3
Total	1	287	140	175	148	3	0	24	778

Appendix III. Hunter success vs. transport means from harvest reports in Alaska's Game Management Unit 16, 1978.

Transport means	Successful means of transport				Unsuccessful means of transport				Total means of transport
	Res.*	NR	Unk.	Tot.	Res.	NR	Unk.	Tot.	
Aircraft	393	53	13	459	550	25	17	592	1,051
Horse	2	9	0	11	3	2	0	5	16
Boat	137	3	3	143	259	4	4	267	410
Motorbike	8	0	0	8	6	0	0	6	14
Snowmachine	1	0	0	1	0	0	0	0	1
Off-road vehicle	44	3	5	52	122	1	5	128	180
Highway vehicle	78	4	3	85	320	3	14	337	422
Afoot	3	0	0	3	1	0	0	1	4
No means reported	16	0	0	16	293	2	8	303	319
Total	682	72	24	778	1,554	37	48	1,639	2,417

* Res.=Resident; NR=Nonresident; Unk.=Unknown; Tot.=Total.

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Appendix IV. Moose sex and age ratios in Alaska's Game Management Subunit 16A, Peters-Dutch Hills count area, 1967-1978.

	Total M per 100 F	Small M per 100 F	Small M per 100 Large M	Small M % in Herd	Small M per 100 M Calves	Calves per 100 F	Incidence of Twins per 100 F w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1967	25	8	43	4	39	40	13	24	126	1121
1968	20	9	53	5	46	40	88	24	58	587
1969	NOT FLOWN									
1970	33	13	65	7	50	51	12	28	---	602
1971	26	8	42	5	49	32	3	20	42	815
1972	19	2	15	2	16	30	9	20	40	742
1973	21	6	42	4	27	46	11	27	41	858
1974	18	11	147	7	46	48	7	29	44	757
1975	30	11	55	7	88	24	1	16	34	478
1976	NOT FLOWN									
1977	32	8	33	5	41	39	9	23	46	621
1978	38	9	30	5	54	32	8	19	50	714

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Appendix V. Moose sex and age ratios in Alaska's Game Management Subunit 16B, Mt. Susitna - Mt. Beluga count area, 1968-1978.

Year	Total M per 100 F	Small M per 100 F	Small M per 100 Large M	Small M % in Herd	Small M per 100 M Calves	Calves per 100 F	Incidence of Twins per 100 F w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1968	48	7	18	4	54	27	4	15	54	457
1969	NOT FLOWN									
1970	65	10	18	5	64	31	12	16	83	175
1971	48	10	27	6	66	31	4	17	62	1139
1972	21	1	5	1	11	18	1	13	40	557
1973	34	7	24	4	30	44	11	24	33	324
1974	34	10	40	6	51	38	9	22	51	730
1975	NOT FLOWN									
1976	NOT FLOWN									
1977	35	8	30	5	47	34	10	20	62	824
1978	37	6	17	3	49	22	10	14	38	469

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Appendix VI. Moose sex and age ratios in Alaska's Game Management Unit 16, Sunflower Basin count area, Subunit 16B, 1973-1978.

Year	Total M per 100 F	Small M per 100 F	Small M per 100 Large M	Small M % in Herd	Small M per 100 M Calves	Calves per 100 F	Incidence of Twins per 100 F w/calf	Calf % in Herd	Animals per Hour	Total Sample
1973	30	8	39	5	49	34	7	21	85	494
1974	34	10	43	6	78	27	4	17	59	328
1975	38	13	52	8	140	19	5	12	62	363
1976	NOT FLOWN									
1977	45	11	33	7	135	17	4	10	112	504
1978	44	11	35	7	118	19	4	12	128	603

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 17 - Bristol Bay

Seasons and Bag Limits

Sept. 10-Sept. 20 One bull

Dec. 10-Dec. 31

Harvest and Hunting Pressure

Harvest reports submitted by 160 hunters indicated that 65 moose were harvested in Unit 17 in 1978; 63 of these were bulls and 2 were of unspecified sex (Appendix I). Resident hunters had a success rate of 33.3 percent and took 41 moose while nonresidents had a 71.9 percent success rate and took 23 moose. Overall success was 40.6 percent.

Composition and Productivity

No data were available.

Management Summary and Conclusions

The reported moose harvest in Unit 17 was substantially below the actual Unit harvest. The reported kill may accurately reflect the magnitude of the legal recreational kill, but the larger "subsistence" kill by local villagers is not reported. The inability to estimate this harvest accurately, coupled with the lack of sex and age composition data, makes it difficult to assess the overall impact of hunting on the moose population in Unit 17.

Moose numbers appear to be seriously depressed in the vicinity of Native villages as a result of extensive winter hunting. Limited habitat surveys indicate that these areas could support a larger moose population. More effective moose management in this Unit can only be accomplished through better rapport with local residents, a rapport which will convince them of the necessity to limit their harvest and abide by the regulations.

Recommendations

No changes in seasons and bag limits are recommended at this time. Data should be collected to more accurately determine the status of the population and the level of harvest.

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SUBMITTED BY:

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APPENDIX I

Moose harvest and hunting pressure - Unit 17

Year	Bulls	Cows*	Unk.	Total	# hunters	% success
1964	31	1		32		
1965	41	1		42		
1966	25	1		26	90	28.9
1967	37	0	1	38	77	49.0
1968	45	0	1	46	66	69.7
1969	11	1	3	15	31	48.4
1970	23	0	2	25	35	74.2
1971	36	0	1	37	63	58.3
1972	35	0	3	38	74	51.4
1973	39	2	1	42	93	45.2
1974	65	2	2	69	119	58.0
1975	113	0	2	115	207	55.6
1976	48	0	1	49	168	29.2
1977	54	0	0	54	113	47.8
1977**	67	0	0	67	173	38.7
1978	63	0	2	65	160	40.6

* No legal cow season has been held.
** Extrapolated to correct for absence of reminder letters.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 18 - Yukon-Kuskokwim Delta

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Forty-eight bull moose were harvested in Unit 18 during the 1978 fall season. This is slightly more than twice the number of successful hunters reporting last year, and probably reflects better compliance with the harvest ticket regulations rather than a significant increase in the actual moose harvest.

A total of 133 hunters reported hunting compared to 36 hunters reporting in 1977. Reminder letters were not sent out either year so this increase may be a reflection of the work done in conjunction with the media during, and following, the season. Forty-three of the successful hunters were Alaska residents and five did not specify their residence. No nonresidents reported hunting or taking a moose in the Unit in 1978. Four of the 125 hunters that reported residency were from urban areas, all of these hunters were unsuccessful.

Twenty-five moose were reported taken from the lower Yukon River, 13 from the lower Kuskokwim River and ten animals from undesignated areas. Forty-one of the moose were taken during the month of September. One animal was reported taken in late October and six were harvested during December.

In addition to the information gathered from the Department's harvest tickets, the regional Native corporation conducted a survey in many of the villages in the Unit which showed 32 moose taken on the

lower Kuskokwim. The lower Yukon villages did not respond to the survey. An ADF&G crew monitoring the harvest on the Yukon River during September documented 28 moose taken with 64 parties contacted during the survey. From these sources of information, I estimate the harvest for Unit 18 to be 72 moose; 37 from the Kuskokwim and 35 from the Yukon River.

Data from harvest tickets indicate 40 moose were taken by hunters using boats; six by hunters using snow machines and 2 by hunters using highway vehicles. Significantly, no one reported using aircraft for moose hunting in Unit 18 during the 1978 season. The regional corporation surveys also showed that hunters used boats and none used aircraft. The ADF&G's field crew also reported only seeing hunters using boats while hunting. Fish and Wildlife Protection officers flew aerial surveys during the moose season and reported no aircraft being used for moose hunting in Unit 18. All of these surveys reveal a trend, supported by information from the harvest tickets, which shows that only Unit residents hunted moose in this Unit during the 1978 season.

Range and Habitat

No major changes in habitat condition from past years are obvious at this time, and the range along the flood plains of the Kuskokwim and Yukon Rivers remains excellent.

Population Trend

Four hours of moose surveys were flown April 11, 1979 along the Kiseralik River. Although habitat looked fair in the headwaters no moose were seen and only one possible set of tracks was spotted. Survey conditions were marginal with overcast skies and spotty snow conditions present.

Eight hours of surveys were flown the next day following a course from Bethel to Devil's Elbow on the Yukon, along the Yukon River to the old village of Paimute, along the boundary of the Kalskag Management Area to Lower Kalskag on the Kuskokwim River, and along the Kuskokwim back to Bethel. The weather was excellent and snow conditions along the Yukon were fair. Snow cover on the Kuskokwim was very poor with almost 95 percent of the snow gone. Two moose were sighted near the Paimute area inside the Kalskag Management Area and tracks of more were observed. This section was probably supporting around seven moose at this time in April. Old tracks were observed in the Devil's Elbow area and all along the Yukon River to Paimute.

Management and Summary and Recommendations

It appears that one of the major limiting factors on the moose population in Unit 18, particularily along the Yukon River, is the extensive use of snow machines by Unit residents. In April, good winter browse was available in this area, but there was little sign of moose. Efforts to educate local hunters of the consequences of continual abuses of the existing game regulations should be continued. The lack of compliance with present regulations continues to curtail establishment of a viable moose population in this Unit.

This year's return of harvest tickets, particularly those of unsuccessful hunters, shows a significantly increased compliance by residents of the Yukon-Kuskokwim Delta with the harvest ticket program. I feel this is a good sign and reflects a show of good faith by many of the residents toward the Department. In addition, during the spring Game Board meeting, two advisory committees opposed their own proposals which were for an enlargement to the existing Kalskag Management Area, and the proposed establishment of several subsistence hunting areas, after they had carefully reviewed the available data and spoken to Department representatives. We are still a long way from 100 percent compliance but this year reflects a great deal more cooperation with the Department than in the past.

If spring moose surveys continue to reveal low moose population levels and hunter success remains low, reduced moose seasons should be instituted to try and reestablish moose populations in the Unit. A season similar to the one in the northwest section of the Unit, September 1 - September 20, would be appropriate. Local responsibility for the condition of the herd should be encouraged to bring pressure from within the Unit to curtail the illegal harvests.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 19 - Middle and Upper Kuskokwim Drainages

Seasons and Bag Limits

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

Population Status and Trend

Moose populations in Unit 19 continued to vary from low to moderate levels. The most notable increase occurred in Subunit 19D where yearling survival appeared to be excellent. Portions of Subunits 19A and 19B also exhibited better calf survival and an increased incidence of twinning. The lowest moose populations occurred in the upper Kuskokwim along the North Fork. Since 1973 moose in Unit 19 have been moderately abundant and populations have generally demonstrated a slow increase.

Population Composition

Fall composition surveys were not flown in Unit 19 during 1978. However, surveys of Subunits 19A and 19D were conducted in January and February 1979 (Tables 1 and 2, respectively). Calf production and survival appeared to be increasing in Subunit 19A except for the Aniak drainage where the population has probably stabilized (Table 1). Elsewhere in this Subunit the moose population increased slightly, partially in response to favorable climatic conditions and restrictive hunting regulations.

Table 1. Moose composition surveys, Subunit 19A.

Date	Area	No. Unid. Adults	Cows with 1 Calf	Cows with 2 Calves	Lone Calf	Percent Calf	Total Moose	Moose per Hour
1/21/79	Hoholitna R.	75	20	3	1	22	125	104
2/10/79	Holitna R.	95	27	4	0	22	161	107
2/10/79	Aniak R.	61	12	6	0	23	103	103
		231	59	13	1	21	389	105

Table 2. Moose composition surveys, Subunit 19D.

Date	Area	No. Unid. Adults	Cows with 1 Calf	Cows with 2 Calves	Percent Calf	Total Moose	Moose per Hour
12/19/78	McGrath to Sulatna R.	83	16	2	17	121	121
1/2/79	Kuskokwim R., McGrath to Big R.	47	8	0	13	63	90
1/6/79	Nixon Fork R.	28	9	2	25	52	74
1/8/78	Takotna R.	103	36	4	24	187	187
		261	69	8	20	423	128

The 1979 aerial counts in Subunit 19D support previous observations regarding a general increase in calf production and survival in the Nixon and Takotna River area and low recruitment in the upper Kuskokwim River drainage. Yearling bulls were notably prevalent in hunter kills from the McGrath area during September 1978; this further supported the suggested increase in surrounding moose populations.

Mortality

During the September 1-20 and November 1-30 season in Subunit 19A, hunters took 48 bulls, 25 of which were reportedly taken by individuals using boat transportation. The additional 23 bulls were taken by airborne hunters hunting mostly in the upland areas of the Subunit. Wolves continued to be a serious mortality factor in the Aniak and Holitna drainages. However, the aerial permit season during March 1979 resulted in a significant harvest of wolves in the Aniak drainage. About 50 percent of the wolves present in this Subunit were removed by permit holders or other hunters during 1978-79.

Hunters harvested 20 bulls from September 1-October 10 in Subunit 19B. This area is accessible only by aircraft; 91 percent of those hunting in this area reported using aircraft for transportation. The majority of the moose were taken by nonresident hunters. Although wolves were common in Subunit 19B, moose mortality due to predation may have decreased as a result of wolves utilizing caribou wintering nearby. Winter losses during 1978-79 were low and no carcasses (other than several wolf kills) were located during a survey in March 1979.

Harvest levels during the September 1-October 10 season in Subunit 19C remained about the same as 1977-78, with hunters taking 152 bulls. All but 11 were taken by hunters using aircraft for transportation.

The moose harvest increased in the Subunit 19D area as hunters took 100 bulls during the September 1-30 season. Hunters utilizing boats accounted for 75 percent of the harvest, airborne hunters took 15 percent, and hunters utilizing other transportation means contributed the remaining 10 percent. Wolves continued to cause significant moose mortality in

the North Fork Kuskokwim area. Wolf predation, in addition to the illegal harvest, is severely depressing this moose population. Elsewhere in Subunit 19D, deep snow and a brief cold spell caused some losses in the Middle Kuskokwim River and upper Takotna River. A conservative estimate of this loss is approximately 50-75 moose, or 5 percent of the local herd. Mortality due to wolf predation was lower than in previous years, but at least equaled or exceeded other winter losses.

The Unitwide harvest for 1978-79 was 332 bulls. This suggests an increase over the 1977-78 harvest and approximates the 1976-77 reported kill. The unreported and illegal kill for Unit 19 is estimated to be approximately 250 moose.

Management Summary and Recommendations

Moose populations in Unit 19 are generally showing slow growth as a result of improved productivity. These favorable herd conditions should allow some latitude in season lengths during the next few years, especially in Subunits 19A and 19B. Harvests of moose in the upland areas of these Subunits could increase without adversely affecting local moose populations. Since harvests in Subunit 19C are approaching the maximum allowable level, future harvests should be closely monitored. The current season length in Subunit 19D is adequate to provide hunting opportunities for all user groups; however, wolf populations in the North Fork area must be reduced to provide the moose population in this area some chance of recovery.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 20 - Central Tanana Drainage

Seasons and Bag Limits*

Subunit 20A	Sept. 1-10	One bull
Subunit 20B,C,D	Sept. 5-15	One bull
Subunit 20E	No open season	

* Refer to regulations for specific areas which were closed, or governed by permit hunts

Population Status and Trend

Subunit 20A: The moose population in Subunit 20A continued to increase due, primarily, to the wolf control efforts of the Department since 1976. Recruitment data suggested an annual population increase of 10 percent. In lieu of fall sex and age composition surveys on traditional count areas, an effort was made during fall 1978 to census moose by use of a stratified random sampling technique. This census resulted in a population estimate for Subunit 20A and Subunit 20C east of the Nenana River of 3,500 moose ($\pm$ 600).

Subunit 20B: Survey data indicated that moose calf survival and yearling recruitment were only fair in Subunit 20B. Because mortality probably at least equaled recruitment, the moose population continued to decline.

Subunit 20C: Moose numbers in Subunit 20C have been declining since the early 1970's and are presently at the lowest level in decades. Continued poor recruitment virtually assured that the herd did not increase; at best, moose numbers may have stabilized at a low level in some portions of the Subunit.

Subunit 20D: The moose population in Subunit 20D stabilized after a 3-year decline. Thirty moose per survey hour were recorded, and prior to the hunting season the population was estimated at 700 moose.

Subunit 20E: The moose population in Subunit 20E remained low and apparently declined 15 to 20 percent from 1977 levels despite the hunting closure.

Population Composition

Subunit 20A: Both calf survival and recruitment remained high in Subunit 20A, especially when compared to adjacent areas where wolf

control has not occurred. As in past years, differential survival rates were noted between the foothills and Tanana Flats, with the Flats showing higher calf and yearling survival. These differences probably reflect that a higher percentage of the wolf population was removed from the Flats than from the foothills. Sex and age composition data from November and December 1978 are summarized below:

Bulls per 100 Cows	Calves per 100 Cows	Percent Calves	Percent Yearlings
49	50	25	19

Precalving surveys to assess overwinter calf survival were conducted during mid-May 1979. These surveys are flown annually on standardized count areas on the Tanana Flats. Data obtained were comparable to 1978. Counts were conducted about a week earlier than normal because of advanced leaf emergence. Lack of antler development made some bulls difficult to distinguish; therefore, sex and age ratios obtained must be considered minimum. The combination of a mild winter during 1978-79 and continued wolf control efforts in Subunit 20A resulted in high moose calf survival. Results of the spring 1979 surveys indicated 29 yearlings per 100 cows, and 19 percent yearlings in the sample.

Subunit 20B: Subunit 20B fall sex and age composition surveys were confined to the Chena River drainage during 1978 because of limited manpower and aircraft availability. Nevertheless, 15.7 hours of survey time were expended in the Chena drainage, including the East Fork, the area adjacent to the Chena Hot Springs Road, and the Little Chena drainage. In general, the bull to cow ratio showed improvement over that of recent years. Calf survival remained about average, but was below the previous year's figure. Moose seen per hour of flying also remained low. Sex and age ratios for the November 1978 surveys are summarized below:

Bulls per 100 Cows	Calves per 100 Cows	% Calves	% Yearlings	Moose per Hour
45	33	18	16	15

Subunit 20C: Aerial surveys were flown during October and November in portions of Subunit 20C. The Salcha drainage was not surveyed due to shortages of aircraft and personnel. Nevertheless, counting conditions were good elsewhere, and the data were believed to be representative of moose populations throughout the Subunit.

In general, moose densities appeared to be low throughout Subunit 20C. The number of moose observed per hour of survey varied from 12-14 in most areas; the upper Beaver Creek drainage was the only area where moderate densities were noted. Despite the low densities, bull to cow ratios (averaging 53:100) were adequate for reproductive purposes and met management objectives for the area. These data reflect low harvests that have resulted from poor access and reduced availability of moose.

Sex and age composition data from the fall 1978 surveys are summarized below:

Area	Bulls: 100 Cows	Calves: 100 Cows	Percent Calves	Percent Yearlings	Moose per Hour
Goodpaster River	53	14	8	6	14
Victoria Creek to Woodchopper Creek (north side of Tanana Hills)	71	20	10	6	12
Upper Beaver Creek	134	23	9	12	32
Minto/Manley area	72	64	27	9	14
McKinley Park[1]	26	18	13	6	--
All areas surveyed	53	23	13	7	--

[1] Data provided by U.S. Park Service.

Recruitment in Subunit 20C was relatively poor (6-12% yearlings during fall surveys) and was probably insufficient to effect an increase in moose numbers. However, data for Minto Flats and Manley areas showed unexpectedly high calf/cow ratios which could not be adequately explained. Further surveys will be necessary to determine whether these data are representative of calf production or sampling bias.

Subunit 20D: November composition counts in Subunit 20D indicated that calf production (31 calves per 100 cows) was down slightly from 1978 levels (34 calves per 100). Production appeared more uniform throughout the Subunit than in the past. In the western areas adjacent to Subunit 20A where wolf control has occurred, 32 calves per 100 cows were observed. Elsewhere in Subunit 20D the calf/cow ratio averaged 29:100. Recruitment improved substantially (20% yearlings) over the previous year (8% yearlings). The bull/cow ratios (36:100) also increased from that recorded for 1977. Sex and age composition data from fall 1978 surveys are summarized below:

Bulls per 100 Cows	Calves per 100 Cows	% Calves	% Yearlings	Moose per Hour
36	31	18	20	30

Spring survival counts in Subunit 20D showed a slight reduction from 18 percent calves in the population (November 1978) to 13 percent (April 1979). This suggests that survival during winter 1978-79 was good.

Subunit 20E: Results of sex and age composition surveys conducted in Subunit 20E from November 19 through December 5, 1978 are presented below:

Area	Bulls per 100 Cows	Calves per 100 Cows	Calf % in Herd	Percent Yearlings	Moose per Hour
Kechumstuk-Mt. Veta	64	18	10	12	22
Ladue River	77	38	18	8	12
Mt. Fairplay[1]	57	14	8	16	10
Mosquito Flats[1]	34	0	0	6	26
Sixtymile Butte-W. Fk. Dennison	106	11	5	20	13
All Areas Surveyed	70	16	8	12	16

[1] Antler drop may have affected composition calculations.

Range and Habitat

Since moose numbers were low throughout Unit 20, range condition was not thought to be a factor presently operating to affect moose survival and, eventually, population size. Nevertheless, browse quality and quantity throughout the Unit are declining. The amount of existing browse is being reduced through succession, and vigorous fire suppression programs prevent new areas from being converted to high quality moose habitat. Although 29,000 acres of black spruce forest burned in Subunit 20D during 1979, most of this area will become farm land that will provide very little benefit to moose. Because of the reduced carrying capacity throughout Unit 20, restoration of moose populations to levels recorded prior to the 1970's will not occur unless habitat management programs are implemented.

Mortality

Subunit 20A: According to harvest ticket returns, hunters took 52 moose in Subunit 20A during the 10-day season in 1978, a moderate increase from the 35 animals reported taken during both the 1976 and 1977 seasons. According to antler size information from harvest tickets, 27 percent of the moose taken were yearlings. To assure a small harvest, the season was purposely set for a time of year when hunting conditions were poor. The distribution of the harvest, where known, is indicated below:

Drainage	Moose Harvest
Tanana Flats	17
Wood River	7
Delta River to Little Delta River	13
Gold King-Japan Hills	2

As shown below, aircraft was the favored means of transportation followed by boats and off-road vehicles.

Transportation Type	No. Successful Hunters	No. Unsuccessful Hunters
Airplane	25	53
Horse	5	3
Boat	12	89
Motorbike	2	0
Off-road vehicle	6	15
Highway vehicle	2	18
Not specified	0	28
Total	52	206

A total of 258 people reported hunting moose in Subunit 20A in 1978, approximately twice the number of hunters in each of the preceding 2 years. Residents accounted for 87 percent of the take and comprised 93 percent of the hunters in Subunit 20A. Overall success was 20 percent.

During fall 1978, approximately 20 packs of wolves, numbering at least 81 animals, were known to have occupied the area south of the Tanana River between the Delta and Nenana Rivers. Thirty wolves were removed from this area during winter 1978-79 by the Department's control program and by trappers. Wolves have been identified as the principal source of predation in Subunit 20A, but moose losses during this reporting period were relatively low because of the lowered wolf density.

Losses due to poaching in Subunit 20A were thought to have been negligible.

Subunit 20B: Harvest ticket returns indicated that 48 moose were taken in Subunit 20B by sport hunters during the 1978 season, an increase over the 35 animals taken during 1977. The relatively small harvest was due, in part, to the season timing and length (September 5-15). The distribution of the harvest is indicated below:

Drainage	Moose Harvest
Chatanika	15
Chena	19
Goldstream-Minto	8
Tanana	5
Tatalina	1
Total	48

A total of 592 people reported hunting in Subunit 20B during the 1978 season. Hunter success was 8 percent, down slightly from the previous year. Successful hunters expended an average of 4.7 days in the field. Yearling moose comprised 41 percent of the harvest, a reflection of both improved recruitment during 1978 and vulnerability of this age class to hunters. Resident hunters constituted 96 and 72 percent of the successful and unsuccessful hunters, respectively. Information regarding transportation modes is summarized below:

Transportation Type	No. Successful Hunters	No. Unsuccessful Hunters
Aircraft	2	9
Horse	0	7
Boat	3	31
Motorbike	0	3
Off-road vehicle	11	103
Highway vehicle	31	259
Foot	1	1
Unspecified	0	131

According to data from the Fish and Wildlife Protection Division, 10 moose were reported killed by automobiles in Subunit 20B during this reporting period. It is suspected that poaching accounted for a significant loss of moose. The Fish and Wildlife Protection Division estimated that a minimum of 15 moose were illegally taken. Additional mortality resulted from 14 wolf packs, numbering at least 69 animals, that ranged at least partially in portions of Subunit 20B. The magnitude of wolf predation in Subunit 20B was not determined, but if the rate of predation was similar to that recorded in the past for adjacent Subunit 20A, loss to wolves was probably the major source of moose mortality.

Subunit 20C: Most of Subunit 20C was open to sport hunting; only the Yanert Fork of the Nenana River drainage was closed. According to harvest ticket returns, 858 hunters harvested 130 moose, resulting in a success rate of 15 percent. Compared to 1977 the harvest declined 11 percent while the rate of success was unchanged. Twenty-one percent of the nonresidents were successful, but they only comprised 4 percent of the Subunit 20C moose hunters. The distribution of the harvest, where known, is indicated below:

Location	Moose Harvest
Healy River, Volkmar River, George Creek	6
Salcha River, Shaw Creek, Goodpaster River	24
Birch Creek, Steese Highway, Central, Circle	11
Beaver Creek, Nome Creek	7
Manley, Livengood	9
Totatlanika River, Nenana River	15
Stampede Trail	8
Kantishna River, Kantishna	19
Minchumina, Muddy River	2
Zitziana River, Wien Lake	2

The take in the northern and eastern portions of the Subunit continued to decline and, depending on the drainage, varied from 40 to 60 percent less than the 1976 harvest. On the other hand, some areas in the southwest portion of the Subunit experienced two-fold increases in harvest. Most likely the increased take in these areas resulted from an influx of hunters rather than from increased availability of moose. Several areas were undoubtedly underrepresented in the harvest. Families living along the Cosna River surely take a few moose each year (5 were

reported in 1976). Although not reflected by harvest ticket data, residents of Tanana, Rampart, Stevens Village, Beaver, Fort Yukon, and Circle probably took some moose in Subunit 20C during the 1978 season.

The most popular mode of access was boats (33%), followed by highway vehicles (24%), ORV's (15%), and aircraft (6%). However, hunters utilizing aircraft were most successful (35%), followed by those utilizing ORV's (26%). Those individuals who hunted along the road system were the least successful (11%).

Wolves were numerous in Subunit 20C (approximatley 1 per 40 square miles) and wolf predation was thought to be the primary cause of low calf survival. This is a manageable mortality factor, and until the current wolf to moose ratio (1:10) is lowered, increases in moose abundance are not expected. Illegal taking was also a significant source of mortality because it normally results in loss of a substantial number of cows. Since the legal harvest was relatively low and restricted to bulls, it is thought to have had very little impact on the population trends in the Subunit.

Subunit 20D: The total moose kill in Subunit 20D during the 1978 season was 24 bulls. Most of the harvest (14 bulls) occurred in the registration permit hunting area west of the Gerstle River. One hundred and sixty-five of the 215 permittees hunted, resulting in an 8 percent rate of success. Thirty-three percent of the bulls harvested were yearlings. The kill was 57 and 10 percent yearling bulls in the western and eastern portions of Subunit 20D, respectively. Known mortality other than hunting totaled 13 moose. Among these, 10 were road-kills, 2 were bulls shot illegally, and 1 involved a cow becoming tangled in telephone wire.

Overwinter loss was not thought to be unusually high. The winter of 1978-79 was relatively mild in Subunit 20D and snowfall was only slightly higher than average on moose winter ranges. Maximum snow depth at three sites averaged 18 inches from January through March, while the 10-year average snow depth for this period was 16.5 inches.

Although the amount of loss to wolves was unknown, ranges of wolf packs numbering approximately 40 animals were known to include portions of Subunit 20D. At the current (April 1979) ratio of 1 wolf per 17 moose, wolves are considered to be a significant mortality factor operating on the Subunit 20D moose population.

Subunit 20E: The moose hunting season was closed throughout Subunit 20E during the 1978 season. Although moose mortality due to human causes in the Subunit was negligible, some poaching likely occurred along the Yukon River during September when moose on the north side of the river in Unit 25 could be legally taken. While the wolf density has declined in this area since 1973, grizzly and black bear densities remained high. Consequently, predation was believed to be the primary mortality factor operating on moose in Subunit 20E.

Management Summary and Recommendations

The moose population in Subunit 20A continued to increase, unlike adjacent Units where populations have stabilized at low levels or were continuing to decline. The increase was due to ongoing wolf control efforts, in conjunction with continued restrictive hunting regulations, and a series of mild winters.

Management plans for Subunit 20A call for increasing moose numbers to the mid-1960's level. Recent range surveys indicate that, while the browse supply is adequate for the present population, both quality and quantity of browse are declining in most portions of the Subunit. Consequently, the carrying capacity is currently below that of the mid-1960's. Efforts should be directed toward creating more habitat through controlled burns and reduced wildfire suppression efforts. Without browse rehabilitation the full potential of current management efforts and the public demand for increased moose populations cannot be realized.

The ongoing wolf control program in Subunits 20A and 20C should be continued until the moose/wolf ratio has reached a level which allows the moose population to reach and maintain a level commensurate with the carrying capacity. Aerial hunting permits should be issued to the public as a supplement to reduced Departmental efforts during years of low funding.

Despite increases in yearling recruitment, the Subunit 20B moose population is probably still declining. Although wolf predation appears to be the largest single source of mortality, losses due to poaching, road-kills, legal harvest, predation by bears, and accidents exceed recruitment. A wolf reduction program should be initiated in Subunit 20B and restrictive hunting seasons should continue until population levels reach and maintain a level commensurate with the carrying capacity. Range rehabilitation should proceed in conjunction with efforts to reduce the level of predation.

Moose populations in Subunit 20C are far below carrying capacity, and numbers could increase severalfold before habitat would become a limiting factor. However, there is an urgent need to revamp fire management strategies for this area so that high quality moose habitat will be perpetuated. Moose numbers are low throughout most of Subunit 20C and probably will remain low because of continued poor recruitment. Legal harvests have been greatly reduced and this source of mortality, at the present level, is considered insignificant. Wolf predation is believed responsible for the poor calf survival and is probably the largest source of moose mortality.

Short, bulls-only hunting seasons should be continued in Subunit 20C until calf survival improves and moose numbers increase. A reduction in wolf numbers to a more favorable wolf/moose ratio would be the best short-term solution to problems with the moose herd. However, habitat improvement will eventually be necessary if large numbers of moose are to be maintained. Simply returning to a more natural fire regime (less fire suppression) would accomplish that goal.

The Subunit 20D moose population has declined over the long-term, primarily because moose habitat has deteriorated. However, overwinter losses through predation remain as the major factor limiting the moose population. Wolf control conducted by the Department in Subunit 20A is believed responsible for halting the population decline in western portions of Subunit 20D. Moose numbers and yearling and calf survival have increased slightly in the western portion of the Subunit, but in the eastern portion, 20 to 30 miles from Subunit 20A, the population is probably still declining. Consequently, wolf control activities should be increased to include all of Subunit 20D.

Because of the high proportion of old bulls in Subunit 20E, a limited bulls-only hunt may be justified. Active predator management to allow an increase in the moose population is certainly justified in Subunit 20E. This should be accomplished through allowing aerial hunting of a limited number of wolves by the public.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 21- Middle Yukon Drainages

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. 20	One bull
Remainder of Unit 21	Sept. 10-Sept. 30 Nov. 1-Nov. 30	One bull

Population Status and Trend

The status and trend of the Unit 21 moose population were difficult to monitor due to variations in the rates of production and mortality for the various subpopulations or herds. Moose surveys revealed calf percentages which ranged from 13 percent (portion of the Koyukuk drainage) to 32 percent (lower Yukon River area). Mortality from hunting and natural factors also varied because of differences in snow depth, flooding, abundance of wolves, harvest of wolves, hunter access, and proximity of moose to local villages. In some areas moose numbers were increasing, while in other areas declines were evident. Overall, the Unit 21 population was stable or increasing slowly.

Population Composition

Koyukuk River - Three fall moose surveys were conducted in portions of the Koyukuk River drainage. Population composition was similar to that observed in 1977. However, the number of moose observed per hour increased from six in 1977 to 90 in 1978 which was attributed to concentration of moose in response to deep snow during 1978. Bull/cow ratios (29:100), calf production (25:100), and yearling recruitment (7%) indicated a slightly declining population. However, removal of 12 wolves from the Dulbi drainage the preceding winter undoubtedly contributed to the high observed calf production (35:100). Calves comprised 21 percent of the Dulbi population compared to 13 percent for the adjacent portion of the Koyukuk River.

Nowitna River - Moose surveys were conducted in October following 6-10 inches of fresh snow. The majority of moose were concentrated along the Nowitna River north of the Little Mud River and on the Nowitna

Flats between the Nowitna River and Ruby. This was similar to their distribution during the hunting season. No moose were observed along the Nowitna River between the Little Mud River and the Susulatna River. However, by March moose had moved into the riparian habitat along the southern portion of the Nowitna River and its major tributaries. The composition counts indicated a healthy moose population with adequate sex ratios (32:100), calf production (42:100), and recruitment (14%). The counts were probably not representative of the entire herd due to the absence of a sample from the southern portion of the drainage where the wolf population was high.

Innoko River - Winter surveys were conducted during January and February in portions of the Innoko River drainage. The moose population remained at moderate levels during 1978 with calf production varying from 21 percent of the herd on the upper Innoko to 30 percent on the Iditarod and Dishna Rivers. Calf survival was slightly higher on adjacent portions of the Yukon River west of the Innoko where calves comprised 32 percent of the herd. This Innoko population should continue to increase provided wolf predation and illegal taking of moose are kept to a minimum.

Yuki River - The Yuki River was surveyed on January 12 from the confluence of Ketlkede Creek to the Yukon River. Snow depth was approximately 2-1/2 feet and moose were concentrated along the river. In a sample of 159 moose, calves comprised 22 percent.

Yukon River (Koyukuk to Bonasila River) - The Yukon valley from Koyukuk to the Bonasila River was surveyed on January 9 and 10. The snow depth was approximately 3 feet at Koyukuk and increased to 6 feet at Anvik. Moose were yarded on islands and in willow stands from Twentytwo Mile Island south to the Bonasila River where the snow depth exceeded 4 feet. Throughout this area the Yukon River was windblown which allowed moose movement along the river and between islands. Very little new snow fell for the remainder of the winter and by early March the settling and compaction of snow permitted moose to disperse from the yarding areas. Six dead moose were observed during an aerial survey on March 2 between Twentytwo Mile Island and Blackborn. Live moose appeared to be in very poor condition and by breakup mortality may have exceeded 5 percent of the herd. Although the population is probably increasing, considerable loss undoubtedly occurred to the excellent calf crop (32% of the herd) observed in January.

Moose density and productivity were much lower between Koyukuk and Twentytwo Mile Island where calves comprised only 16 percent of the herd. Moose densities recorded during surveys of this area were relatively low. This was partially due to less snow accumulation and subsequent concentration of moose prior to the surveys. Nevertheless, actual moose numbers in the area are thought to be low due in part to large harvests in recent years by Nulato and Kaltag residents. Overwintering mortality of moose was low in this area. However, during breakup the southern third of the Kaiyuh Flats flooded which may have resulted in some loss.

The Yukon River from Galena to Ruby, which was surveyed on January 18, exhibited moderate production (24% calves) and higher moose densities than that portion between Koyukuk and Twentytwo Mile Island.

Mortality

Based on hunter harvest reports, 353 bull moose were taken in Unit 21 during the 1978 hunting season. As mentioned in previous reports, the actual harvest was two or three times greater than the reported harvest.

Innoko Area - Hunters took 55 bulls along the Iditarod and Innoko Rivers outside of the Paradise Management Area during the September 1-20 season. Ten of the 35 moose harvested on or near the Iditarod River were taken by a group of unguided Swedish hunters. Fifty bulls were reported taken in the Paradise Management Area, mostly by local village residents. The unreported kill in this area may have exceeded 150 moose.

Snow accumulation in 1978-79 on the upper Innoko drainage exceeded 4 feet in some areas. Mortality resulting from a period of cold weather accompanying this deep snow in early February was not significant. However, several wolf packs (consisting of at least 28 wolves) affected moose survival in the North Fork area. Aerial hunters removed only five wolves from these packs during control efforts. Late spring flooding in 1979 probably did not cause significant loss of moose in the Innoko area.

Nowitna Area - A moose hunter check station was operated at the mouth of the Nowitna River during the September 10-30 season. Hunters utilizing riverboats for access who checked out at this station harvested 60 bull moose. Fairbanks residents accounted for the majority of this harvest (43), followed by residents of Ruby and Tanana (14), Anchorage (2), and nonresidents (1).

Based on hunter harvest reports, 62 bull moose were taken from the Nowitna River drainage. Additionally, 19 bull moose were reported taken along the Ruby-Poorman Road or along the south bank of the Yukon River between the Nowitna River and Ruby, for a total reported harvest of 81 moose from the Nowitna area.

Of the 62 moose reported taken from the Nowitna River, only 40 were reported taken by hunters traveling by boat. Even though hunters were checked in the field and reminded to mail in their harvest reports, one-third failed to do so. Perhaps some hunters felt that mailing in their harvest tickets was unnecessary since they had already been checked in the field by Fish and Game personnel. The adjusted known harvest from the Nowitna area would therefore be at least 103 bull moose. The total harvest including the unreported take is estimated at 130 to 150 moose.

Koyukuk Area - During the 1978 season a large portion of the Koyukuk River drainage within the Koyukuk Management Area was closed to the use of aircraft for hunting moose. As a result, only seven moose were harvested from the Koyukuk drainage by hunters using aircraft transportation, compared to 26 in 1977. All these moose were taken from the Dulbi River drainage southeast of the Koyukuk Management Area. An additional 50 moose were reported taken by hunters utilizing riverboats in 1978, compared to 22 in 1977. This increase in the reported take resulted from greater compliance with the harvest ticket reporting among local residents. The total harvest from the Koyukuk area was probably at least double the reported take.

In both the Nowitna area and the Koyukuk area snow depth was 3 feet or less and did not result in significant winter mortality. Only minor flooding occurred in both areas during the spring. Predation by wolves and bears and illegal harvest of moose by local residents continued to be significant sources of mortality in both the Koyukuk and Nowitna areas.

Management Summary and Recommendations

Substantial restrictions on seasons and bag limits since 1973 (when the moose season extended from August 20 through February 28 and the bag limit was 2 moose) have failed to reduce the level of illegally taken moose from Unit 21. These restrictions have resulted in reduction in the legal take by local residents, but no reduction in total harvest by local residents has occurred. The take by non-Unit residents has declined, and was insignificant compared to harvests by Unit residents.

Although the November season provided a second opportunity for local residents to legally take a moose, only 7 percent of the total harvest occurred during this period. Few nonlocal hunters participated in this hunt because of weather conditions that persisted during this season.

Considering the present moose population, the September 1-20 season on the upper Innoko is not considered to be too long. The moose herd in this area could withstand a harvest of 100 bulls annually. To achieve this level of harvest, it may be necessary to lengthen the fall season.

Unit 21 should be divided into subunits based primarily on access and human use patterns. It is exceedingly difficult to recommend meaningful season changes because of the underlying problems of illegal harvest and conflicts between user groups.

Wolf population manipulation should continue until moose survival and herd growth are sufficient to support all natural mortality and a greater harvest by man.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 22 - Seward Peninsula

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.	No open season	
Unit 22, all drainages into 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 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-Nov. 30	One moose; antlerless moose may be taken by permit only from Sept. 15. - Nov. 30. See 5 AAC 81.055 and separate hunt supplement.
Remainder of Unit 22, all drainages flowing into Norton Sound east of, but not including the Solomon 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.

Harvest and Hunting Pressure

The Seward Peninsula was divided into the above four "management areas" for the first time during the 1977-1978 hunting season. With one minor exception, this was the second consecutive year these regulations were in effect. The hunting season in the central Seward Peninsula (Imuruk Basin), was extended 1 month from October 31 to November 30.

The long hunting seasons (4 to 8 months), the relatively open terrain characteristic of most of the Seward Peninsula, and a strong demand by locals for moose meat, combined to produce the highest

annual harvest ever recorded. The minimum known harvest was 297 moose (up from last season's previous high of 244). The composition of the harvest was 198 bulls (67%), 97 cows (32%), and 2 animals of unspecified sex (1%). It should be noted that the statewide harvest for the Unit, as reported from the return of moose harvest tickets was 273 moose. This discrepancy occurred because there were 24 successful hunters who reported the taking of a moose on their antlerless moose permit, but failed to turn in a harvest report. This condition was determined by matching the names from the successful antlerless moose permits (turned into the Nome office) against the names from the moose success log (derived from the return of moose harvest tickets), listed on the computer printout.

Throughout Unit 22 an undetermined number of hunters regularly fail to report taking of a moose even though it is a regulatory requirement. An analysis of the antlerless moose permits and the data obtained with harvest report reminder letters provided an insight to part of the nonreporting problem. Prior to sending reminder letters, only 295 moose harvest tickets had been returned, and the reported harvest was only 193 moose. As a result of sending reminder letters, an additional 299 moose tickets were received, and this added an additional 80 moose to the reported harvest. Thus, reminder letters alone resulted in a 41 percent increase in the known harvest. A critical review of the successful antlerless moose permits increased the known harvest an additional 11 percent. Since the review of successful antlerless moose permittees was determined after the termination of all hunting seasons, it may be an approximation of the percentage of hunters (without antlerless permits) who failed to report the taking of a moose. Using this data in addition to information supplied by hunters from the rural villages, it was estimated that the total Unit 22 harvest was 325-350 moose.

Based strictly on the known harvest, 43 percent of the total kill occurred in the Kuzitrin drainages of the central Seward Peninsula. A well maintained gravel road traverses most of this area in a north-south direction, and provides ready access from Nome. There were over 2,500 residents from Nome many of whom were avid hunters. The hunting pressure along the road system was intense particularly during the snow-free months. Each fall for the past 3 years, Nome residents have spent hundreds of man hours driving the roads in search of a legal moose.

In the Kuzitrin area, road hunters using highway and off-road vehicles accounted for 66 percent of the harvest. Of the remaining successful hunters, boats were used in 20 percent of the cases, aircraft six percent, and the remaining eight percent was not specified. No hunters reported using a snow machine as the principal means of transportation. As soon as snow conditions closed the road system to vehicle traffic, few hunters bothered to use other forms of transportation to reach the area.

Other types of transportation played a more dominant role in other portions of the Unit, especially in the latter half of the hunting season. In the Unit as a whole, hunters using road vehicles accounted for 40 percent of the harvest; followed by hunters using boats, 29 percent; snow machines, 17 percent; and 14 percent was not specified.

For several years, subsistence hunting has been an issue in vogue with many of the local residents. In the debate over the allocation of the moose resource, accusations were made that competition from aircraft adversely affected the success of hunters who used other forms of transportation that were "less efficient." The reported data, however, do not support this claim. Only 8 percent of the harvest, or 23 moose, was taken by hunters with the aid of an aircraft, and most moose taken in this manner were killed in the early fall, usually in areas that were not readily accessible by other forms of transportation. It appears that excessive competition from aircraft was more of a perceptual problem than an actual one.

Access during the snow-free months played a dominant role in the chronology of the harvest. During the first 10 weeks of the regular hunting season, when it was feasible to use vehicles and/or boats, hunters took 64 percent of the annual harvest (190 moose). During the next 12 weeks (beginning October 8) 27 percent of the harvest was taken (81 moose). The remaining 9 percent of the harvest (26 moose) occurred during the last 2 months of the "spring" season, beginning February 1.

The antlerless moose season opened the 15th of September (except for a small closed area around Nome), and depending on the area, remained open as late as March 31. During this 28-week period, a total of 596 antlerless permits were issued; approximately 500 of which were obtained during the first 4 weeks of the season. Hunters took a total of 97 cows, up from 88 during the previous season. However, this figure does not tell the whole success story, as 54 bulls and 11 antlerless males were killed by hunters holding valid antlerless permits. The number of permits issued by area of residency is depicted in Table 1 as well as data on the number of bulls, antlerless bulls, and cows taken by hunters from each area. The table illustrates several noteworthy points. There were 4 permits issued to nonresidents and only 40 to Alaska residents who resided outside Unit 22. These two groups of hunters took 10 moose (either bulls or cows) on their antlerless permits. It is important to point out that the data indicate that these hunters (nonresidents and out of state residents) obtained only 7 percent of the antlerless permits, and took only 6 percent of the antlerless harvest (including bulls reported on their antlerless permits). Non-unit residents regularly used aircraft as an aid to hunting which in turn made them highly visible. The data show that in terms of absolute numbers "outside hunters" did not significantly compete with local residents for antlered or antlerless moose.

Table 1. Unit 22 Antlerless Harvest by Residency

	Nome	Unalakleet	Other Areas Within Unit 22	Alaska Residents Outside Unit 22	Nonresidents	Total
Number of permits Issued	397(67%)*	42(7%)	113(19%)	40(7%)	4(.1%)	596(100%)
Number of Antlered Bulls killed	40	4	5	3	2	54
Number of Antlerless Bulls killed	6	2	3	0	0	11
Number of Cows killed	56	3	33	5	0	97
Total # Successful Hunters (Bulls, Cows Antlerless Bulls)	102(25%)**	9(21%)	41(36%)	8(20%)	2(50%)	162(27%)
Number of Unsuccessful Hunters	296(75%)**	33(79%)	72(63%)	32(80%)	2(50%)	435(73%)
	398(100%)	42(100%)	113(100%)	40(100%)	4(100%)	597(100%)

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

Nome residents were issued 67 percent of the antlerless permits, and they took 63 percent of the Unit's total harvest. However, a harvest of this magnitude would be expected since Nome residents obtained a proportionally higher percentage of the permits. Yet, the success ratio by area residency is not markedly different among the three categories of hunters solely from Unit 22. Nome hunters had a success ratio of 25 percent, versus Unalakleet with 21 percent, and 36 percent for other (rural) areas. Although there are minor differences, these data suggest the opportunity for taking a moose was similiar throughout the Unit. Differential terrain features, accessibility, and data from aerial moose surveys indicate this was not the situation. Omitting Nome and Unalakleet, all other residents of Unit 22 (which included 11 rural villages) obtained only 113 antlerless permits. There were certainly more than 113 hunters from the villages of Unit 22 that wanted to (or did) take a moose. Probably the success ratio in the rural areas of Unit 22 was higher than the data indicate, but some of these hunters failed to obtain an antlerless moose permit and/or a moose harvest ticket.

From 1973 through 1978 moose incisor teeth were collected to assess changes in the age structure of the population. Age data by year and by sex from a sample of 800 bulls and cows appear in Table 2. Because of biases in the sample (hunter selectivity, age determination, and others), there are inherent dangers in a strict interpretation of these data. However, they indicate trends that have important management implications. During the 5-year period 1973-1977 the percentage of yearling bulls in the sample slowly declined (fall composition counts detected the same trend). Yearling bulls comprised 44 percent of the 1973 sample, and only 17 percent in 1977. In 1978, yearlings comprised 37 percent of the sample. A trend reversal of this magnitude was not expected. Other than a biased sample, the two most probable causes that accounted for the increase in the 1978 yearling sample were: 1) for some unexplained reason, yearlings were more vulnerable/available to hunters; 2) initial production of calves during the summer of 1977 was excellent and a high percentage survived to the age of 1 year. This condition may have occurred because snowfall during the 1976-77 and 1977-78 winters was less than average, and temperatures during both seasons were generally mild. There is yet a third factor that may have played a partial role. Most of the sample was taken from the Kuzitrin drainages, an area that has experienced relatively heavy hunting pressure. During the last 3 years approximately 20 percent of the moose population was harvested annually, which may have reduced competition on winter range and, coupled with mild winters, contributed to higher yearling survival.

Table 2. Percentages of moose in various age classes comprising annual harvests, Unit 22.

Year/Sex	AGE IN YEARS 1	2	3	4	5	6	7	8+	Sample Size
1973 (Bulls only)	44	4	15	23	7	3	4	0	73
1974 (Bulls only)	33	26	15	8	10	2	4	2	94
1975 (Bulls only)	23	32	10	17	7	5	4	2	87
1976 (Bulls only)	24	37	20	9	3	3	1	3	124
1977 (Bulls only)	17	22	16	14	8	9	5	9	98
1978 (Bulls only)	37	23	15	10	6	3	1	5	100
Total Bulls 1973 thru 1978	29	25	15	13	7	5	3	3	577
1978 (Females only)	21	25	7	10	6	10	6	15	67
Total Females 1974 thru 1978	23	17	16	14	6	8	5	16=105	223
Total sample Males & Females 1973 thru 1978	27	23	16	13	6	5	3	7	800

The age data also indicate that bulls older than 8 years are becoming more prominent in the age structure of the population. In 1973 there were no bulls judged to be over 8 years of age, but in the 1977 and 1978 sample 5 to 9 percent of the population was in this category. Moose were a rarity on the Seward Peninsula 20 years ago, and as the population increased in size and expanded into new areas two trends would be expected. With increasing competition for food, production of calves and survival of yearlings would decline. Also, a higher percentage of animals would be entering the older age classes. As a general statement, the age data show the moose population is still relatively young, and is maintaining relatively high rates of production and survival.

Composition and Productivity

Aerial surveys were conducted during March 1979, when moose were concentrated along the major river valleys. This was the first time in 5 years that surveys were flown on all the major drainages of the Seward Peninsula. In a sample of 1,421 moose, short yearlings (1978 calves) comprised 20 percent of the population. This compares to 19 percent short yearlings in the 1974 survey derived from a sample of 895 moose. For the Unit as a whole, it appeared survival of yearlings remained relatively stable during the 5-year period. However, combining the yearling data from all drainages may lead to erroneous interpretation because environmental conditions (e.g. terrain and habitat) are considerably different from area to area. During surveys the difference in moose density (e.g. total numbers on any one drainage) was particularly striking moving from east to west across the peninsula. The central Seward Peninsula contained the highest numbers, with 58 percent of the sample (830 moose) counted in this area alone. On the other extreme, the density was very low in the eastern portion of the Unit. The total count in the drainages of the Ungalik, Inglutalik, Shaktoolik and Unalakleet River was only four percent of the sample (50 moose); yet, this area comprised about 20 percent ot the total land mass. The situation was similar in the northwestern portion of Unit 22. The drainages that flow into the Chukchi Sea from Wales to Espenberg constitute about 20 percent of the land mass in Unit 22, but only 6 percent (82 moose) of the total moose population was sighted in this area. The percentage of short yearlings in each of these low density areas was similiar in both cases varying from 19.5 to 22 percent.

The most consistent population data from which trends may be interpreted come from the Kuzitrin drainages where spring aerial surveys have been conducted annually since 1972. Moose survey data from that area are depicted in the following table.

Summary of moose population composition counts from the Kuzitrin Drainage.

Year	Total adults	Total calves	Percent calves	Total moose
1972	179	37	17.1	216
1973	297	72	19.5	369
1974	341	92	21.2	433
1975	370	156	29.7	526
1976	226	87	27.7	313
1977	310	83	21.1	393
1978	484	111	18.7	595
1979	380	107	21.9	487

The above data indicate short yearling survival increased steadily during the early 1970's when the population was expanding and hunting pressure was relatively light. Beginning in 1976 it appeared that production and survival of yearlings began to taper off slowly. If this occurred, it may have been in response to deteriorating range conditions and/or increased competition. There is an obvious inconsistency in the survey data that does not fit with the age data discussed earlier. Short yearlings comprised 18.5% of the Kuzitrin population in spring 1978. Yet, in the fall harvest, yearling bulls comprised 37 percent of the age sample. When cows are computed in the age sample the yearling percentage drops to 31, but this is still considerably higher than the spring aerial surveys data indicated. Since there are biases in both the survey and age structure data, the actual percentage of yearlings in the population was probably somewhere between 18 and 30 percent. However, it is believed that aerial survey data more accurately represent the ratio of yearlings in the population.

Due to unfavorable weather, fall composition counts were conducted only in a small portion of the Seward Peninsula. In a sample of 144 moose from the Agiapuk River (a drainage immediately west of the Kuzitrin), there were 50 calves per 100 cows (22.5% of the population was calves) and 61 bulls per 100 cows. Surveys during fall 1977 indicated bull ratios were high throughout most of the Seward Peninsula, varying from a low of 56 bulls per 100 cows to a high of 77 bulls per 100 cows. Based on spring and fall surveys during 1978 and 1979, the total moose population in Unit 22 was estimated to be approximately 2000 animals.

Management and Summary and Recommendations

In 1978, four areas in Unit 22 were identified for management purposes; the drainages of the immediate road system near Nome, northwestern Seward Peninsula, the drainages of the central Seward Peninsula, and the combined eastern and southern portions of Unit 22. The moose density and terrain features are unique in each of these areas, and for the present they should be retained.

It is well-known that a number of rural residents of northwestern Alaska consistently take moose without reporting the event as specified in the game regulations. Many hunters also have the best of intentions to abide by the regulations, but forget to turn in their harvest ticket even when they are successful. This was demonstrated when 24 successful hunters who reported taking a moose on their antlerless moose permit, but who failed to return their harvest tickets. It is difficult to manage a big game resource when human induced mortality must be estimated, and the confidence limits are unknown. The antlerless moose permit provides a level of positive control not available with harvest tickets. As the harvest escalates and as environmental conditions change, precise harvest information becomes a necessity. Rather than a "general open season," a regulated season using antlerless moose permits should be established in all locations where it has been determined that there is a sufficient surplus of cows. To help improve compliance with the harvest ticket program and to complement annual harvest data, it is recommended that the antlerless permit system should be retained in Unit 22. When a desired cow harvest is obtained in a specific drainage, the antlerless season should be closed by field announcement.

Aerial surveys revealed the density of moose on the Seward Peninsula is extremely variable even in habitats that appear similiar. At this time, the factors responsible for differential moose densities are not understood. Hunting pressure certainly plays a part, but may not necessarily be the dominant factor. As an example the Kuzitrin drainage contained one of the highest moose densities, but was also subjected to the heaviest hunting pressure. In some of the remote areas, the situation was the complete reverse; e.g. predation and hunters were seemingly low, but moose densities were low as well.

Over a period of years, it has become apparent that moose moving between winter and summer ranges may cover great distances. It appeared that there was some interchange between one or more subpopulations, but the magnitude of such movements and the fidelity to a particular home range are unknown. Hunting pressure in portions of Unit 22 has increased dramatically in the last few years. To effectively manage all of the Unit on a sustained yield basis, data on the extent of moose movements are needed. It is recommended that a moose movements study be initiated in the near future; preferably by radio-collaring a sample of moose (30 plus animals) from high and low density areas and monitoring their movements through the course of the year.

During the past 8 years, spring aerial surveys have shown a substantial increase in moose numbers in portions of Unit 22. Annual recruitment has been relatively high and, although seasons have been liberal, harvests in some areas were probably lower than the annual increment. Winter browse is restricted primarily to a narrow belt along the major rivers, and in some locations it appeared the density of moose exceeded the carying capacity of the winter range. Spring surveys, as well as

age composition of moose harvested suggest there has been a gradual decline in recruitment in the central Seward Peninsula. In some locations this decline may have been triggered, in part, by overcrowding and competition for food. The last two winters the Kuzitrin area has experienced an increased harvest and relatively mild winters which appeared to stimulate yearling survival this last year. More information is needed to confirm or reject this hypothesis.

With two minor exceptions, it is recommended that the season dates and bag limits remain the same in Unit 22. In the central Seward Peninsula it is recommended that the hunting season be lengthened 1 month to the end of December. Local hunters have expressed an interest in having a longer season, and the winter density of moose appears to warrant a greater harvest. The cow season should be eliminated in the southeastern portion of the Unit. Moose numbers south of the Koyuk River are very low, and harvesting the reproductive segment of the population does not seem warranted at this time. The closed area along the road system near Nome should remain in effect for at least 1 more year. Moose numbers have more than doubled during the two hunting seasons it has been closed, but the area can probably support twice the number of moose that presently exist. Although the northwestern Seward Peninsula has a relatively low number of moose it is recommended that the 8-month season remain in effect. Winter browse is very limited in this area, and it would be advisable to retain moose density at a low level. In addition, local hunters favor the concept of a long season. By keeping moose numbers low the area serves to help determine whether annual recruitment will remain high when a high percentage of the population is removed annually.

Throughout most areas of the Seward Peninsula the moose population is vulnerable to over hunting due to open terrain and the accessibility by hunters using aircraft and snow machines. Therefore, the seasons and bag limits should be critically reviewed in all management areas on an annual basis.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 23 - Kotzebue Sound

Seasons and Bag Limits

Aug. 1 - Dec. 31	One moose; antlerless moose may be taken by permit only from Sept. 1-Oct. 15. See 5-ACC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

The harvest for Unit 23, as tabulated from hunter report cards after reminder letters, was 213 moose. This figure is similar to the estimated harvest of 212 moose in 1977. The antlerless harvest of 24 cows was similar to the reported harvest of 28 cows in 1977. Permits were required prior to hunting antlerless moose and 260 permits were issued, all of which were accounted for. Based on data from these permits, 35 cows were taken compared to 24 cows as reported on harvest reports. The degree of nonreporting on harvest tickets was similiar to 1977 when 35 cows were taken by permitted hunters.

The reasons for the discrepancy between the cow harvest figures of the antlerless moose permit system and the harvest ticket report system are unknown. Antlerless permits are available only from Department employees although applications are available at villages with license vendors. Department employees do make special trips to villages to issue these antlerless permits, but the visits often do not coincide with the majority of the hunters being present to obtain the permits. Some hunters may assume that it is unnecessary to return their harvest tickets once they turn in their antlerless permit.

The largest number of hunters of record (437), reported hunting in Unit 23. The increase was almost entirely due to increased hunting pressure from resident hunters, as only 24 were nonresidents. This increase is in part a reflection of greater compliance with the harvest report system, plus a definite increase in moose hunting pressure due, in part, to the decline of the Western Arctic Caribou herd. Hunter success was 49 percent based on data from harvest reports. As seen in Table 1, hunter success was variable throughout the Unit but the harvest was greatest on the Kobuk and Noatak Rivers.

Table 1. Moose harvest and hunter success by drainages of Unit 23.

Drainage	Moose killed Male	Female	total hunters	hunter success %
Cape Lisburne to...				
the Noatak drainage	5	0	8	63
Noatak drainage	80	14	162	58
Kobuk drainage	58	5	129	49
Selawik drainage	18	4	42	52
Buckland drainage to and including the...				
Goodhope drainage	14	0	16	88
Other	14	1	80	19
Total	189	24	437	49

Composition and Productivity

The density and productivity of moose populations in most drainages of Unit 23 showed improvement during this reporting period (Table 2). There was a continued decline in productivity in the Buckland drainage, however, the remainder of the areas surveyed improved in productivity and densities. The Noatak drainage (between the Agashashuk and Kelly Rivers), the only area surveyed in fall 1978, showed the greatest improvement in moose density. The fall Noatak count is summarized as follows: 63 males per 100 females, 24 small males per 100 females, 63 small males per 100 large males, 12 percent small males in the herd, 37 calves per 100 females, 13 sets of twins per 100 females with calves, 18 percent calves in the herd, 51 moose per hour, 10.3 hours count time and a total of 523 moose.

The winter of 1978-79 differed from the preceding two winters in that snow accumulations were earlier and deeper especially affecting the Noatak and Kobuk drainages. This weather phenomenon probably resulted in moose seeking sheltered areas resulting in the pronounced change in survey results.

Management Summary and Recommendations

The reported harvest in 1978 (213 moose) was similar to the estimated harvest in 1977 (212 moose).

Composition and productivity information gathered this reporting period indicated the Unit 23 moose population is generally healthy.

Table 2. Density and productivity of moose in drainage in Unit 23.

Drainage	Incidence of Twins per 100 cows/calf	Calf % in Herd	Moose per Hour	Count time in Hours	Total Moose
Kiwalik	24	15	112	1.7	184
Buckland	0	7	28	3.3	91
Selawik	17	25	77	5.2	402
Lower Kobuk (Delta to Kiana)	23	28	26	3.8	98
Kobuk (Squirrel R.)	12	23	63	2.0	124
Middle Kobuk (Kiana to Kobuk village)	27	29	52	3.5	182
Upper Kobuk (Kobuk village to Pah River)	75	28	28	.9	25
Noatak (Delta to Aggie)	50	21	9	1.6	14
Noatak* (Aggie to Kelly River)	13	18	51	10.3	523
Wulik	0	6	19	1.8	33
Kivalina	0	0	3	.6	2

President Carter declared much of the Noatak and Kobuk drainages National Park Monuments which will exclude airplane access by subsistence hunters and eliminate all sport hunters. Most of the harvest on the Noatak drainage above Noatak village has been by hunters using airplane access. Hunters using airplanes for transportation probably will shift their effort south to the Selawik and those drainages on the Seward Peninsula. Seward Peninsula drainages have lower moose densities reflecting a more impoverished habitat compared to the Noatak and Kobuk areas now encumbered by the Park Monument designation.

The Seward Peninsula portion of Unit 23 should be closed to the taking of antlerless moose to ensure against a reduction in the reproductive segment of the moose population by an anticipated change of hunter distribution. The remainder of Unit 23 should continue to have a long bull season and a restricted antlerless season.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 24 - Koyukuk Drainage

Seasons and Bag Limits

Unit 24, that portion of the Alatna drainage downstream from Helpmejack Creek and that portion of the Koyukuk River drainage downstream from its confluence with the South Fork	Sept. 10-Sept. 30 Nov. 1-Nov. 30	One bull
Remainder of Unit 24	Sept. 10-Sept. 30	One bull

Population Status and Trend

Aerial surveys in portions of Unit 24 indicated that moose density was generally low north of Hughes and moderate in the southern portion of the Unit. The moose population has been declining for several years in Unit 24 and there are no data to suggest that trend changed in 1978.

Population Composition

Fall composition surveys were conducted between November 16 and 18 in selected portions of Unit 24. Areas surveyed included the John River, the North Fork of the Koyukuk, the Koyukuk River from Bettles to the confluence of the South Fork of the Koyukuk, and portions of the Kanuti Flats. A sample of 102 moose consisted of 23 percent large bulls, 5 percent yearling bulls, 52 percent cows, and 20 percent calves. The largest concentration of moose was observed between Bettles and the confluence of the South Fork of the Koyukuk River. Twenty-two moose per hour were observed in this area. In other areas, 11 or fewer moose per hour were observed indicating that the density of moose in the northern half of Unit 24 was low in most areas but moderate in some locations. The density of moose in the Koyukuk drainage south of Hughes was probably 2 or 3 times higher than that in the northern portion of the Unit.

Mortality

A total of 97 bull moose was reported taken in Unit 24 during the 1978 season compared to a harvest of 57 the previous year. The apparent increase in harvest resulted from greater compliance with the harvest reporting requirement among residents of Huslia, Hughes, and Allakaket.

In 1977 residents of these villages reported taking seven bulls compared to 50 in 1978. Considering the remaining unreported harvest and illegally taken moose, the total harvest in 1978 was probably double that reported. The number of moose harvested by Alaska residents from outside the Unit and nonresidents was similar to 1977, which suggests that hunting pressure has not changed significantly.

Wolf surveys were not conducted during winter 1978-79 in Unit 24. Extensive wolf surveys were conducted the previous year and indicated a minimum population of 440 wolves in Unit 24. At this level, wolves are considered to be a significant source of ungulate mortality.

Management Summary and Recommendations

The presence of large numbers of grizzly bears and wolves in Unit 24, the high illegal harvest of moose adjacent to villages, and the low density of moose within areas surveyed all indicate low and declining moose populations. Moose densities within the Koyukuk Management Area are perhaps three or four times higher than in the Koyukuk drainage upstream from Hughes. Nevertheless, this population is also believed to be declining due to predation and a high hunter take.

Conventional management techniques, such as alteration of season length, the timing of seasons, or access restrictions are of dubious value in Unit 24 and other areas where compliance with regulations is poor. It is, however, possible that through the establishment of controlled use areas, local residents may feel more responsible for the resource, and thus comply more with seasons and bag limits. The large increase in compliance with the reporting requirement during the 1978 season supports this theory.

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SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 25 - Chandalar and Eastern Yukon Drainages

Seasons and Bag Limits

Subdivision of Unit 25 into three areas resulted in a season length of 11-21 days during the period September 10-30. Refer to regulations for more specific information. The bag limit was one bull.

Population Status and Trend

Moose surveys were flown in several "new" areas within Unit 25 during October 1978 to assess moose distribution, habitat, and calf survival. Moose did not appear to be numerous in Unit 25. The highest density area was selected for surveying, yet even there the numbers of moose seen per survey hour (16-30) were indicative of low moose populations. Nevertheless, several areas showed signs of a slightly increasing population.

Few surveys have been attempted in Unit 25 in prior years, so little can be said concerning population trend. A late winter survey along the Yukon River in 1975 when moose were concentrated in the riparian habitat revealed a startling scarcity of moose. Based on the results of the 1975 and 1978 surveys and observations obtained during flights related to other work, it was evident that moose numbers have been low during recent years. Furthermore, moose populations in Unit 25 probably were declining similar to populations farther south in adjacent portions of Unit 20 where surveys have been frequent enough to demonstrate population trends.

Moose were extremely scarce in the western portion of the Yukon Flats during October. Although this resulted partly from seasonal movement into foothill areas coincidental to the rutting period, habitat limitations were probably the overriding factor responsible for the low moose density. Vast portions of the lower Dall, Hodzana, and Hadweenzic Rivers, and the drainages into the south side of the Yukon River are vegetated with black spruce, with little or no browse species evident. Moose tracks were almost nonexistent in these areas.

Population Composition

In western Unit 25, the only places where moose existed in numbers sufficient to survey were the few burns that exist in the mountainous areas at the head of the Dall, Hodzana, and Hadweenzic Rivers. However, even in these areas, densities were low as only 30 moose were observed per hour of survey. Data gathered from aerial surveys conducted in

these upland burns indicated high calf/cow (49:100) and yearling/cow (31:100) ratios (Appendix I). The present recruitment (11%) may be sufficient to stabilize herd levels. Based on the wide variation in antler size observed, survival has been adequate and most age classes exist in the population. The high bull/cow ratio suggested that little, if any, harvest has occurred in the areas surveyed.

Farther to the east, recurring forest fires have created what appears to be excellent moose range between the Black and the Yukon Rivers. During 1978 few areas on the flats could be found that contained sufficient numbers of moose to warrant classification counts. Thus, data that were collected came from upland areas. Since moose densities were low in the survey areas (the highest density areas that could be located), overall density throughout this portion of Unit 25 must, indeed, be low.

The moose population appeared to be faring poorly in the Black River drainage and probably will continue to decline unless calf survival improves in subsequent years. The presence of intermediate-sized bulls may mean that some recruitment has been occurring in recent years, but recruitment was poor during the past year. Long yearlings (18 months of age) comprised only 5 percent of the herd during October 1978 (Appendix I). However, high calf/cow ratios (53:100) existed in fall, indicating that initial survival may have been good despite considerable overwinter loss. A high bull/cow ratio suggested that the population was either lightly hunted or that all mortality occurred uniformly within the adult segment of the population.

Similarly, evidence of declining populations was noted in portions of the Chandalar drainage. Low fall calf/cow ratios (17:100) and yearling/cow ratios (7:100) were noted in the upper Chandalar drainage. Yearling bulls comprised 2 percent of the sample, and no twin calves were observed. This situation is cause for concern since hunting pressure is increasing in the upper Chandalar. If poor recruitment continues this population may decline at an accelerated rate. Slightly higher calf production (20:100) and excellent yearling survival (25:100) characterize the Middle Fork of the Chandalar drainage. Recruitment (12% yearlings) and a 10 percent twinning rate indicate a stable or slightly increasing population. Bull/cow ratios, although high overall, suggest that hunting pressure may already be sufficient to skew the sex ratio. Sixty bulls:100 cows were noted in the upper Chandalar where hunting access is good, compared to 98:100 for the lower portion of the Middle Fork where little access is available.

Mortality

The legal hunting seasons in Unit 25 ranged from 11 to 21 days during September, depending on the area. Refer to the regulation booklet for specific dates and boundaries. In general, the Yukon Flats were separated from the Brooks Range for regulatory purposes in recognition of the different traditional hunting practices employed in the two areas. The hunting season was reduced in the upper Sheenjek drainage

because of this area's recent popularity as a hunting site, comparatively good aircraft access, and limited number of moose. In all areas a bag limit of one bull moose per person was retained.

According to the harvest reports, 171 hunters took 84 bull moose in Unit 25 during the 1978 season. Overall hunter success for those reporting was 49 percent as compared to 42 percent the previous year. A substantial portion of the local harvest is unreported and the reported harvest is biased toward urban hunters who are more accustomed to complying with reporting requirements. Harvest ticket data showed that only 33 percent of the moose killed were taken by residents living within, or immediately adjacent to, Unit 25 (Appendix II). In reality, local residents probably accounted for at least 75 percent of the total (reported plus unreported) harvest. Calculations based on data obtained during a socioeconomic survey by the University of Alaska (Yukon-Porcupine Regional Planning Study, 1978) suggest that the local harvest may be 6 times what is actually reported (Appendix II). Factors such as some families requiring more than one moose per year, persons other than the head of the household taking moose, and the availability of alternate food sources (i.e. caribou and fish) tend to cloud attempts to estimate the actual harvest. The data are presented simply to demonstrate the inadequacy of the present reporting system and the need for more reliable data on which to base management decisions.

The distribution of the reported harvest within the Unit and the method of access used by reporting hunters are shown in Appendix III. Due to the low return rate of harvest tickets from Unit residents, the data are biased toward nonlocal use. As would be expected, most hunters on the Yukon Flats used boats for access. In the Brooks Range the only feasible form of access for nonlocal hunters is aircraft. The lack of compliance with reporting procedures prevented any meaningful comparison of either local versus nonlocal use or the method of access (i.e. degree of aircraft use).

Little is known concerning other mortality factors. 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 received from hunters and trappers in the area, suggest that wolves are numerous in many portions of Unit 25.

Management Summary and Recommendations

Initial survival of the 1978 cohort was fair to good, but overwinter survival of the previous year's calves was only poor to fair. In some areas recruitment and moose density appear to be sufficient to maintain the populations. In other areas this is not the case. If poor recruitment continues, populations that are currently declining will be severely reduced which in turn will necessitate more restrictive seasons.

The limited information available pertaining to the status of the moose and the magnitude of unreported take precludes any 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 demands (local take and wolf predation) currently placed on moose in this area.

Moose surveys should be repeated in the future to monitor recruitment and population trends. An adequate assessment of the local harvest must be obtained to evaluate the impact of human-induced mortality in view of the subsistence preference on resource allocation. Land management agencies should be encouraged to return to a more natural fire regime to improve the habitat in the western Yukon Flats and to maintain the existing fire-caused shrub communities in the eastern portion. Guiding and nonlocal hunting activities have been increasing in the Brooks Range and should be closely monitored, particularly in the upper reaches of the Chandalar drainage where moose appear to be declining and are particularly vulnerable due to openness of the terrain.

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Appendix I. Fall moose sex and age ratios, Unit 25, October 1978.

Location	Calves: 100 Cows	Percent Calves in Herd	Percent Cows w/Twins	Long Yrlgs: 100 Cows	Percent Long Yrlgs in Herd	Bulls: 100 Cows	Moose per per Hour of Survey	Total Moose Seen
Dall, Hodzana, and Hadweenzic R.	49	17	23	31	11	142	30	189
Black and Little Black R.	53	20	17	13	5	116	19	153
Your Cr. to Wind R. (upper Chandalar R.)	17	10	0	7	2	60	17	144
Middle Fork Chandalar R. below Your Cr.	20	9	10	25	12	98	16	120
Total	34	14	15	19	8	101	20	606

* Determined by doubling the number of small bulls observed. Animals are approximately 18 mos. old.

Appendix II. Residency of hunters taking moose in Unit 25 (derived from 1978 harvest ticket reports).

Location		Number of Successful Hunters
Residents of Unit 25		
Fort Yukon		12
Tanana		3
Chalkyitsik		1
Beaver		1
Arctic Village		1
Venetie		0
Stevens Village		0
	Total	18
Other Interior Residents		
Fairbanks area		27
Eagle		8
Rampart		1
Livengood		1
Central		1
Bettles		1
Wiseman		1
	Total	40
Other Alaska Residents		5
Nonresidents of Alaska		11
Foreign		7

Appendix III. Reported 1978 moose harvest for Unit 25 compiled according to kill location and method of hunter transport.[a]

Location	Aircraft Access	Boat Access	Total
Yukon Flats			
Dall R. to Chandalar R., including Hodzana and Hadweenzic R.[b]	2	6	8
Porcupine R. to mouth of Sheenjek, Black, and Little Black R.[b]	11	8	19
Yukon R. above Woodchopper, including Kandick and Nation R.	1	13	14
Yukon R. below Dall R., including Tozitna and Salt R.	3	3	6
Yukon Unspecified	1	3	4
Brooks Range			
Chandalar River[b]	14	1	18[c]
Sheenjek River	6	0	6
Coleen River	4	0	4
Total	42	34	79

[a] Data are incomplete, and biased toward urban residents. Harvest ticket reports do not adequately represent the kill by local, rural residents.
[b] Areas roughly comparable to those described in Appendix I.
[c] Includes 3 moose for which the hunter access mode was unspecified.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 26 - Arctic Slope

Seasons and Bag Limits

Sept. 10-Dec. 31 One bull

Harvest and Hunting Pressure

During the 1978-79 season, 81 hunters reported taking 46 moose in Unit 26. Two additional hunters, one successful and one unsuccessful, residing within the Unit did not report where they hunted but probably hunted in Unit 26. Although the number of hunters reporting in 1978-79 was nearly double the number reporting in 1977-78 (48 hunters), only 10 more moose were harvested than reported in 1977-1978 (36 moose). Thus, the percentage of successful hunters dropped sharply from 75 percent in 1977-78 to 57 percent in 1978-79. Alaska residents predominated (78%), of which nearly one-half were residents of Unit 26.

A small, but unknown, number of additional moose were killed by residents of the Unit but were not officially reported. One moose was reported to have been taken in January near the coast southwest of Pt. Lay.

Aircraft was the most widely used method of transportation by both successful (91%) and unsuccessful (43%) hunters. Over 63 percent of the reported harvest came from the Colville River with the Anaktuvuk and Chandler Rivers being the next two most hunted.

Composition and Productivity

Moose sex and age ratios resulting from a survey during November on a portion of the Colville River, Kutchik and Chandler Rivers are listed in Table 1.

Table 1. Fall, 1978 moose sex and age ratios

Area	Date	Total ♀ per 100 ♂	Calves per 100 ♂	Calves % in herd	Moose per hr.	Total moose
Colville River	11/15-16	8	13	14	8	16
Kutchik River	11/16	92	58	23	60	30
Chandler River	11/15-16	67	33	16	68	98
	Means:	61	34	17	38	

A total of 119 adults were observed, 45 bulls and 74 cows giving a mean bull:cow ratio of 61:100.

On April 16-20, and April 26, aerial surveys were conducted on the Colville River between the mouth of the Anaktuvuk River and the Killik River; on the Chandler River and its tributaries; on the Killik River; and on the Anaktuvuk River except for about 15 miles of the river.

Of 715 animals observed in the Colville drainage 605 were adults, and 110 were short yearlings; short yearlings represented 15 percent of the total population but this percentage varied between tributaries from 3 to 36 percent (Table 2.)

Table 2. Counts of moose from April 1979 aerial survey on portions of the Colville drainage.

River/Sector	Total	Adults	short yearlings	% short yearlings
Colville R., Umiat to Anaktuvuk River	59	38	21	36
Colville R., Umiat to Killik River (incl. Prince Ck., Ninuluk Cr.)	192	167	25	13
Anaktuvuk River (incl. Tuluga R)	83	70	13	16
Chandler R. (incl. Kutchik River, Ayiyak R., Kiruktagiak R., Autumn Ck., Siksikpuk R., Natvakruak Ck & west branch of Desolation Ck.	310	261	49	16
Killik River	71	69	2	3
Totals	715	605	110	Mean 15

There were 13 sets of twins observed during the Colville survey.

Comparison of spring survey results for the past 6 years, 1974 through 1979 indicates that while the total number of animals observed has varied, (due in part to year to year differences in survey conditions) the percentage of adults in the survey population has remained relatively stable, especially during the last 4 years (1974:84%; 1975:69%; 1976:76%; 1977:79%; 1978:81%; 1979:83%).

Management Summary and Recommendations

Survey data indicate the moose population in the Colville River system, the most heavily hunted area on the Arctic Slope, is healthy and productive. Recruitment and overwinter survival of calves remains good. Losses due to predation appear to be very low due to low numbers of predators. Reported harvest has averaged fewer than 50 bulls for all

of Unit 26 during the past 5 years ($\bar{x}$ = 48.4 $\pm$ 13.4, 1974 - 1978). Given low mortality and an apparently stable population, the Department recommended a slight increase in harvest opportunity by lengthening the season 10 days and providing for an either-sex harvest starting in fall 1979. Since moose are more conspicuous, and perhaps more vulnerable, on the Arctic Slope than in forested areas to the south, the results of increased hunting on the North Slope should be carefully monitored.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 18 - Yukon - Kuskokwim Delta

Seasons and Bag Limits

Unit 18, except Nunivak Island		No open season
Nunivak Island	Sept. 1 - Sept. 30	5 bulls by permit only; cows may be taken at the discretion of the Commissioner. See 5 AAC 81.055 and separate permit hunt supplement.
	Feb. 15 - Mar. 31	20 bulls by permit only*, 5 cows may be included at the discretion of the Commissioner. See 5 AAC 81.055 and separate permit hunt supplement.

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

Harvest and Hunting Pressure

Twelve applicants applied for five bull permits available for fall 1978. There, again, was no interest shown in the available cow permits. Three bulls were harvested by Alaska residents and one by a nonresident. The remaining applicant did not hunt.

There was little contact between the hunters and the Bethel Fish and Game office. In fact, two of the hunters did not check out with this office at all, but contacted the Anchorage office. They were very unhappy with the guide services they got and did not feel they had received a quality hunting experience.

Seventy people, 51 nonresidents and 19 residents, applied for 21 bull permits available for the spring 1979 hunt. Twelve alternates were contacted and a total of 20 people actually hunted. Nineteen bulls were harvested; one hunter was not successful due to weather conditions and a misunderstanding regarding his permit. Four bulls were taken by Alaska residents and 15 by nonresidents. Five Alaska residents applied for the five cow permits that were available but no one actually hunted.

Nine hunters used residents of Mekoryuk for guiding and transporting services; five were Alaska residents and four were nonresidents. The remaining ten hunters used a registered guide from the Fairbanks area with some assistance from several local residents. Snow machines were used for all hunts and with one exception, all hunts lasted only one day. One resident hunter spent two days hunting. Twelve of the hunters left 100 percent of the meat in the village of Mekoryuk, two left 75 percent of the meat, three left 50 percent, and two left less than 25 percent on the island.

The majority of the hunters enjoyed their hunt and were pleased with their experience. One hunter, however, was quite dissatisfied and, in fact, did not harvest an animal due to complications with the information he received, his guide and weather.

Incisors and green trophy measurements were collected from 18 bulls. These samples have not been analyzed to date.

Composition, Productivity, Transplants, and Mortality

Nunivak Island: An aerial survey was conducted from August 29 thru September 3, 1978 by the U.S. Fish and Wildlife Service. A total of 394 muskoxen was counted including 88 (22%) calves and 45 (11%) bulls that were 4 years or older. Complications with this survey resulted in a 3-day gap during the survey.

U.S. Fish and Wildlife Service conducted composition surveys prior to the spring hunt and transplant between February 26 - March 6, 1979 and a total of 529 muskoxen was counted. Eighty-two adult bulls (4 years and older), 160 adult cows, 12, 3-year-old bulls, 43, 3-year-old cows, 35, 2-year-old bulls, 38, 2-year-old cows, 114 yearlings, and 45 unknown animals were classified. The conditions were moderate to poor with travel impaired for 4 days because of poor weather and bad visibility. Temperatures were cool, and the snow was hard packed with some lensing which had resulted from warmer weather in December and January. The participants felt that some muskoxen may have been missed in the interior of the island during the poor weather (estimated to be less than 50 animals).

Twenty muskoxen were captured in mid-February. Sixteen animals were transported to the Institute of Arctic Biology, University of Alaska, Fairbanks. These included four adult cows, three 2-year-old cows, two yearling cows, one 3-year-old bull, one 2-year-old bull, and five yearling bulls. The San Diego Zoo received three muskoxen; one yearling bull, and two yearling cows. One adult female died on the island as a result of the capture procedures.

Based on survey data, and allowing for removals by the hunt and transplant, the total population (as of 1 April 1979) was as follows:

Adults		3-year olds		2-year olds		Yrl.	Unk.	Total
Bulls	Cows	Bulls	Cows	Bulls	Cows			
63	155	13	43	34	35	104	45	492

Nelson Island: An aerial survey was flown on September 11, 1978 and 78 muskoxen were counted, 14 of which were calves. Survey conditions were fair with high overcast clouds, and calm winds. Fifteen separate groups were located, however, muskoxen were probably missed as a result of the color of the vegetation which made the animals very difficult to spot.

No winter mortality was reported during the 1978-79 season.

Management Summary and Recommendations

Nunivak Island Herd: Currently there are about 110 adult and subadult bulls available and 233 adult and subadult cows. This ratio should encourage rapid growth in the Nunivak Island Herd. The total number of muskoxen present on the island is now close to the 1974 recommended number of breeding animals. The age structure of the herd has changed with the hunting conducted since 1975, and it does not appear that removing large numbers of adult bulls to reduce the herd size is feasible. For this reason, the Board of Game again reduced the number of available bull permits for the 1980 spring season to five. They also initiated a registration cow hunt. This program will assist in reducing the total number of muskox on Nunivak Island and will allow removal of a variety of younger age classes.

There continues to be little interest in hunting cow muskoxen at the current tag fee. There is pressure from local residents to reduce this tag fee so that they may utilize these animals locally.

Nelson Island Herd: Little survey work has been done on Nelson Island this year. Fall surveys do not appear reliable and should be dropped in favor of a spring survey during early March. If this herd has continued to grow at its past rate, the population now requires population management through regulated hunting and transplant programs.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 22 - Seward Peninsula

Seasons and Bag Limits

No open season

Herd Size, Composition, Productivity and Mortality

Since 1973 one of the two groups that has become established following the 1970 transplant has remained in the general vicinity of Black Mountain, an area of rolling hills and wind-swept ridges approximately 12 miles northwest of Brevig Mission. An aerial survey of this area on May 11, 1979 revealed 21 adults and subadults, and at least six calves-of-the-year. (This compares to 22 adults and three calves at the same time a year ago). The entire herd was located near the apex of Black Mountain at an elevation of approximately 1300 feet. One month later a cursory aerial survey indicated the herd had left the mountain, and apparently moved to lower ground where the vegetation was beginning to green-up. On June 28 a thorough survey of the Black Mountain area and the "flats" below confirmed that the herd had moved to lower ground, and was utilizing willow leaves and a variety of green herbs. Through close examination from the ground it was found that the herd contained two mature bulls, five yearlings, 13 animals classifed as adult cows, and 12 calves-of-the-year. Later in the day two solitary bulls were also located; one was standing on a gravel bar about 1 mile east of the main herd, and the other was feeding in a small patch of willows approximately 4 miles to the west. From the June survey it was determined the Black Mountain herd contained at least 34 members.

For the past 5 years a second group of muskoxen exhibited a preference for a 400 mi^2 area of marshy plains and tundra foothills between Ear Mountain and the drainages of the Pinguk River (north of Black Mountain). From 1974 through 1977 this group was sighted on several occasions, and contained about 15 to 20 members. During the last 2 years muskoxen were regularly seen in this area, but only in small groups of 10 or less.

On July 29, 1978 a pilot flying for one of the Nome air taxi operators sighted five adults and three calves on the Pinguk River about 3 miles west of the point where the river enters Ipek Lagoon. On September 3 a reindeer herder flying out of Shishmaref located a group of about 30 muskoxen several miles north of Black Mountain. This unconfirmed report suggested the herd established in the Nuluk area may have fractured into one or more subgroups, and perhaps one of these subgroups temporarily joined the Black Mountain herd. When five muskox were sighted on the Nuluk River on November 17 (during a moose survey), the hypothesis that

the Nuluk herd has split seemed confirmed. This is the time of year that muskoxen usually move to their wintering grounds, often consolidating numbers enroute. A small band of muskoxen located this late in the year strongly suggests the group had probably remained by itself for a considerable period of time. On the same flight, two adult bulls were seen on the American River 20 miles to the southeast. These animals may have also been part of the original Nuluk herd. During the summer, single animals were sighted east of Shishmaref, which also supported the concept that the Nuluk herd had divided.

Although the exact status of the Nuluk herd was unknown, it appeared there were about 45 to 55 muskoxen on the western end of the Seward Peninsula, in at least two, or more, small herds. These groups have collectively produced at least four or more calves every spring for the past 6 years. However, absolute herd numbers have not increased in proportion to the observed productivity. Two factors may account for this difference: a rather high calf mortality (perhaps associated with grizzly bear predation) and/or emigration from the herd. The latter appeared to be a significant factor because single muskoxen were seen at many locations throughout the Seward Peninsula. During the report period there were sightings in the vicinity of Nome, Council, Deering and Taylor. From these data it appeared there was a tendency for adults, especially bulls, to leave the nucleus herd, and wander. Since a number of strays were sighted considerable distances from the nearest known muskox herd, it is not likely that very many (if any) ever returned. Animals that wander away from the nucleus herd during the summer foraging period probably contribute significantly to herd attrition. No mortalities were documented during the report period.

Management Summary and Recommendations

Despite the fact that muskox numbers have not increased in Unit 22 as rapidly as desired, calf production during the last 2 years has been very encouraging. If annual recruitment remains high (relative to the number of breeding adults) the herds that have established "residency" appear to have the capability to increase substantially in the next few years. This is assuming they receive maximum protection from harassment and human caused mortality. At the present time, no single group is large enough to warrant a hunting season. Further herd growth and emigration should be monitored closely.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 23 - Kotzebue Sound

Seasons and Bag Limits

No open season

Mortalities

Two muskoxen were found dead 4 miles west of Ogotoruk Creek on Cape Thompson. Evidence indicated that these animals were shot by a hunter using a dog team for transportation. The Division of Fish and Wildlife Protection has this incident under investigation.

Population Status

On March 3, 1979 an aerial survey was conducted between the Noatak drainage and Cape Lisburne. In the Mudgrave Hills, Tahinichok Mountain, three muskoxen were observed, two adults and one calf; at Cape Thompson 4 miles west of Chariot nine adult muskoxen were observed, two of which had been recently killed; between Point Hope and Cape Lisburne two groups of muskoxen were spotted, one group on Iviangik Mountain had six animals of unknown age and the other group located on an unnamed mountain just south of Iviangik mountain had 27 animals of unknown age. The lower areas near Point Hope were not surveyed because of ground fog. It is believed more animals were present near Point Hope.

Management Summary and Recommendations

The illegal taking of muskoxen must be stopped. More information on the tenuous nature of this transplant needs to be distributed to the residents of this Unit. Strict enforcement of game laws is needed along with adequate penalties for these offenses. Individuals engaged in the illegal take of game are currently not adequately penalized.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT - 1978-79

Game Management Unit 26 - Arctic Slope

Seasons and Bag Limits

No open season

Population Size and Distribution

A total of 112 muskoxen in six separate groups were observed within Subunit 26C, the Arctic National Wildlife Range, by the U.S. Fish and Wildlife Service and other biologists during muskox surveys and studies made during spring 1979. Date, location and number were:

Date	Location	Size	1979 group location compared to 1978
April 17	Tamayariak River	40	17 km SE of 1978
March 21-April 3	Sadlerochit Springs	42	
April 17	Niguanak River	24	7 km NE of 1978
April 16-17	VABN CAN	3	
April 16-17	VABM DAR (Kongakut R)	2	
Feb 26	Katakturuk River	1	

Additional, isolated muskox probably exist elsewhere within GMU 26, as has been reported in the past, but no muskox were reported in Subunits A and B during the period covered.

Composition and Productivity

The sex and age composition of muskox groups in GMU 26C were determined during the Fish and Wildlife Service survey in April, 1979. Based on these data, bull:cow ratios were: Adults, 71:100 and subadults (35 month) 75:100. Two year olds comprised 17 percent of the population; yearlings comprised 22 percent of the population. Eleven animals, or 10 percent of the population, were not classified.

During summer 1978 a University of Alaska graduate student, Martha Robus, counted calves in the three largest muskox groups. Calves represented 26 percent of the 108 animals observed.

Mortality

U.S. Fish and Wildlife Service biologists estimated a loss of six animals, three of which were probably calves, between summer 1978 and mid-April 1979.

Management Recommendations

The present management program of no human harvest should be maintained to allow the slow, continued growth of the muskox population in Unit 26C.

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