

ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

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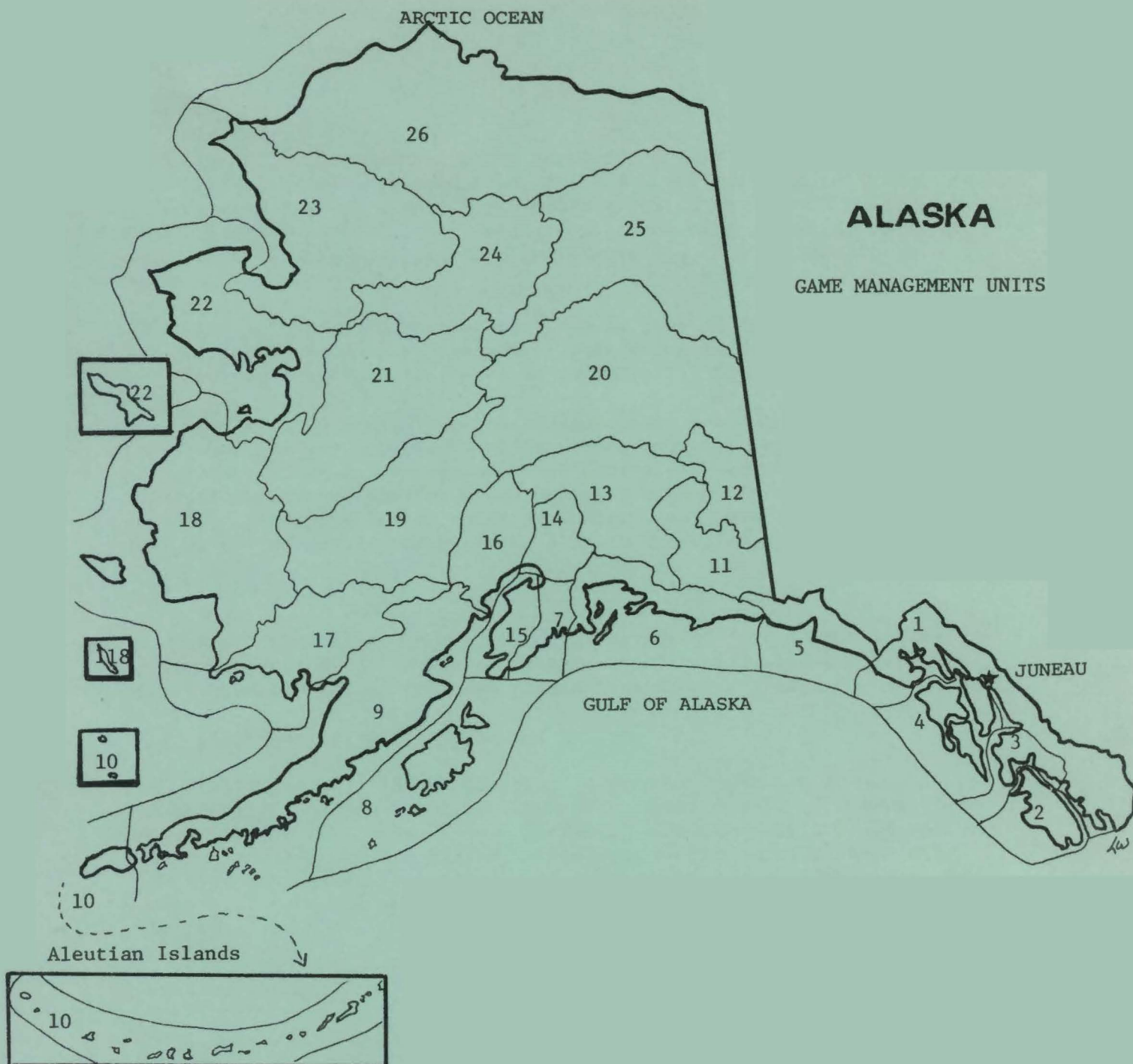
ANNUAL REPORT OF
SURVEY-INVENTORY ACTIVITIES
PART I. MOOSE, ELK, DEER

Edited and compiled by
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(Printed April 1979)



(From new map valid July 1, 1978)

STATEWIDE HARVESTS AND POPULATION STATUS

Moose

The statewide reported moose harvest for 1977-78 was 5,145 animals. This represents an increased take of 1,078 moose compared to 1976-77 and an increased take of almost 1,900 moose compared to 1975-76. The actual harvest may be higher, since compliance with reporting requirements is generally poor, especially in more remote Game Management Units.

Harvest continued to increase in most Game Management Units throughout the State, increasing dramatically in Units 16, 18, 21, 22, 23, and 24. The moose harvest decreased in Units 1, 11, 25 and 26.

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. Deterioration of range in Central and Southcentral Alaska as well as on the Alaska Peninsula is also an unfavorable factor.

Elk

Twenty-four elk were harvested during the 1977-78 season in Game Management Unit 8. This number is near the 6-year average; a permit hunt system limits the take and populations have increased.

Sitka Black-Tailed Deer

During the 1977-78 season, 6,111 deer were harvested in Alaska. The number of animals taken is 2,900 more than the year before, yet more representative of the usual deer harvest. The winter of 1977-78, more severe than the previous winter, drove deer to the beaches where they were more accessible to hunters. An increase in harvest was again apparent in Game Management Units 4 and 8, increasing 1,470 and 747 respectively.

STATEWIDE MOOSE HARVEST

<u>Unit</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unknown</u>	<u>Total</u>
1A&2	21			21
1C	25			25
5	14			14
6A	10	1		11
6B	20	23		43
6C	19	16		35
7	95			95*
9	212			212
11	35			35*
12	94			94*
13	855			855*
14A	307			307*
14B	33			33*
14C	41			41*
15A	182			182*
15B	38			38*
15C	101			101*
16	348	136	1	603*
17	67			67*
18	22			66 ^A
19	177	5	3	450 ^A
20A	36			36*
20B	55			55*
20C	146			146*
20D	25			25
21	227			681 ^A
22	151	88	5	325 ^A
23	212	35		247*
24	67			201 ^A
25	65			65*
26	36			36 ^A
TOTAL	3,736	304	9	5,145

* Extrapolated total figures; method of extrapolation is explained in the Moose report for Unit 7.

A Estimated total figures; compliance with reporting requirements is poor in some rural Game Management Units.

STATEWIDE ELK HARVEST

<u>Unit</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unknown</u>	<u>Total</u>
8	15	9		24
TOTAL	15	9		24

STATEWIDE DEER HARVEST

<u>Unit</u>	<u>Bucks</u>	<u>Does</u>	<u>Unknown</u>	<u>Total</u>
1A&2	119	42		161
1C			152	152
4			2,945	2,945
5	3	1		4
6			992	992
8	1,344	513	1	1,857*
TOTAL				6,111

* Extrapolated figure as explained for Moose in Unit 7.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR 1977-78

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

Seasons and Bag Limits

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

Harvest and Hunting Pressure

The 1977 harvest ticket data indicated that two moose were taken in Subunit 1A, which is equal to the 1976 harvest. One moose was taken from the Unuk River drainage and the other from the Chickamin River.

The reported harvest in Subunits 1B was 19 moose in 1977 compared to 31 reported in 1976. Of the 19 moose taken, 12 were from the Stikine River, six from Thomas Bay, and one from Farragut River.

In Subunit 1A, one moose was taken on September 15 and one on October 4. Seven moose were taken in September and 12 in October in Subunit 1B.

The two successful hunters in Subunit 1A spent a total of 8 days hunting moose, whereas five unsuccessful hunters spent 11 days hunting. In Subunit 1B successful hunters spent 120 days pursuing moose for an average of 7.1 days per hunter. Seventy unsuccessful hunters hunted a total of 617 days for an average of 8.8 days each.

The Stikine River and Thomas Bay harvests were monitored in the field by contacting hunters and it was estimated that 21 and 14 moose, respectively, were taken.

The Canadian harvest on the Stikine River within 8 miles from the border was reported to be 17 moose, compared to 12 in 1976.

Composition and Productivity

No counts were conducted in Subunit 1A, however 79 moose were counted in the Stikine River area on November 30, 1977. The percentage of calves in the herd was 23. In January 1977, 66 moose were counted, of which 15 percent were calves.

Of 15 bulls in Subunit 1B for which the age was determined, 33 percent were yearlings compared to 35 percent (n=17) in 1975 and 50 percent (n=8) in 1974.

Management Summary and Conclusions

The 1977 harvest in Subunit 1A remained the same as in 1976. Hunting pressure was less than in 1976 and the most hunted area was the Unuk River drainage. No adverse effects of the harvest were noted.

In Subunit 1B the reported harvest indicated a reduction of animals taken compared to 1976, however, the number of kills recorded by Fish and Game personnel monitoring the season did not reflect this change. The 33 percent yearling bulls in the harvest was nearly the same as the 35 percent occurring in 1976.

Total moose numbers in Subunit 1B have remained relatively static for the past 3 years.

Recommendations

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

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Regional Research/management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR FISCAL YEAR 1977-1978

Game Management Unit 1(C) - Juneau

Seasons and Bag Limits

Unit 1(C) except Berners Bay	Sept. 15-Oct. 15	One bull
Unit 1(C) Berners Bay drainages only	No open season	

Harvest and Hunting Pressure

An estimated twenty-five males made up the 1977 moose harvest in Unit 1(C). All of the animals were taken in the Taku River area southeast of Juneau. The kill represents a 417 percent increase over the reported six bulls taken in 1976. This kill figure is not excessive as the 18-year average is 21 moose per year (Appendix I).

The moose hunt on the Taku was monitored by Fish and Game employees stationed in the area during the season. Visual observations and hunter interviews were used to approximate hunter numbers of 60-75 and hunter success rate at approximately 33 percent. Harvest data are presented in Figures 1 and 2. Age estimates based on general appearance of twelve of the 25 moose taken in 1977 were made by Chris Pace who monitored the hunt. He estimated four moose to be yearlings, five between two and four years of age, and three over four years old.

There was no open season in Berners Bay.

Composition and Productivity

Weather precluded aerial surveys in the Taku River area in 1977.

An aerial survey was conducted in the Berners Bay drainages in December 1977. Ninety-two moose were counted of which 22 were males, 14 females, 16 calves, and 40 adults of undetermined sex. The 1977 tally is a high for this area and is 33 percent higher than the six-year average of 71 (Appendices II and III).

Management Summary and Conclusions

Analysis of harvest data for the Taku River area shows a sharp increase in kill from the previous two years while hunter numbers remained about the same. The age data collected from half of the moose taken shows an even distribution between age classes. This sample, though small, points to a static population and indicates movement into the area rather than an expanding population as a possible cause of the kill increase. The Taku herd is recognized as being composed of moose ranging both sides of the US-Canada border whose movements are not fully understood. Lack of adequate data emphasizes the need for a thorough survey to determine the status of the Taku herd.

A large discrepancy exists between kill statistics taken from hunter reports and those collected by Fish and Game employees monitoring the hunt. Hunter reports show 49 hunters taking 14 moose while observers have 75 hunters killing 25 moose. These differences underline the desirability of keeping close watch on the harvest to insure adequate management.

Recommendations

No changes in seasons or bag limits are recommended at this time for Unit 1C except Berners Bay drainages. However, the Berners Bay population appears high and a permit hunt for 20 bulls is recommended for the fall of 1978.

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APPENDIX I. Moose Harvest - Unit 1C excluding Berners Bay drainage.

<u>Year</u>	<u>Harvest</u>	<u>Number Hunters</u>	<u>Success Percentage</u>
1959	19	-	-
1960	27	-	-
1961	24	-	-
1962	34	-	-
1963	15	-	-
1964	35	101	34.7
1965	25	-	-
1966	29	69	42.0
1967	30	73	41.1
1968	14	-	-
1969	17	-	-
1970	14	-	-
1971	19	-	-
1972	26	-	-
1973	30	139	21.6
1974	13	88	14.8
1975	4	71	5.6
1976	6	71	8.4
1977*	25	75	33.3

* Data from field observations and hunter checks. Hunter reports indicated 14 moose were taken by 49 hunters.

APPENDIX II. 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

* Not sufficient data

**No data collected

APPENDIX III. BERNERS BAY MOOSE STATUS

Date	Survey Date	Size Sample	MM/ 100 FF	Calves/ 100 FF	Calves % in Herd	Harvest			Hunter Success	Season
						M	F	T		
1960	--	8	--	--	50			-	--	None
1961	--	17	--	--	6			-	--	None
1962	12/17/62	20	--	--	10			-	--	None
1963	2/ 4/63	25	--	--	32	3	-	3	--	Bull
1964	--	--	--	--	--	6	-	6	--	Bull
1965	1/28/65	37	--	--	35	11	-	11	16	Bull
1966	--	--	--	--	--	10	-	10	--	Bull
1967	--	--	--	--	--	18	-	18	--	Bull
1968	12/11/68	67	24	74	37	21	-	21	--	Bull
1969	11/22/69	67	10	20	15	14	-	14	--	Bull
1970	11/19/70	76	5	14	12	10	-	10	--	Bull
1971	12/22/71	67	7	52	33	3	20	23	82	Either Sex
1972	12/ 7/72	91	20	46	28	5	17	22	63	Either Sex
1973	12/ 7/73	88	14	38	25	15	18	33	79	Either Sex
1974	12/ 6/74	45	17	38	24	9	11	20	48	Either Sex
1975	11/28/75	60	28	26	17			-	--	None
1976	--	--	--	--	--			-	--	None
1977	12/23/77	92	--	--	17			-	--	None

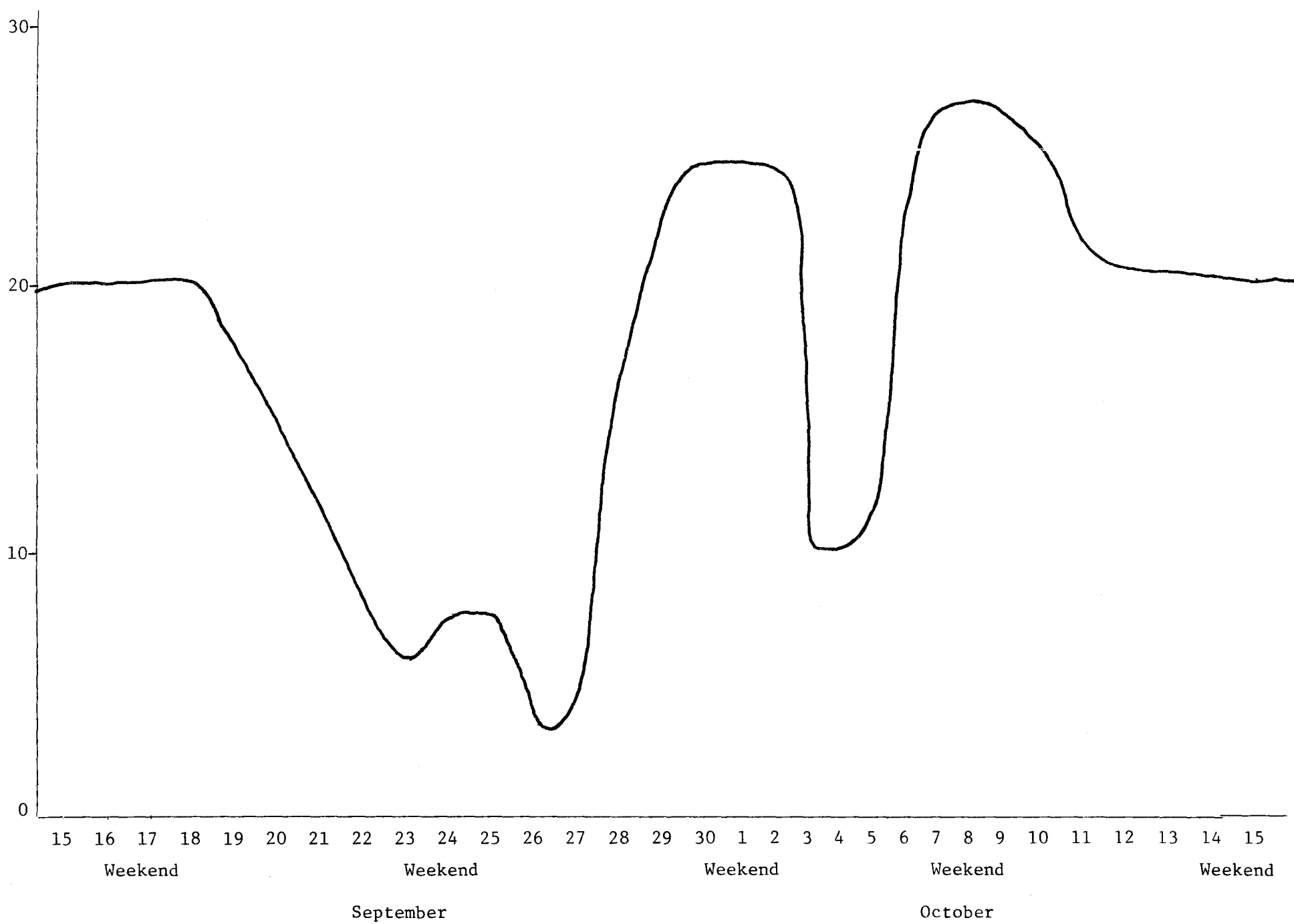


Figure 1. Estimated Number of Hunters/day 1977 Taku Moose Hunt.

PREPARED BY: Christopher Pace, Game Biologist I

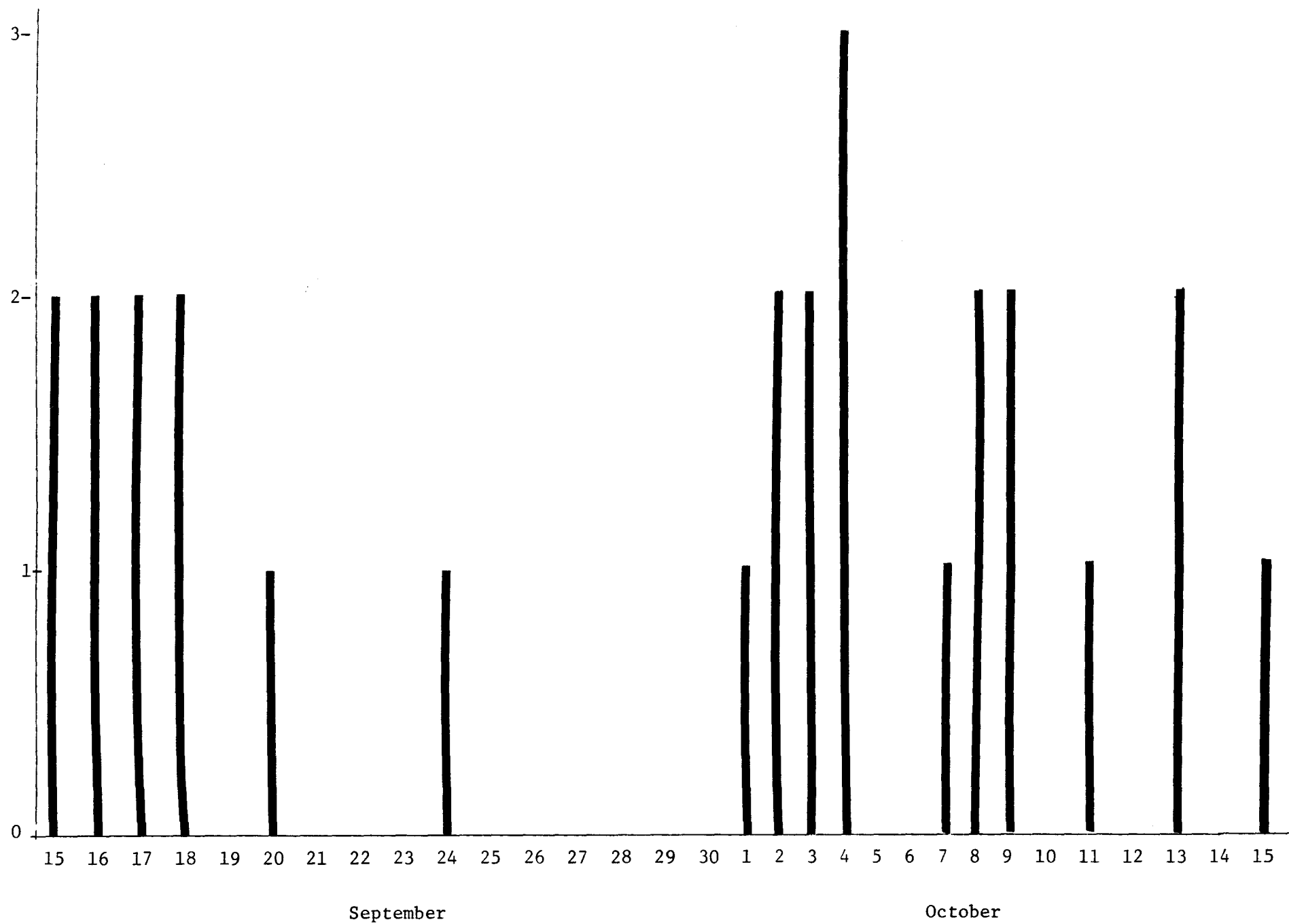


Figure 2. Number of moose harvested/day 1977 Taku moose hunt.

PREPARED BY: Christopher Pace, Game Biologist I

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR 1977-78

Game Management Unit 5 - Yakutat

Seasons and Bag Limits

That portion of Unit 5 lying west of Yakutat Bay, including the area north of Nunatak and Russell Fjords and East Nunatak Glacier	Sept. 15-Oct. 15	One bull
--	------------------	----------

Remainder of Unit 5	No open season
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Harvest and Hunting Pressure

Voluntary returns of harvest reports show a harvest of 14 bulls by 35 hunters for a success rate of 40 percent. The resource provided over 161 days of hunter recreation (3 unsuccessful reports did not record hunter days) with successful hunters averaging 4.4 days in field and unsuccessful hunters averaging over 4.8 days pursuing moose.

Composition and Productivity

Sex and age composition surveys were conducted with a Cessna 180 aircraft within established count areas in November and March. During the November survey, 236 moose (15.7% bulls, 66.1% cows, 18.2% calves) were counted in 3.6 hours for an average of 65.5 moose per hour.

Two hundred and eight moose were observed in the Yakutat Forelands area during the March survey (87% adults, 13% calves) in 10.2 hours, averaging 20.5 moose per hour. During the November survey, 334 moose were counted (59.3% cows, 24.5% bulls, 13.2% calves, 3% yearlings) in 11.1 hours (30 moose/hour).

Management Summary and Recommendations

The Yakutat Forelands moose population has shown an increase in numbers in recent years, therefore the Game Board approved a proposal to reopen the moose season by means of a special registration hunt during the 1978-79 season. Harvest will be monitored closely and limited to 25 bulls. Post season surveys will be intensive, as will spring 1979 surveys, to determine herd status and to assay the effects of light harvest upon the increasing population.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Unit 6(A) - Katalla to Icy Bay

Seasons and Bag Limits

Aug. 20 - Nov. 30*

One moose by permit; up to 10 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 supplement were: Moose Hunt 950 - (1) permits could be obtained at the Cordova Fish and Game office from August 1 throughout the season, (2) harvest is restricted to 10 bulls and 10 cows and (3) successful hunters were required to report their kill within three days to the Cordova Fish and Game office.

Harvest and Hunting Pressure

The 1977 moose harvest in Unit 6(A) was 10 bulls and one cow; all were taken from the Bering River - Controller Bay portion of Unit 6(A).

The bull season was terminated September 30 after 42 days of hunting when the desired harvest was reached. The antlerless season remained open through November 30.

Actual hunting pressure is unknown but is suspected to have been 20-30 persons. Seventy-eight permits were issued: 66 (85%) to Cordova residents, four to Anchorage, three to Juneau, two to German hunters and one each to Fairbanks, Chitina and Washington hunters. One guide, Jere Griffin, operated in the area and his German client took a moose.

Composition and Productivity

Two surveys were flown in Unit 6(A) during November 1977, one in the Bering River - Controller Bay area and another from Suckling Hills to Cape Yakataga. This is the first year surveys have been flown in the Suckling Hills-Cape Yakataga area. Excellent survey conditions were present in both areas. The survey data are presented in Appendices I and II.

In the Bering River - Controller Bay area, 156 moose were observed with ratios of 70 bulls to 100 cows and 44 calves to 100 cows. In the Suckling Hills to Cape Yakataga area, 77 moose were observed with ratios of 71 bulls to 100 cows and 77 calves to 100 cows.

A survey flown on March 23, 1978 in the Bering River - Controller Bay area failed to yield enough animals to provide meaningful data but did indicate mild winter conditions which should be reflected in high over-winter survival.

Management Summary and Conclusions

1977 was the first year that the portion of Unit 6 from Katalla to Icy Bay was designated and managed as a separate moose management area, Unit 6(A). The moose herds in Unit 6(A) represent an expansion to the east of moose transplanted to the Copper River Delta during the 1950's. The Suckling Hills and Bering Glacier naturally divide Unit 6(A) into two separate moose populations. The Bering River - Controller Bay area is west of the Suckling Hills and nearest to the site of introduction. In March 1969, 19 moose were observed in the Bering River-Controller Bay area. In November of 1977, 156 moose were observed in this area (Appendix II) plus another 77 moose were observed east of Suckling Hills. Thus, the Bering River-Controller Bay moose herd has built rapidly and is probably approaching the carrying capacity of the range. The moose herd east of the Suckling Hills is now established and should build rapidly during the next few years.

The high bull:cow ratio (70:100) in both portions of Unit 6(A) indicates that moose populations are unaffected by hunting. The high calf:cow ratio (77:100) east of Suckling Hills indicates excellent survival to fall and the capability of rapid herd growth. The good, but more moderate, calf:cow ratio (44:100) in the Bering River-Controller Bay area may indicate a leveling off of reproduction in this herd.

The meager harvest of eleven moose during 1977 is the largest (Appendix III) to occur in Unit 6(A), but is far below the area's potential.

The winter of 1977-78 was mild after January (November and December 1977 were big snow months). Survival of calves and adults should have been excellent. Spring-like conditions were evident in a survey flown on March 23, 1978, the ground was 95% snow free and the moose were scattered. Wolf predation is known to have occurred but has minimal effect upon the herds at present.

Recommendations

The quota of moose for 1978 should be raised to 20 bulls and 20 cows, most of which would and should come out of the Bering River-Controller Bay herd.

Either sex hunting is desirable to encourage hunters to utilize the moose resource in Unit 6(A).

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APPENDIX I

Moose Sex & Age Ratios - Unit 6(A)

<u>Area</u>	<u>Date</u>	<u>Males/100 Females</u>	<u>Yrlg. MM % in herd</u>	<u>Calves/ 100 FF</u>	<u>Calf % in herd</u>	<u>Twins/100 FF w/calf</u>	<u>Total Sample</u>
Bering River-Controller Bay	11/18/77	69.9	9.6	43.8	20.5	33.3	156
Suckling Hills-Cape Yakataga	11/22/77	71.0	7.8	77.4	31.2	33.3	77
Unit 6(A)		70.2	9.0	53.9	24.0	33.3	233

Moose Sex & Age Composition - Unit 6(A)

<u>Area</u>	<u>Date</u>	<u>Large Males</u>	<u>Small Males</u>	<u>Total Males</u>	<u>FF W/0</u>	<u>FF W/1</u>	<u>FF W/2</u>	<u>Total FF</u>	<u>Total Adults</u>	<u>Lone Calves</u>	<u>Total Calves</u>	<u>Unid. sex & Age</u>	<u>Total Sample</u>
Bering River- Controller Bay	11/18/77	36	15	51	49	16	8	73	124	0	32	0	156
Suckling Hills- Cape Yakataga	11/22/77	16	6	22	13	12	6	31	53	0	24	0	77
Unit 6(A)		52	21	73	62	28	14	104	177	0	56	0	233

Submitted by: Julius Reynolds, Game Biologist III

APPENDIX II

Moose Sex & Age Ratios - Unit 6(A)

Bering River - Controller Bay Area

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 MM calves	Calves per 100 FF	Incidence of twins per 100 FF w/calf	Calf % in herd	Survey Conditions	Total Sample
1968-69							66.7	26.3	UNK	19
1970-71	140.0	80.0	133.3	26.7	266.7	60.0	20.0	20.0	POOR	30
1972-73							28.6	22.5	FAIR	40
1974-75							46.2	29.2	FAIR	65
1975-76							25.0	20.8	FAIR	96
1977-78	69.9	20.6	41.7	9.6	93.8	43.8	33.3	20.5	EXCELLENT	156

Moose Sex & Age Composition - Unit 6(A)

Bering River - Controller Bay Area

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	Count time (hrs.)
11/17/69	3	3	6	0	1	2	3	9	0	5	5	19	UNK
12/16/70	6	8	14	5	4	1	10	24	0	6	0	30	2.7
2/5/73			5	0	5	2	7	12	0	9	19	40	1.5
1/28/75			9	0	7	6	13	22	0	19	24	65	2.1
1/14/76	10	10	20	0	12	4	16	36	0	20	40	96	2.0
11/18/77	36	15	51	49	16	8	73	124	0	32	0	156	3.6

Submitted by: Julius Reynolds, Game Biologist III

APPENDIX III

Moose Harvest - Unit 6(A)

<u>Year</u>	<u>Bull</u>	<u>Cow</u>	<u>Unid.</u>	<u>Total</u>
1971*			3	3
1972*				0
1973				0
1974	1			1
1975*	5	3		8
1976*	3			3
1977*	10	1		11

* Years with either sex season.

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

Submitted by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Unit 6(B) - Martin River Area

Seasons and Bag Limits

Aug. 20 - Nov. 30*

One moose by permit; up to 20 antlerless moose may be taken. See 5 AAC 81.055 and separate permit hunt supplement.

*Season subject to closure by field announcement.

The conditions outlined in the supplement were: Moose Hunt 951 - (1) permits could be obtained at the Cordova Fish and Game office from August 1 throughout the season, (2) harvest was restricted to 20 bulls and 20 cows and (3) successful hunters were required to report their kill and present the lower front teeth of their kill within three days to the Cordova Fish and Game office.

Harvest and Hunting Pressure

The 1977 harvest in Unit 6(B) was 43 moose, 20 bulls and 23 cows (Appendix I). The either sex season was terminated at noon August 27 after 7 1/2 days of hunting.

The actual hunting effort is unknown but 248 permits were issued. Ninety-five percent (237) of the permits were issued to residents of Unit 6; of these 235 were issued to Cordova residents and two to Valdez residents.

Airboats were the major method of transportation used to hunt and/or retrieve moose: 23 persons used airboats, 8 used river boats, 8 used autos and 4 used planes.

Composition and Productivity

In a sex and age composition survey flown on November 16, 1977, 179 moose were observed, with ratios of 52 bulls to 100 cows, 49 calves to 100 cows and 25 percent calves in the herd (Appendix II). A late-winter survey flown March 22, 1978 produced a sample of 127 moose and 28 percent calves in the herd (Appendix III). This compares favorably with the November 1977 survey and suggests high calf survival.

Cementum age data were obtained on the 43 moose harvested:

<u>Sex</u>	<u>Calf</u>	<u>1½</u>	<u>2½</u>	<u>3½</u>	<u>4½</u>	<u>5½</u>	<u>6½</u>	<u>7½</u>	<u>8½</u>	<u>9½</u>	<u>10½</u>
Male	1	7	1	7	1			2		1	
Female	3	9	2	1	1	2	1	1		1	2
Total	4	16	3	8	2	2	1	3	0	2	2

Management Summary and Conclusions

The Martin River moose herd is currently being managed to achieve a post-harvest population of 150-175 moose. The post-season survey in November 1977 revealed 179 moose which indicates that the herd is in balance with the management objective. The calf:cow ratio (49.4) is good but the herd contains a surplus of bulls. The current 52 bulls per 100 cows ratio could be reduced to 30 bulls per 100 cows.

Survival through the 1977-78 winter was good. No winter calf mortality was indicated in the March 1978 survey and the major wintering area was 75 percent snow free.

Recommendations

Retain the current season but limit the harvest to 25-30 bulls.

PREPARED BY:

Julius Reynolds
Game Biologist III

SUBMITTED BY:

Jim Faro
Regional Management Coordinator

APPENDIX I

Moose Harvest - Unit 6(B)

Martin River Area

<u>Year</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>
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

* Number reported to Cordova Fish & Game office by permit hunters.

** Estimated harvest. Harvest report data indicated 23 bulls.

Prepared by: Julius Reynolds, Game Biologist III

APPENDIX II

Moose Sex & Age Ratios - Unit 6(B)

Martin River Area

Date	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	Incidence of twins per 100 FF w/calf	Calf % in Herd	Survey Conditions	Total Sample
1964-65							36.4	28.9	UNK	52
1965-66							20.8	31.2	UNK	93
1966-67		ZERO	DATA							
1967-68	76.2	36.9	93.9	15.0	105.1	70.2	25.5	28.5	UNK	207
1968-69							27.3	21.4	UNK	201
1969-70							17.4	20.3	POOR	138
1970-71	41.2	14.5	54.3	8.1	76.0	38.2	6.4	21.3	GOOD	235
1971-72	37.7	14.1	60.0	9.2	177.8	15.9	13.6	10.3	EXCELLENT	261
1972-73	50.7	17.4	52.2	10.0	171.4	20.3	0.0	11.7	GOOD	120
1973-74							5.0	15.9	GOOD	132
1974-75	41.8*					50.0**	18.9	30.5	EXCELLENT	151
1975-76	27.7	6.2	28.6	3.5	26.7	46.2	36.4	26.6	FAIR	113
1976-77							7.4	16.6	FAIR	187
1977-78	51.7	9.0	21.1	4.5	63.4	49.4	33.3	24.6	GOOD	179

* Based on a 11/6/75 survey.

** Based on a 12/26/74 survey.

Prepared By: Julius Reynolds, Game Biologist III

APPENDIX II continued

Moose Sex & Age Composition - Unit 6(B)

Martin River Area

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	Count Time (Hours)
12/17/64	8	6	14	0	7	4	11	25	0	15	12	52	UNK
1/27/66	8	8	16	1	19	5	25	41	0	29	23	93	2.6
1966-67	ZERO DATA												
12/11/67	33	31	64	37	35	12	84	148	0	59	0	207	3.1
1/18/69	4	3	7	0	24	9*	33	40	0	43	118	201	UNK
2/13/70	1	0	1	0	19	4	23	24	1	28	86	138	4.7
12/8/70	35	19	54	84	44	3	131	185	0	50	0	235	2.8
12/2/71	40	24	64	148	19	3	170	234	2	27	0	261	3.1
12/21/72	23	12	35	56	13	0	69	104	1	14	2	120	3.6
2/26/74	0	0	0	0	19	1	20	20	0	21	91	132	2.7
2/28/75	0	0	0	0	30	7	37	37	2	46	68	151	3.1
12/9/75	14	4	18	43	14	8	65	83	0	30	0	113	2.4
2/28/77	0	0	0	0	25	2	27	27	2	31	129	187	3.5
11/16/77	38	8	46	56	22	11	89	135	0	44	0	179	3.0

* Includes one with triplets.

Prepared by: Julius Reynolds, Game Biologist III

APPENDIX III

Moose Sex & Age Ratios - Unit 6(B)

Martin River Area

<u>Date</u>	<u>Total MM Per 100 FF</u>	<u>Small MM Per 100 FF</u>	<u>Small MM Per 100 Large MM</u>	<u>Small MM % in Herd</u>	<u>Small MM Per 100 MM Calves</u>	<u>Calves Per 100 FF</u>	<u>Incidence of twins per 100 FF w/ calf</u>	<u>Calf % in Herd</u>	<u>Survey Conditions</u>	<u>Total Sample</u>
11/16/77	51.7	9.0	21.1	4.5	63.4	49.4	33.3	24.6	GOOD	179
3/22/78							25.9	27.6	GOOD	127

Moose Sex & Age Composition - Unit 6(B)

Martin River Area

<u>Date</u>	<u>Large MM</u>	<u>Small MM</u>	<u>Total MM</u>	<u>FF W/O</u>	<u>FF W/1</u>	<u>FF W/2</u>	<u>Total FF</u>	<u>Total Adults</u>	<u>Lone Calves</u>	<u>Total Calves</u>	<u>Unid. Sex & Age</u>	<u>Total Sample</u>	<u>Count Time (Hours)</u>
11/16/77	38	8	46	56	22	11	89	135	0	44	0	179	3.0
3/22/78					20	7			1	35	65	127	2.9

Prepared By: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Unit 6(C) - West of Copper River

Seasons and Bag limits

Sept. 10 - Sept. 25

One moose by permit; 20 antlerless moose permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

The conditions outlined in the supplement were:

A. Moose Hunt 901. Unit 6(C) for antlerless moose - (1) applications for a permit had to be received in Anchorage by July 15, (2) a permit drawing was held July 20, (3) 20 antlerless permits were issued, (4) 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., (5) successful hunters had to report their kill to the Cordova Fish and Game office within five days and (6) unsuccessful hunters had to return a completed report within 15 days of the season closure.

B. Moose Hunt 952. Unit 6(C) for antlered moose - (1) permits were available at the Cordova Fish and Game office beginning August 1, (2) Approximately 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., and (4) successful hunters had to report their kill the same day the kill was made to Fish and Game personnel in Cordova.

Harvest and Hunting Pressure

The Unit 6(C) moose harvest for 1977 was 19 bulls and 16 cows. The bull moose season was closed by field announcement at midnight, September 10 after one (1) day of hunting. The 1977 harvest of 35 moose is slightly less than in previous either sex seasons (Appendix I).

The actual hunting pressure exerted for bull moose is unknown but 299 permits were issued. Ninety-four percent (281) of these were issued to Unit 6 residents: 277 to Cordova and four to Valdez hunters. A total of 178 applications was received for the 20 antlerless moose permits.

Composition and Productivity

In a survey flown November 17, 1977, 213 moose were counted, the largest number ever counted west of the Copper River (Appendix II). Calves represented 29 percent of this sample and 36 bulls per 100 cows were observed. In a late-winter survey flown March 21, 1978, 71 moose were counted under poor counting conditions. In this sample, calves represented 27 percent of the herd (Appendix III).

Cementum age data were obtained on 33 of the 35 moose harvested.

<u>Sex</u>	<u>1½</u>	<u>2½</u>	<u>3½</u>	<u>4½</u>	<u>5½</u>	<u>6½</u>	<u>7½</u>	<u>8½</u>	<u>9½</u>	<u>10+</u>	<u>Total</u>
Male	6	0	5	2	4	1	0	0	0	0	18
Female	4	3	1	1	2	1	1	0	1	1	15
Total	10	3	6	3	6	2	1	0	1	1	33

Management Summary and Conclusions

The moose herd west of the Copper River is currently larger than desired. The management objective at present is to maintain a post-hunting season population of 175-200 moose. In the November 1977 survey, 213 moose were counted. Excellent winter survival was indicated by the March 1978 survey. Thus, the Unit 6(A) moose population will exceed the desired population level in the winter of 1978-1979, if a substantial harvest is not obtained in the fall of 1978.

Composition of the herd as indicated by the November 1977 survey is excellent, 35 bulls per 100 cows and 54 calves per 100 cows.

The registration permit type hunt for bulls (which allowed everyone to hunt) resulted in a short one-day season but was well received by the public. The restriction against using boats, airboats or ATV's to hunt moose was readily accepted by most members of the public. The concurrence of bull season with an unlimited number of hunters and the cow season with a restricted number of hunters, was confusing to the public and these hunts should be separated. If the cow season was held separately, there would be no need to restrict permit holders from using boats, airboats or ATV's to hunt.

Recommendations

1. Increase the harvest quota to 30 bulls and 30 cows.
2. Separate the bull and cow season.
3. Retain the registration permit hunt for bulls with boat, airboat and ATV restrictions.
4. Retain the permit drawing hunt for cows but do not restrict the use of transportation for hunting.

PREPARED BY:

Julius Reynolds
Game Biologist III

SUBMITTED BY:

Jim Faro
Regional Management Coordinator

APPENDIX I

Moose Harvest - Unit 6(C)

West of the Copper River

<u>Year</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>
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

* First harvest since introduction of moose to Unit 6.

** Estimated.

Prepared by: Julius Reynolds, Game Biologist III

APPENDIX II

Moose Sex & Age Ratios - Unit 6(C)

West of Copper River

Date	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	Incidence of twins per 100 FF w/calf	Calf % in Herd	Survey Conditions	Total Sample
1962-63							10.0	32.8	UNK	67
1963-64	Z E R O		D A T A							
1964-65							18.8	31.4	UNK	121
1965-66	Z E R O		D A T A							
1966-67	Z E R O		D A T A							
1967-68	13.0	6.4	100.0	4.3	33.3	39.0	7.1	25.6	EXCELLENT	117
1968-69							24.2	27.6	EXCELLENT	156
1969-70							26.3	25.4	GOOD	193
1970-71	11.4	3.0	36.4	2.0	15.4	39.4	31.6	26.1	GOOD	199
1971-72	13.3	8.0	150.0	5.1	38.3	41.6	38.7	26.9	FAIR	175
1972-73	30.1	7.5	33.3	5.0	73.7	20.4	5.6	13.6	GOOD	140
1973-74	21.4	7.1	50.0	4.5	39.0	36.6	28.1	23.2	GOOD	177
1974-75	34.1	15.3	81.3	8.2	59.1	51.8	24.2	27.9	GOOD	158
1975-76	22.0					52.4	22.9	30.1	GOOD	143
1976-77							13.3	15.2	POOR	112
1977-78	34.5	12.4	56.0	6.6	45.9	54.0	20.0	28.6	GOOD	213

APPENDIX II continued

Moose Sex & Age Composition - Unit 6(C)

West of Copper River

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	Count Time (hrs)
3/15/63	1	0	1	0	18	2	20	21	0	22	24	67	2.3
1963-64	Z E R O			D A T A									
12/9-10/64	5	6	11	9	26	6	41	52	0	38	31	121	4.7
1965-66	Z E R O			D A T A									
1966-67	Z E R O			D A T A									
12/7/67	5	5	10	49	26	2	77	87	0	30	0	117	4.8
1/15-16/69	2	2	4	0	25	8*	33	37	1	43	76	156	UNK
1/17/70	4	5	9	0	28	10	38	47	1	49	97	193	3.1
11/27/70	11	4	15	94	26	12	132	147	2	52	0	199	3.4
11/2/71	6	9	15	82	19	12	113	128	4	47	0	175	3.5
12/22/72	21	7	28	75	17	1	93	121	0	19	0	140	3.0
1/19/74	16	8	24	80	23	9	112	136	0	41	0	177	2.7
12/20/74	16	13	29	52	25	8	85	114	3	44	0	158	3.2
12/10/75	14	4	18	47	27	8	82	100	0	43	0	143	1.8
2/25/77	2	8	10	0	13	2	15	25	0	17	70	112	2.7
11/17/77	25	14	39	63	40	10	113	152	1	61	0	213	2.9

* Includes one female with triplets.

APPENDIX III

Moose Sex & Age Ratios - Unit 6(C)

West of Copper River

<u>Date</u>	<u>Total MM Per 100 FF</u>	<u>Small MM Per 100 FF</u>	<u>Small MM Per 100 Large MM</u>	<u>Small MM % in Herd</u>	<u>Small MM Per 100 MM Calves</u>	<u>Calves Per 100 FF</u>	<u>Incidence of twins per 100 FF w/ calf</u>	<u>Calf % in Herd</u>	<u>Survey Conditions</u>	<u>Total Sample</u>
11/17/77	34.5	12.4	56.0	6.6	45.9	54.0	20.0	28.6	GOOD	213
3/21/78							13.3	26.7	POOR	71

Moose Sex & Age Composition - Unit 6(C)

West of Copper River

<u>Date</u>	<u>Large MM</u>	<u>Small MM</u>	<u>Total MM</u>	<u>FF W/O</u>	<u>FF W/1</u>	<u>FF W/2</u>	<u>Total FF</u>	<u>Total Adults</u>	<u>Lone Calves</u>	<u>Total Calves</u>	<u>Unid. Sex & Age</u>	<u>Total Sample</u>	<u>Count Time (Hours)</u>
11/17/77	25	14	39	63	40	10	113	152	1	61	0	213	2.9
3/21/78					13	2			2		37	71	2.9

Prepared by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR REGULATORY YEAR 1977-78

Game Management Unit 7 - Seward

Seasons and Bag Limits

Unit 7	Sept. 1 - Sept. 15	One bull
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Harvest and Hunting Pressure

Harvest report returns indicated that 76 moose were killed by 361 hunters in GMU 7 during the 1977 season (Appendix I). Because harvest report reminder letters were not sent in 1977, these data were corrected by the technique described below. The extrapolated data indicate that 95 moose would have been reported harvested (± 26 , $p = .05$) and 607 hunters would have reported (± 405 , $p = .05$) had harvest report reminder letters been sent (Appendix I). An excellent fit was obtained for the harvest extrapolation ($r^2 = .98$) and a very poor fit for the extrapolation of number of hunters ($r^2 = .60$).

Over the past 5 years, seasons have varied considerably in length. The twenty day season of 1973 was cut to ten days in 1974, 1975 and 1976, then increased to 15 days in 1977. Harvests and hunter numbers have reflected these changes. During the 10-day seasons in 1974 through 1976, the harvest ranged from 64 to 77 while hunter numbers held at 462-492. With the 5-day increase in season length, hunter numbers jumped to approximately 600 and the harvest rose to an estimated 95 moose.

Methodology of Moose Harvest and Hunter Participation Extrapolations, Statewide

All hunters are required to have a harvest ticket to hunt moose; this harvest ticket includes a self-addressed report form for the hunter to report his participation and success. Traditionally, reminder letters have been sent to hunters not voluntarily returning these reports, but reminder letters were not sent for the 1977-78 regulatory year. As a result only 49.1 percent of the moose harvest reports were returned for the 1977 season compared to an average of 72 percent (68%-78%) from 1971 to 1976. Extrapolations were therefore necessary to make these data directly comparable with harvest data from previous years. These extrapolations were made by Game Biologist Sterling Miller.

Regression equations were calculated based on hunter reports returned before and after reminder letters were sent for the previous six years (1971/72 - 1976/77). Using an early compilation of harvest reports (preliminary IBM run dated 2/2/78) as equivalent to prereminder letter returns of previous years, these regressions were used to estimate what the reported harvest and hunter participation would have been had reminder letters been sent for the 1977/78 season. This technique was utilized

for statewide data as well as for individual game management units. Implicit in these extrapolations is the assumption that the pattern of hunter reporting in 1977/78 is equivalent to the base period of regression. This assumption is probably valid for the 1977/78 regulatory year as hunters did not "know" that reminder letters were not being sent, but this assumption will become increasingly invalid in subsequent years as reporting compliance declines in the absence of reminder letter prodding.

Extrapolated estimates of harvest and hunting pressure for subunits within a unit were obtained using the percent of harvest or participation reported only in that subunit relative to the whole unit. This percentage, multiplied by the extrapolated unit figure, yielded extrapolated subunit figures.

Values for the coefficient of determination (r^2) for the harvest data ranged from a low of 0.82 (Unit 24) to highs of 1.0 (Units 9 and 15), and for hunter participation data from 0.60 (unit 7) to 1.0 (unit 9). Little confidence should be placed on estimates with r^2 values less than 0.90. Where appropriate, these extrapolations are presented in the following Region II, moose S&I reports in addition to the uncorrected data.

Composition and Productivity

The first complete sex and age composition counts since 1973 were conducted in Unit 7 in 1977 (Appendices II and III). The ratio of 14 bulls/100 cows remained unchanged over that period, despite reduced seasons in the interim. Major changes occurred in the calf/cow and animals/hour figures.

The ratio of 20 calves/100 cows is the lowest recorded for Unit 7 since counts were initiated in 1962. This low productivity is probably the result of a series of circumstances. Age data from antlerless hunts held prior to 1974 suggest that there may well be a preponderance of older females in the population. Condition data collected by Al Franzmann show that Kenai moose are generally debilitated which strongly implies habitat deterioration. However, Franzmann has examined relatively few animals from Unit 7. The rapid spread of wolves on the Kenai has led to increased predation on moose. Data collected by Rolf Peterson in 15A show that calves constitute about 40 percent of the known wolf kill. The winter of 1976 may have been more difficult for moose than we supposed, leading to reduced survival of calves.

The count of 38 animals per hour is the lowest ever recorded in Unit 7 (59 per hour in 1973 is the closest recent survey). This very methodical survey may have biased sex and age ratios in that the more secretive sex and age classes would have had a greater chance of being seen. However, survey conditions were less than ideal with only partial snow cover in portions of the area surveyed which reduced moose "sightability".

Nevertheless, there is little doubt that moose numbers have experienced a significant decline in Unit 7 since 1971.

Management Summary and Conclusions

Less is known of Unit 7 moose than of other areas on the Kenai. Historically on the Kenai, high moose numbers have occurred in 1913, 1916, 1922-23, 1936, 1945, 1960 and 1971 (Spencer & Hakala 1964 and Bishop & Rausch 1975). Probable causes of the declines were severe winters augmented by overpopulation and related habitat stress. Given the constraint of what appears to be a chronically overbrowsed winter range, we can assume that moose mortality in moderate to severe winters will continue to be high. Thus, the ability of the population to increase is limited. Additional stress is being applied by increased predation from wolves, as wolves appear to have occupied the bulk of available range on the Kenai following their reestablishment in 1968. Certainly the fall calf/cow ratio was low in 1977, down to 20/100 from a 1972-76 mean of 30/100.

Bull:cow ratios have hovered around 10:100 since 1972. With lowered moose density, such ratios may be considered minimal for successful impregnation during the cow's first estrus cycle. However, the ratio of 10 bulls per 100 cows allows the bulk of the limited habitat to be utilized by the more productive members of the population, adult cows.

The increased season in Unit 7 allowed moderately greater participation in hunting and increased harvest of bulls. The increased harvest appeared to have had negligible effect on post-season bull:cow ratios.

Recommendations

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

PREPARED BY:

Dave Hardy
Game Biologist II

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Harvest and Hunting Pressure - Unit 7

<u>Year</u>	<u>Season</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>	<u>Hunters</u>	<u>Percent Success</u>
1965	1st	*	*	*	*	*	*
	2nd	*	*	*	*		
	Comb.	60	1	0	61	*	*
1966	1st	*	*	0	*		
	2nd	*	*	0	*		
	Comb.	112	1	0	113	455	25.4
1967	1st	*	*	*	*		
	2nd	*	*	*	*		
	Comb.	123	1	1	125	414	30.0
1968	1st	140	1	0	141		
	2nd	19	0	0	19		
	Comb.	160 ²	1	3	164 ²	481	34.1
1969	Comb.	174	4	1	179	557	32.1
1970	1st	104	0	1	105		
	2nd	23	0	1	24		
	Ant. ¹	0	14 ³	0	14		
	Comb.	152 ²	14 ³	2	168 ²	520	32.3
1971	1st	110	14	2	126		
	2nd	25	0	0	25		
	Comb.	153 ²	14	2	169 ²	563	30.0
1972	1st	111	19	0	130		
	2nd	16	0	0	16		
	Comb.	154 ²	22 ²	0	176 ²	780	22.6
1973		114	47 ³	0	161	779	20.7 ⁴
1974		59	2	3	64	492	13.0
1975		66	0	0	66	462	14.3
1976		71	0	6	77	490	15.7
1977		72	0	4	76	361	21.1
(1977 ⁵)		(95)	(-)	(-)	(95)	(607)	(15.7)

* Date not available

1 Antlerless 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 Extrapolated data: Harvest = 95 ± 26 , $p = .05$, $r^2 = .98$, Number of hunters = 607 ± 405 , $p = .05$, $r^2 = .60$.

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE - GMU 7

APPENDIX II

Moose Sex and Age Ratios, Unit 7 Totals.

Date	large MM	small MM	total MM	FF w/0	FF w/1	FF w/2	total MM	total adults	lone calves	total calves	unid. sex & age	total sample	count time (hrs)
1962	D A T A M I S S I N G												
1963	4	8	12	-	323	29	-	607	-	-	-	1383*	
1964	N O S U R V E Y S												
1965	4	10	14	362	93	7	462	476	4	111	0	587*	11.3
1966	58	21	79	351	95	9	455	534	8	121	1	656	-
1967	32	19	51	122	50	7	179	230	0	64	3	297	3.4
1968	45	27	72	346	156	8	510	582	3	175	35	792	14.8
1969	22	9	31	217	67	15	299	330	3	100	0	430	8.2
1970	94	56	150	586	160	11	757	907	1	183	0	1090	12.4
1971	132	84	216	782	163	17**	962	1178	6	204	11	1393	15.7
1972	66	15	81	487	165	14	666	747	2	195	0	942	14.8
1973a	69	16	85	455	149	6	610	695	8	169	2	866	13.7
1973b	96	31	127	680	234	10	924	1051	10	264	6	1321	22.4
1974	-	-	-	-	6	2	8	8	-	10	11	29	-
1975	1	1	2	39	27	1	67	69	0	29	0	98	2.0
1976	15	13	28	170	86	1	257	285	4	92	0	377	4.8
1977	78	24	102	608	131	11	750	852	0	153	0	1005	28.9

* No explanation for numbers not corresponding with ratio sheet.

** Includes one cow w/3 calves.

1. All Count Areas (1963)
2. Count Areas 5, 6, 12, 13, 19 (1965)
3. All Count Areas (1966)
4. Count Areas 6 & 10 (1967)
5. Count Areas 1, 4, 5, 6, 8, 9, 10, 13, 14, 20 (1968)
6. Count Areas 5, 6, 8, 9, 12, 20 (1969)
7. Count Areas 5, 6, 8, 9, 10, 12, 20, 21 (1970, 1971, 1972, 1973a)
8. Count Areas 5, 6, 8, 9, 10, 12, 20, 21, 1, 11, 13, 14, 15, 16, 17, 18 (1973b)
9. Count Areas 6 (count conducted 2/3/75) (1974)
10. Count Area 6 (1975)
11. Count Areas 10, 12 (1976)
12. Count Areas 1-5, 8-16, 18-21 (1977)

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE - GMU 7

APPENDIX III

Moose Sex and Age Ratios, Unit 7 Totals.

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 MM calves	Calves per 100 FF	Incidence of twins per 100 FF w/calf	Calf % in herd	Animals per hour	Total sample
1962	23.2	15.2	191.7	10.0	53.5	28.8	22.9	18.8	-	229
1963	-	-	-	-	-	-	8.8	30.9	44.5	1389
1964	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	7.7	19.0	60.6	565
1966	17.4	4.6	36.2	3.2	34.7	26.6	8.7	18.4	-	656
1967	28.4	10.6	59.4	6.4	59.4	35.8	12.3	21.6	87	297
1968	14.1	5.3	60.0	3.4	30.9	34.3	4.9	22.1	54	792
1969	10.4	3.0	40.9	2.1	18.0	33.4	18.3	23.2	52	430
1970	19.8	7.4	59.6	5.1	61.2	24.2	6.4	16.8	88	1090
1971	22.4	8.7	63.6	6.0	82.4	21.2	9.4	14.6	89	1393
1972	12.2	2.3	22.7	1.6	15.4	29.3	7.8	20.7	64	942
1973a*	13.9	2.6	23.2	1.9	18.9	27.7	3.9	19.5	63	866
1973b*	(13.7	3.4	32.3	2.4	23.4	28.6	4.1	20.0	59	1321)
1974	-	-	-	-	-	-	-	34.4	-	29
1975	3.0	1.4	100	1	7	43	3.6	29.6	49	98
1976	10.9	5.1	87	3	28	36	1.2	24	79	377
1977	13.6	3.2	31	2	31	20	7.8	15	35	1005

* 1973a includes 11/27-30/73, 1973b includes 11/27/73 through 12/4/73.

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR REGULATORY YEAR 1977-78

Game Management Unit 9 - Alaska Peninsula

Season and Bag Limits

Unit 9(A)	Sept. 10 - Sept. 30	One bull
Unit 9(B) & (C)	Sept. 10 - Sept. 30 Dec. 1 - Dec. 31	One bull
Unit 9(D)	No open season	
Unit 9(E)	Sept. 10 - Oct. 10	*One bull with minimum antler spread of 50 inches or three brow tines on one side of the antlers.

* See 5AAC 81.176. Sealing of moose antlers and surrendering of moose jaws.

Harvest and Hunting Pressure

Harvest Reports received from 386 hunters show a harvest of 185 moose in 1977. Sealing data revealed an additional harvest of 24 bulls in GMU 9(E) and three bulls in GMU 9(C), for which no Harvest Reports were submitted. Thus the overall GMU 9 known moose harvest was 212 bulls.

Harvest location breakdown by subunit is as follows:

9(A)	(Cook Inlet drainages)	5	(2.4%)
9(B)	(Kvichak River drainages)	38	(17.9%)
9(C)	(Alagnak and Naknek Rivers)	54	(25.5%)
9(E)	(Egegik Bay to Port Moller)	98	(46.2%)
		195	92.0%

The harvest location of the remaining 17 bulls (8.0%) is unknown.

As harvest report reminder letters were not sent in the 1977/78 season, the regression technique described in the moose S&I report for Unit 7 was employed to estimate what the reported harvest would have been and how many hunters would have reported, had reminder letters been sent. Utilizing this technique, a harvest of 180 moose (± 61 , $p = 0.05$) by 435 hunters (± 28 , $p = 0.05$) was estimated yielding an estimated success rate of 41 percent. Excellent fits ($r^2 = 1.0$) were obtained for both harvest and hunter participation data. These estimates were based on a preliminary tabulation of moose harvest reports. The final tabulation of these reports yielded a reported harvest of 185 moose by 386 hunters for a success rate of 48 percent. Unlike the other game management

units in Alaska and contrary to expectations, the final reported harvest without reminder letters exceeded the regression estimate. From this it was tentatively concluded that reminder letters have little impact on the incidence of hunter reporting in Unit 9; the nonresidents who take approximately half the Unit 9 moose harvest may report consistently regardless of any reminder letters and many local residents never report, also regardless of any reminder letters. In such a situation the close fitting regression equation mentioned above would result. The best estimate of hunter success rate in Unit 9 was therefore obtained utilizing the known harvest (212 moose) divided by the estimated number of hunters (435) yielding a success rate of 49 percent (Appendix I).

Composition and Productivity

Composition surveys have revealed that calf production and survival have been low in GMU 9 since 1970; never exceeding 14.0 calves per 100 cows in fall counts (Appendix II). Among the possible causes for this reduced productivity are: 1) lower pregnancy rates due to altered bull:cow ratios or nutritional imbalances, 2) impaired viability of calves, and 3) increased predation on newborn calves. Several of these factors could be inter-related and simultaneously operative. Work was undertaken in 1977 to assess some of the possible causes of the low calf numbers.

During April, 1977, 57 adult cow moose were immobilized, collared and examined in the vicinity of Mother Goose Lake to provide data on productivity and physiology. Rectal palpation revealed a pregnancy rate of 84 percent which is within the normal range for healthy Alaskan moose populations (Franzmann, et al 1976). Blood samples were collected from 56 of the moose captured for collaring. Analysis of these samples showed low cholesterol, blood urea nitrogen and packed cell volume (Faro and Franzmann 1978). These low levels indicate the Alaska Peninsula moose population is nutritionally stressed, but the effect of these low levels on post-parturition survival is unknown.

Post parturition surveys were flown every third day commencing 28 May and extending through 15 June to determine calf production and survival. These surveys showed varying ratios of calves/100 cows, which declined from a high of 45.8 to a low of 20.9 in early June (Appendices III and IV). Thus, apparent calf production reached less than 60 percent of the potential minimum of 84 calves per 100 cows (based on sampled pregnancy rate) and neonatal calf survival was poor. The significant difference between observed and expected calf production ratios and the high levels of early mortality may indicate that nutritional factors are, indeed, responsible for the general reproductive failure in this population.

It is also obvious, however, that predation must be a significant proximate cause of reduced calf numbers. Wolves and brown bears were observed during most post-calving surveys in the Mother Goose Study area (Appendix IV). Wolf density is believed low in the area and it is unlikely that wolves are a major cause of mortality. Brown bears are abundant throughout the Peninsula and were observed regularly during the

surveys. On five occasions, bears were observed feeding on the remains of calves, and one bear was observed pursuing a calf. In addition, Faro and Franzmann (1978) noted that "Dirt piles, typical of the carcass burial feeding behavior of brown bears, were also observed during surveys. Initially, it appears brown bears are the major predator on newborn moose calves."

The age structure of the female segment of the population as determined by Faro and Franzmann (1978) reflects the poor recruitment to the population in recent years. Seventy-four percent of the cows were 6 years old or older. Given that age structure, it is unlikely that the GMU 9 moose population will halt its decline and again regain a productive profile in the next few years.

Fall composition counts also reflected high calf mortality through the summer. During the fall of 1977, 747 moose were classified on two trend count areas. The ratio of calves:100 cows observed on the "flats" area was 9.1; on the Katmai area the ratio was 20.3. The overall ratio was 13.4 calves to 100 cows which is comparable with results for the last seven years. Although lack of adequate snow cover limited the number of areas counted relative to other years, the sample size in 1977 was within the range of surveys made since 1970 and indicates continuing low calf survival through summer and fall (Appendix V).

Management Summary and Conclusions

In view of the general decline of the Unit's moose population, conservative regulations were established for Unit 9 in 1976. In addition, because of the impact of heavy hunting pressure on average antler sizes of bulls taken in Unit 9, an experimental management program was established for GMU 9 (E) in 1976. Under this program, the harvest of bull moose was restricted to animals with antler spreads of 50 inches or greater or with three brow tines on one side. Successful hunters harvesting moose in this Subunit were required to present the antlers to the Department of Fish and Game for sealing and to surrender the lower jaw for age determination. During this period, a minimum of 98 bulls were harvested in GMU 9(E), of which 88 were sealed. Ten hunters returned harvest reports for which there are no corresponding sealing data.

Data gained from the 1977 sealing program are almost identical to those of 1976 (Appendices VI and VII). This similarity included the number of illegal antlers presented in both years, three in 1977 and five in 1976. The mean antler spread on a sample size of 87, compared to 84 in 1976, varied only 1.1 inches. The mean age of 5.7 years for 1977 bulls is not significantly greater than the 5.6 years for 1976. Residency of successful hunters followed the pattern noted in 1976; only 17 percent of the successful hunters in Subunit 9 (E) were Alaskan residents, compared to 48.6 percent unit-wide.

Recommendations

1. The management experiment has been in effect for 2 years. The data gained are valuable, but inconclusive. The experiment should be continued at least 2 more years.
2. Season lengths should remain the same for bulls and limited harvests of females during December could be allowed if local residents desired to utilize this source of meat.

References Cited

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- Franzmann, A. W., R. E. LeResche, P. D. Arneson, and J. L. Davis. 1976. Moose Productivity and Physiology. Alaska Dept. of Fish and Game P R Final Report. W-17-2,3,4,5,6 and 7. 87p.

PREPARED BY:

Christian A. Smith
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

MOOSE - GMU 9 -- Alaska Peninsula

APPENDIX I

Moose Harvest and Hunting Pressure -- Unit 9

Year	Bulls	Cows	Unid.	Total	Hunters	Percent 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

* Extrapolated Estimate (± 28 , $p = .05$), actual number reporting = 386

PREPARED BY: Nick Steen, Game Biologist II

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX II

Moose Sex and Age Ratios - Unit 9

Date	Total Males per 100 Females	Small Males per 100 Females	Small Males per 100 Lg. Males	Small Males % 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	No counts made									
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

* Area not specified in 1963

** Raw data not available to check

PREPARED BY: Christian A. Smith, Game Biologist III

APPENDIX III
 MOOSE - GMU 9 - Alaska Peninsula
 Mother Goose Area
 Moose Productivity, 1977

Date	Calves per 100 Cows	Calves per 100 Cows and Yearlings	Percent Cows with Calves	Twins per 100 Cows with Calves	Total Sample**
May 28	27.8 (47.1)*	25.7	16.7 (23.5)	66.7 (100)	98 (17)
May 31	33.3 (33.3)	32.4	20.8 (16.7)	60.0 (100)	98 (12)
June 3	40.0 (75)	37.4	24.7 (40)	61.9 (87.5)	125 (20)
June 6	45.8 (41.1)	44.0	27.8 (23.5)	65 (75)	108 (17)
June 9	28.8 (23.1)	25.6	19.2 (15.4)	50 (50)	102 (13)
June 12	20.9 (36.4)	19.7	17.9 (27.3)	16.1 (33.3)	85 (11)
June 15	25.9 (11.1)	24.6	26.7 (11.1)	25 (0)	76 (9)

* Date in parentheses for collared cows

** Excludes bulls

PREPARED BY: Nick Steen, Game Biologist II

APPENDIX IV
 MOOSE - GMU 9 - Alaska Peninsula
 Mother Goose Area
 Moose Productivity, 1977

Date	Cows*	Cows & Yearlings	Total* Calves	Sample* Size**	Total Predators
May 28	72 (17)	78	20 (8)	98 (21)	15
May 31	72 (12)	74	24 (4)	98 (16)	0
June 3	85 (20)	91	34 (15)	125 (35)	8
June 6	72 (17)	75	33 (7)	108 (24)	10
June 9	73 (13)	81	21 (3)	102 (16)	14
June 12	67 (11)	71	14 (4)	85 (15)	8
June 15	58 (9)	61	15 (1)	76 (10)	6

* Data in parentheses for collared moose.

** Excludes bulls

PREPARED BY: Nick Steen, Game Biologist II

APPENDIX V

MOOSE - GMU 9 - Alaska Peninsula

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 *	60.9	15.7	34.8	8.7	155	20.3	11.1	11.2	170	357
Flats	13.5	5.0	59.3	4.1	110	9.1	20.8	7.4	118	390

* Trend area in Katmai National Monument, no hunting allowed

PREPARED BY: Christian A. Smith, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX VI

Moose Antler-Age Relationship

Year	Antler Spread			Mean Age	Sample Size
	% Less than 50"	% Greater than 50"	% Greater than 60"		
1972	0	100	76	6.9	25
1973	3	92	63	6.4	48
1974	6	94	46	7.5	78
1975	40	61	16	5.4	38
1976*	11	89	30	5.6	84
1977*	8	92	24	5.7	82

* Moose antler sealing data

PREPARED BY: Nick Steen, Game Biologist II

APPENDIX VII

Moose Antler Sealing Data, GMU 9(E), 1976-77

	Resident	Nonresident	Data not available	Guided	Non-guided	Data not available,	Total Sample
<u>1976</u>							
No. sealed	21	73	61	33			94
Mean antler spread (inches)	55(19)	56(65)	57(54)	55(30)			84
Mean age (years)	5.1(17)	5.7(65)	5.8(56)	5.1(26)			82
Sub-legal antlers	3	2	2	3			5
<u>1977</u>							
No. sealed	15	72	1	63	24	1	88
Mean antler spread (inches)	56(15)	57(72)	57(63)	55(23)	1		87
Mean age (years)	6.3(13)	5.6(63)	5.6(57)	5.9(18)	1		76
Sub-legal antlers	2	1	2	1			3
Mean antler spread, 1976	56.3(84)						
Mean antler spread, 1977	57.4(87)						

PREPARED BY: James B. Faro, Game Biologist IV

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

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

Season and Bag Limits

Unit 11	Sept. 1 - Sept. 20	One bull
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Harvest and Hunting Pressure

Thirty-five moose were reported harvested in Unit 11 by 146 hunters during 1977. The harvest was the lowest reported since 1963; however, season lengths and bag limits have only remained the same since 1975. Since the elimination of the November season in 1975 and the corresponding initiation of bull-only seasons, harvest, hunting pressure and hunter success have significantly declined (Appendix I). The same trends are evident, utilizing harvest and hunter data which is corrected for the absence of harvest report reminder letters in 1977 (Appendix I). A discussion of the techniques for making these corrections is included in the S & I report for Unit 7.

Prior to 1975 the moose harvest averaged 164 animals (123-242). In the last three years an average of 41 moose were reported taken (40-48-35).

Between 1966 and 1974 an annual average of 431 hunters reported hunting in Unit 11. In the last three years an annual average of only 169 hunters reported, a 61 percent decline. Reported hunter success has been consistent at 24 percent for the past three years, the lowest percentages since 1966.

Composition and Productivity

Moose sex and age composition surveys have been conducted periodically since 1955 in count area 11 (Mount Drum) and since 1965 in count area 18 (Nabesna Road). The Hanagita-Bremner count area (11-09) was surveyed in 1976. Only count area 11 (Mount Drum) was surveyed in 1977. The results of these counts are shown in Appendix II. In recent years, the numbers of moose observed in these count areas have been insufficient to permit conclusions about the trend in sex and age ratios. In 1974, new count areas were designed which would yield larger samples of moose and which would sample moose in previously uncounted areas. These count areas correspond to moose harvest units and will be useful in developing management strategies for specific areas within Unit 11.

Management Summary and Conclusions

Moose populations in Unit 11 declined during the early 1970's. The number of moose observed in recent surveys is too low to demonstrate trends in the sex or age ratio of the population. Recently established count areas have not been in existence long enough, or counted often enough, to show population trends. Harvests have been markedly reduced in Unit 11, primarily due to hunting season and bag limit restrictions initiated in 1975. Although these seasons seem excessively restrictive, they should not be altered until further information is available to accurately assess trends within the moose population.

Recommendations

1. Additional areas within Unit 11 should be flown to obtain population information over more of the moose habitat in Unit 11. However, collection of data should be discontinued in areas within the proposed national parks if management authority of game is withdrawn from the state.
2. Until additional information is available, the season in Unit 11 should conform with adjacent units.

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SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I. Moose Harvest and Hunting Pressure - Unit 11
Based on harvest report data.

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*			43*	231**	19%

* Corrected for absense of reminder letters (± 15 , $p = .05$) ($r^2 = 0.99$)

** Corrected for absense of reminder letters (± 61 , $p = .05$) ($r^2 = 0.99$)

PREPARED BY: Ted Spraker, Game Biologist II

APPENDIX II. A Comparison of Moose Sex and Age Composition Data - Unit 11.

<u>Year</u>	<u>Large Males per 100 Females</u>	<u>Small Males per 100 Females</u>	<u>Calves per 100 Females</u>	<u>Moose per Hour</u>	<u>Sample Size</u>
<u>Mt. Drum Area Count</u>					
1955*	116	29	36	75	300
1956*	130	15	30	55	55
1957*	64	7	39	92	92
1958*	128	12	34	94	291
1960*	64	16	36	48	110
1961-64	NO DATA				
1965*	55	25	19	81	268
1966	NO DATA				
1967	62	10	29	117	456
1968	NO DATA				
1969	54	11	28	85	299
1970*	46	15	14	59	199
1972	46	5	10	69	250
1973	73	6	12	25	97
1974	53	5	13	16	65
1975	39	7	14	16	70
1976	NO DATA				
1977	21	4	29	13	96

Nabesna Road Count Area

1965*	22	20	39	52	83
1968*	14	5	12	44	140
1971	11	0	24	20	50
1972	0	6	19	16	39
1973	---**	---**	---**	5	15
1974	23	8	69	7	52
1975	NO DATA				
1976	NO DATA				
1977	NO DATA				

Hanagita-Bremner Count Area (MMU 11-09)

1976	41	7	54	32	83
1977	NO DATA				

* Area boundary change.

** Data of no value because of small sample size.

PREPARED BY: Ted Spraker, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 12 - Upper Tanana-White River

Period Covered: July 1, 1977 - June 30, 1978

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

Harvest and Hunting Pressure

Harvest ticket data indicated that 86 moose were taken from Unit 12 during the 1977 season, a slight increase over the 1976 harvest but considerably below the 10-year average of 145 animals. Contrary to the customary practice, reminder letters were not mailed to hunters who failed to return their harvest tickets. Therefore, the reported harvest and hunting effort figures must be considered minimal. Based on the results from previous years when reminder letters were used, the reported harvest increased an average of 12 percent after the delinquent reports were tabulated for this unit. Therefore, the extrapolated harvest for Unit 12 was 94 moose. The largest harvest occurred in the Tok River drainage (Table 1), which is typical of recent years.

Table 1. Unit 12 moose harvest by drainage, 1977:

<u>Drainage</u>	<u>No. of animals harvested</u>	<u>Percent of total harvest</u>
Tok	42	49
Tanana	10	12
Nabesna	4	5
Chisana	9	10
White R.-Beaver Ck.	15	17
Unknown	6	7
Total	86	100

Of the successful hunters, 70 percent (60) were residents while the remaining 30 percent (26) were nonresidents. The number of Unit 12 moose hunters reporting declined from 301 in 1976 to 264 during 1977. Ninety percent of the unsuccessful hunters were residents.

As in recent years, the latter part of the season proved to be most productive (Table 2).

Table 2. Calculated harvest per day, Unit 12, 1977.

<u>Period</u>	<u>Harvest/Day</u>
9/1-9/7	3.2
9/8-9/15	4.8
9/15-9/20	5.6

The most successful transportation modes were off-road vehicle, horse and aircraft. Transportation modes reported by hunters in Unit 12 are summarized in Table 3.

Table 3. Transportation modes, Unit 12, 1977.

<u>Transportation mode*</u>	<u>Number of hunters</u>	<u>Percent of total hunters</u>	<u>Success rate</u>
Aircraft	32	14	56
Highway vehicle	77	34	22
Boat	33	14	9
Horse	31	14	61
Off-road vehicle	56	24	41

* Data are from hunters reporting only one mode of transportation.

Based on antler size data obtained from harvest tickets, yearlings comprised 17 percent of the Tok River harvest and 14 percent of the White River harvest. Although 38 percent of the Tanana River harvest were yearlings, the sample size was too small to be meaningful. The relatively low percentage of yearlings in the harvest probably reflected low recruitment rather than moderate exploitation rates. Mean antler size was 42 inches from the Tok drainage and 46 inches from the White River area.

Composition and Productivity

Results of November sex and age composition surveys are presented in Table 4.

Table 4. Sex and age composition, Unit 12, 1977.

<u>Drainage</u>	<u>Calves:100 Cows</u>	<u>Moose/Hr.</u>	<u>Bulls:100 Cows</u>	<u>Sample Size</u>
Tok-Dry Tok	24	58	26	146
Little Tok	13	90	22	325

Calf survival through early November in the Tok and Dry Tok drainages was about average for the past 10 years. However, calf survival was poor in the Little Tok with an observed calf:cow ratio of only 13:100, a decline over the poor survival rate of 17:100 in 1976.

The bull:cow ratio increased significantly in the Tok/Dry Tok drainages to 26:100, the highest figures noted since 1968. Natahona Creek (a tributary of the Tok River) was surveyed for the first time in 7 years and a large percentage of bulls was observed there which caused the bull:cow ratio to increase for the Tok drainage. Disregarding the Natahona Creek figures, there is little doubt that the bull:cow ratio has improved.

The bull:cow ratio of 22:100 in the Little Tok has remained virtually unchanged since 1974.

The numbers of moose observed elsewhere in Unit 12 (Alaska Range and Nabesna area) remained low, and these data are not presented.

Range and Habitat

Snow depths were measured periodically along the Tok Cut-Off at five measuring sites during the 1977-1978 winter. While snow depth measurements from a single year are of little value, when data from several years are compared an indication of the severity of winters with respect to moose browsing conditions is obtained.

Browse utilization sites were established along the same route as the snow measurement stations. Greenleaf willow (Salix pulchra) and feltleaf willow (Salix alaxensis) were used as indicator species to classify browse utilization within the plots as light, moderate or heavy. When snow depth along the highway exceeds 2 feet (61 cm), moose are forced to the valley floor, and if this movement occurs prior to mid-December, browse utilization along the winter range approaches 100 percent (all available twigs show use). Thus, timing of the migration and subsequent range utilization are dictated by snow depth.

Snowfall was light during the winter of 1977-1978, measuring less than 14 inches (35.5 cm). The majority of moose remained in the foothills throughout most of the winter, finally moving to the valley floor during February and March. Browse utilization sites were not checked in spring 1978. Based only on snow depth data, browse utilization was probably light to moderate.

Management Summary and Recommendations

Moose numbers in the Nabesna area remain very low despite a closed season there since 1974. Moose populations are also low in the Alaska Range between the Tok Cut-Off Highway and the Robertson River. Moose numbers in other surveyed portions of Unit 12 appear to be stable, although a decline is probable in the Little Tok drainage if calf survival remains low.

Bull:cow ratios improved in the Tok-Dry Tok drainages and remained stable in the Little Tok.

Moose populations are low to moderate in Unit 12 and are not expected to increase until calf survival improves significantly.

It appears that the low to moderate populations are capable of withstanding a harvest of 75-85 bulls without accelerating the decline, provided that the harvest distribution remains essentially unchanged.

Future seasons in Unit 12 should probably be aligned with seasons in the surrounding units in order to avoid hunter concentration and possible overharvest.

Although the moose season has been reduced from approximately 75 days through the mid-70's to the present 20 days and the harvest reduced by over 50 percent, the moose population has not increased in Unit 12, even in areas closed to hunting. Continued low recruitment is the major problem. A reduction in wolf numbers, in conjunction with habitat rehabilitation programs, is a prerequisite for increasing moose numbers in this unit.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

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

Seasons and Bag Limits

Sept. 1 - Sept. 20

One bull

Harvest and Hunting Pressure

Harvest report reminder letters were not sent in 1977, so both harvest and hunter participation figures are actually higher than reported. Corrected values for these figures, obtained as described in the moose Survey and Inventory Report for Unit 7, are shown in Appendix I along with the uncorrected figures. Using the corrected figures, both moose harvest and hunting pressure continued to increase in 1977. Unit 13 contributed 20 percent of the 1977 reported moose harvest in Alaska.

Appendix II shows the method of transportation used by successful moose hunters in Game Management Unit 13. The percentage of successful hunters using off-road vehicles continued to increase while the percentage of successful hunters using aircraft remained stable at 1976 levels. Hunters using highway vehicles declined both in numbers and in percent of total take.

Composition and Productivity

Sex and age composition data since 1954 are shown in Appendix III. Both bull:cow ratios and calf:cow ratios increased slightly during each of the past two years, although they remain substantially lower than levels recorded during 1950's and 1960's. Increases in ratios were not observed in every count area; some count areas continued to decline. The causes of poor calf survival are currently being studied. Preliminary data indicate that calves in the fall generally survive through the winter and most losses occur soon after parturition (Ballard and Taylor, 1978).

Management Summary and Conclusions

Moose hunting regulations in Unit 13 have remained unchanged since 1975. The 20-day season is the result of progressively more restrictive regulations designed to stop declining bull ratios. Female moose have not been legally hunted since 1971.

Unit 13 apparently suffered a severe decline in moose population during 1971. This decline resulted in a 39 percent reduction in total harvest, a reduction in bull:cow ratios, and a reduction in calf:cow

ratios. Subsequently, moose seasons have been shortened to protect the remaining bulls. Since 1971, there has been no clear trend toward a continuing population decline, but both bull and calf ratios have remained low. Major efforts to determine calf mortalities are now in progress and are needed for management purposes.

Recommendations

1. Retain present season for the 1978 regulatory year.
2. Continue monitoring harvests and sex and age composition.
3. Obtain results of intensive research efforts as they become available and utilize these findings to increase moose populations to optimum levels.
4. If declines in population levels and bull:cow ratios occur, implement appropriate restrictions to reduce harvest levels.

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SUBMITTED BY:

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MOOSE - GMU 13 Nelchina Basin

APPENDIX I

A comparison of Annual Moose Harvest and Hunting Pressure, 1963-77

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

* 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 ± 133 , $p = .05$; hunters = $3698 \pm 1,080$, $p = .05$)

PREPARED BY: Sterling Eide, Game Biologist III

APPENDIX II

Transportation Trends of Successful Hunters Since 1967^a.

TRANSPORTATION TYPE

Year	Airplane	Horse	Boat	Motorbike	Snowmachine	Off-road Vehicle	Highway Vehicle And Afoot	Sample Size
1967, %:	22%	2%	4%	—	1%	34%	37%	
No.:	310	26	57	—	21	475	525	1414
1968, %:	19%	3%	6%	—	3%	34%	34%	
No.:	288	39	85	—	52	515	517	1496
1969, %:	22%	2%	5%	<1%	2%	30%	39%	
No.:	260	18	55	9	26	357	470	1195
1970, %:	20%	2%	4%	<1%	10%	25%	39%	
No.:	259	24	52	5	131	323	505	1299
1971, %:	19%	3%	8%	<1%	11%	24%	33%	
No.:	349	57	141	12	206	436	596	1797
1972, %:	34%	7%	8%	<1%	5%	28%	18%	
No.:	252	51	57	5	37	210	132	744
1973, %:	36%	3%	8%	<1%	<1%	32%	20%	
No.:	229	21	50	4	1	201	123	629
1974, %:	24%	3%	10%	1%	<1%	38%	23%	
No.:	201	29	82	11	1	320	190	834
1975, %:	26%	4%	8%	1%	<1%	41%	19%	
No.:	186	26	61	8	1	297	139	718
1976, %:	23%	5%	9%	<1%	<1%	43%	20%	
No.:	160	32	64	3	1	301	141	702
1977, %:	24%	3%	8%	<1%	0	48%	16%	
No.:	161	20	54	6	0	323	105	669

a. Because of hunters using more than one transportation type or not reporting any transportation types, the numbers and percentages used should be interpreted as levels rather than as absolute values.

PREPARED BY: Sterling Eide, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX III

Moose Population Composition Counts, Nelchina Basin, 1952 - 1977

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

PREPARED BY: Sterling Eide, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Subunit 14A - Palmer

Seasons and Bag Limits

Sept. 1 - Sept. 20

One bull

Harvest and Hunting Pressure

A total of 233 moose were reported harvested by 1,083 hunters in subunit 14A. As harvest report reminder letters were not sent in 1977, these data were extrapolated to provide estimates comparable to previous year's data (Appendix I). The regression technique used in making these extrapolations is described in the Moose S & I report for Unit 7.

The extrapolated data for subunit 14A indicate that 307 moose would have been reported taken (± 103 , $p = 0.05$), and that 2,042 hunters would have reported hunting ($\pm 1,167$, $p = 0.05$) if reminder letters had been sent (Appendix I). For the entire Unit 14, an excellent fit was obtained for the extrapolated harvest ($r^2 = 0.99$), but only a moderate fit for the extrapolated number of hunters ($r^2 = 0.88$). Using the extrapolated figures, hunter success was 15 percent in subunit 14A. Subunit 14A accounted for 79 percent of the total moose harvest in Unit 14.

The 1974 through 1977 moose harvests in 14A are the lowest recorded since 1965. Antlerless moose hunts proposed by the Game Division during the past four years have been cancelled or have not been endorsed by advisory committees. The reported bull harvest increased from 208 in 1976 to 229 in 1977, but the number of hunters also increased so hunter success remained unchanged at 15 percent.

Moose mortality from causes other than hunting is presented in Appendix II. Although 1977-1978 was not a severe winter, the number of road kills was nearly as high as 1976-1977. This is probably due to increased traffic and moose numbers on the Parks Highway between Fairbanks and Anchorage. The total of 79 moose killed by vehicles in the winter of 1977-78 was nearly as high as in 1976-77 (80 moose), although less effort to obtain this information was made in 1977-1978. The Alaska Railroad tracks were not checked for train kills for the third consecutive year. Most information on moose road kills was provided by Ralph Kilbourne, who was hired to pick up moose road kills by the Fish and Wildlife Protection Division of the Department of Public Safety.

Composition and Productivity

In Game Management Subunit 14A, 936 moose were counted during the annual sex and age composition surveys on December 19, 22 and 27, 1977 (Appendix III). Only three of eight count areas in Subunit 14A were

flown. Bull:cow ratios decreased slightly from 18 males:100 cows in 1976 to 16 males:100 cows in 1977. The surveys were conducted in December which is after some males had already dropped their antlers; this probably caused the apparent lower bull:cow ratios in 1977.

The calf:cow ratio in 1977 was 45 calves:100 cows; this is equivalent to those recorded in 1975 and 1976. Calf:cow ratios may decrease in the future if antlerless hunts are not reinstituted to relieve overbrowsing of winter range.

Management Summary and Conclusions

The moose population in Subunit 14A is increasing. Mild winter in direct combination with the lack of antlerless moose harvest plus the restricted seasons on bulls have contributed to the increase. Concurrently, much human encroachment has taken place, which has decreased available habitat for moose, 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. Maintaining appropriate sex ratios and keeping the herd within habitat carrying capacity has proven difficult. The local advisory committee disallowed the Game Division's antlerless moose hunt proposal for the 1977 season. For 1978, a limited antlerless hunt (100 permits) for Subunit 14A has been approved.

Range rehabilitation would improve moose habitat, but high property values and the expense of rehabilitation largely preclude these solutions to date.

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.

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James B. Faro
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Appendix I. Moose Harvest and Hunting Pressure in Alaska's Game Management Subunit 14A, 1971-1977.

<u>Year</u>	<u>Date</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>	<u>Number of Hunters</u>	<u>Percent Success</u>
1971	8/20-9/20	177	0	1	178		
	11/1-11/20	225	0	0	225		
	9/1-9/20 Antlerless	0	101	0	101		
	11/1-11/14 Antlerless	0	233	0	233		
	Unknown Date	127	145	9	281		
	TOTAL	529	479	10	1018	2090	49
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	Season Cancelled					
	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	Season Cancelled					
	Unknown Date	34	1	3	38*		
	TOTAL	337	1	8	346	1506	23
1974	8/20-9/20	164	0	3	167		
	To be announced Antlerless	Season Cancelled					
	TOTAL	164	0	3	167	1225	14
1975	9/1-9/20	166	1	0	167		
	To be announced Antlerless	Season Cancelled					
	TOTAL	166	1	0	167	893	19
1976	9/1-9/20 One Bull	208	0	3	211	1395	15
1977	9/1-9/20 One Bull Raw Data	229	0	4	233	1083	22
	Extrapolated Data				(307)	(2042)	(15)

* Includes 4 males, 1 female, and 1 moose of unknown sex reportedly taken in October, December, January or February.

PREPARED BY: Jack C. 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, 1971 to 1978.

Road Kill						Incidental/Train Kill					Illegal Kill					Winter Kill				
*Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.	Ad.	Ad.	Calf	?	Tot.	Ad.	Ad.	Calf	?	Tot.
M.	F.	M	F			M.	F.	M	F		M.	F.	M	F		M.	F.	M	F	
<u>1971-72</u>																				
8	35	27	28	11	109	8	17	2	6	11	44	3	30	0	4	8	45	0	6	8
<u>1972-73</u>																				
4	20	6	4	2	36	0	2	0	2	1	5	3	31	2	6	7	49	0	0	0
<u>1973-74</u>																				
2	17	7	5	2	33	1	4	2	6	1	14	1	37	2	2	7	49	1	1	2
<u>1974-75</u>																				
8	28	10	13	4	63	5	16	6	7	1	35	5	24	3	3	5	40	0	0	3
<u>1975-76^{a/}</u>																				
0	20	5	3	1	29	1	2	0	1	1	5	1	8	1	0	3	13	0	1	0
<u>1976-77^{a/}</u>																				
7	28	6	15	0	56	1	4	0	1	1	7	9	6	0	0	0	15	0	1	0
<u>1977-78^{a/}</u>																				
9	34	6	17	1	67	0	1	2	0	2	5	2	2	0	0	2	6	0	1	0

Total Confirmed Non-Hunting Kill

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>
Adult Male	19	7	5	18	2	17	11
Adult Female	88	53	59	68	31	39	38
Calf Male	37	8	13	22	6	6	8
Calf Female	48	12	16	27	4	17	17
? Sex &/or Age	<u>31</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>5</u>	<u>1</u>	<u>5</u>
Total	223	90	103	145	48	80	79

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

^{a/} 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, 1968-1977.

<u>Year</u>	<u>Total MM per 100 FF</u>	<u>Small MM per 100 FF</u>	<u>Small MM per 100 Large MM</u>	<u>Small MM % In Herd</u>	<u>Small MM per 100 MM Calves</u>	<u>Calves per 100 FF</u>	<u>Twins per 100 cows w/Calf</u>	<u>Calf % in Herd</u>	<u>Moose per Hour</u>	<u>Total Moose</u>
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 ^{a/}	15	11	250	7	50	44	6	27	49	682
1976 ^{a/}	19	9	96	6	41	44	6	27	51	880
1977 ^{a/}	16	7	70	4	29	45	9	28	51	936

^{a/} Only count areas 1, 5 and 8 of eight count areas in Subunit 14A were surveyed.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR REGULATORY YEAR - 1977-78

Game Management Subunit 14B - Willow to Talkeetna

Seasons and Bag Limits

Subunit 14B	Sept. 1 - Sept. 20	One bull
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Harvest and Hunting Pressure

The final reported moose harvest in Subunit 14B was 25 bull moose (Appendix I). No reminder letters were sent to individuals who did not return their moose harvest reports in 1977. Therefore, extrapolated data obtained as discussed in the moose S&I report for Unit 7 were used to correct for the absence of reminder letters (Appendix I). The extrapolated data for Subunit 14B are 33 bulls harvested by 277 hunters. This yields a 12 percent success rate. Good fits were obtained for the extrapolated kill data in Unit 14 ($r^2 = 0.99$) but not for the extrapolated hunter participation data ($r^2 = 0.88$).

Harvest and hunter success values have decreased 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 has remained restricted through 1977.

Verified non-hunting mortality of moose in Subunit 14B is shown in Appendix II. Less effort was made to document non-hunting moose mortality during 1977-78 and the information is not comparable to prior years. Mortality due to road and train kills or winter starvation has been higher during severe winters (1970-71 and 1971-72) than during mild winters, such as the winter of 1976-77.

Composition and Productivity

Bull:cow ratios declined to a low of 11 bulls to 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 within a normal range.

Management Summary and Conclusions

Moose harvests have declined during the 1970's. Many factors have contributed to the declining harvest. Season restrictions have occurred primarily in response to public pressure rather than on biological considerations.

Moose abundance in 14B is uncertain because of variation 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 limited by food 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 by range rehabilitation programs. Increased harvesting of both sexes of moose should also be incorporated into future management plans. This would permit utilization by humans of moose that would otherwise probably starve during severe winters. Of interest is the construction of a new power line across Subunit 14A from near Willow on the south to Sunshine on the north. Habitat disturbance along the right-of-way should create a considerable amount of browse in the future. Since the power line will be one mile or two miles from the highway this browse may have a tendency to hold moose away from the roadway and thereby decrease the number of winter road kills.

Recommendations

Public acceptance needs to be gained for a substantial harvest of both sexes of moose. The local advisory committee has proposed a permit antlerless moose hunt for 1978-79.

Obtain, through dedication of public ownership, lands that can be used for range rehabilitation. The benefit:cost ratios of various types of range rehabilitation efforts will have to 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.

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Appendix I. Moose Harvest and Hunting Pressure in Alaska's Game Management
Subunit 14B, 1971-1977

Season	Bulls	Cows	Unid.	Total	Hunter	Percent Success
<u>1971</u>						
8/20-9/30	36	0	4	40		
11/1-11/20	48	0	1	49		
9/1-9/30 Antlerless	0	39	0	39		
11/1-12/15 Antlerless	0	101	0	101		
Unknown Date	40	103*	0	143*		
TOTAL	124	243*	5	372	950**	39**
<u>1972</u>						
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**
<u>1973</u>						
8/20-9/20	28	0	1	29		
11/1-11/20	59	0	1	60		
To be announced Antlerless	Cancelled					
Unknown Date	6	0	1	7		
TOTAL	93	0	3	96	395	24
<u>1974</u>						
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
<u>1975</u>						
9/1-9/20 Bulls Only	24	0	0	24	203	12
<u>1976</u>						
9/1-9/20 Bulls Only	38	0	2	40	226	18
<u>1977</u>						
9/1-9/20 Bulls Only	25	0	0	25	147	17
9/1-9/20***	33	0	0	33	277	12

* Using antlerless permit returns rather than harvest report returns.

** Using harvest report returns plus additional successful permit returnees who did not submit harvest report.

*** Extrapolated results: for harvest (33 ± 11 , $p = .05$), for hunters (277 ± 123 , $p = .05$).

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix II. Verified moose mortality (excluding hunting) in Alaska's Game Management Subunit 14B,
June 1-May 31, 1971-72 through 1977-78.

Road kill						Incidental/train kill						Illegal kill						Winter kill					
*Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.	
M.	F.	M	F			M.	F.	M	F			M.	F.	M	F			M.	F.	M	F		
<u>1971-72</u>																							
2	1	2	1	1	7	16	18	7	7	30	78	3	3	0	0	0	6	3	4	8	4	0	19
<u>1972-73</u>																							
1	0 ^{a/}	0	0	2	3	0	4	2	1	3	10	0	0	0	0	1	1	0	0	0	1	0	1
<u>1973-74^{a/}</u>																							
1	3	0	1	1	6	0	1	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0
<u>1974-75</u>																							
1	0 ^{a/}	2	0	2	5	4	16	2	8	19	49	0	1	0	1	0	2	0	0	1	1	0	2
<u>1975-76^{a/}</u>																							
				1						0		1				0				0	0	0	
<u>1976-77</u>																							
1	2	3	0	1	7	0	1	0	0	1	2	0	2	0	0	0	2	0	0	0	0	0	0
<u>1977-78</u>																							
0	2	0	1	2	5	0	0	0	0	5	5	0	0	0	0	4	4	1	0	0	0	0	1

Total Confirmed Non-Hunting Kill

	<u>1971-72</u>	<u>1972-73</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>1976-77</u>	<u>1977-78</u>
Adult Male	24	1	4	5	1	1	1
Adult female	26	4	5	17		5	2
Calf male	17	2	0	5		3	0
Calf female	12	2	1	10		0	1
? sex &/or age	<u>31</u>	<u>6</u>	<u>1</u>	<u>21</u>	<u>1</u>	<u>2</u>	<u>11</u>
Total	110	15	9	58	2	11	15

a/ 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.

* Adult F=Adult female; Adult M=Adult male; Calf M=Calf male; Calf F=Calf female; ? = Unknown sex or age; Tot.=Total.

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 1977.

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
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 ^{a/}	14	6	71	4	39	29	9	20	49	550
1975 ^{b/}	32	4	15	3	43	20	2	13	27	426
1976	Not Flown									
1977	Not Flown									

^{a/} Only the portion of Subunit 14B between Willow Creek and Sheep Creek was flown in 1974.

^{b/} Only portions of Subunit 14B were flown in 1975.

PREPARED BY: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-1978

Game Management Subunit 14C - Anchorage

Seasons and Bag Limits

Sept. 6-Sept. 20

One Bull

Harvest and Hunting Pressure

Appendix I shows the moose harvest data for Game Management Subunit 14C from 1965-1977. During 1977, 31 bull moose were reported taken from the entire subunit. It was estimated that 41 bulls would have been reported, had harvest report reminder letters been sent (see discussion of correction factors in the Unit 7 report). Comparison with former harvests is also complicated by the incorporation of two additional drainages (Twentymile River and Glacier Creek) within Unit 14C boundaries during 1977.

In 1977, 20 percent of the reporting moose hunters were successful (Appendix II). Corrections for absence of reminder letters indicate an actual hunter success rate of 15 percent (Appendix II).

Nonhunting mortality of moose in the period June 1 through May 31 is shown in Appendix III. Seventy-three moose were reported killed during this period in 1977-78 compared to 80 in the previous year. The known number of moose poached decreased from 11 to one over the same period, while the number of road killed moose increased from 59 to 67. Increased traffic throughout the Anchorage area, particularly the Glenn Highway between Muldoon and Eagle River, is the major factor in the continued high road kill mortality.

Composition and Productivity

Five hundred seventy-four moose were observed during October and November sex and age composition counts within the former subunit boundaries; this is up from the 518 observed in 1976 (Appendix IV). Eighty-one additional moose were seen in the Twentymile River drainage. Glacier Creek was not surveyed during 1977. An extremely low bull ratio of 1.6 bulls:100 cows in the Twentymile River drainage reduced the overall subunit bull ratio to 22 bulls per 100 cows. However, within the old subunit boundaries a bull ratio of 26 bulls:100 cows remains within the proposed management goal. Additionally, the Twentymile drainage will be closed to all moose hunting during 1978. A calf ratio of 37 calves to 100 cows was the highest recorded since 1970 in subunit 14C, but was not significantly different from previous years.

The mild winter of 1976-1977 and corresponding excellent calf survival is reflected by the large percentage of yearlings in both incidental and sport kills over the past year. Nine of the 20 road killed cows and 15 of the 22 bulls reported harvested were yearlings. The road killed cows averaged 4.7 years of age with only two animals between 4 and 7 years of age. The lack of moose in these age classes clearly illustrates very poor recruitment over the years 1971-1974.

Management Summary and Conclusions

Harvest levels and hunter success rates have remained fairly consistent over the last 4 years. The overall 14C moose population appears to have increased slightly over the past three years mainly as a result of improved calf survival during recent mild winters. The percent of calves in the population remains high and the number of bulls per 100 cows is at an acceptable level.

Automobile kills remain extremely high and are a major factor preventing larger population increases, given recent mild winters.

Recommendations

Moose harvest reminder letters should be utilized in future years in order to more accurately determine harvest totals and hunting pressures.

Additional browse rehabilitation on Fort Richardson should be encouraged. Approximately 200 acres have been cut during the past three summers, with more cutting planned for the summer of 1978.

Excessive road kills during mid-late winter on or near Fort Richardson could be reduced by a properly timed antlerless hunt adjacent to the Glenn Highway on Fort Richardson. Recent Game Board action has set such a hunt for January and February of 1979. Data gathered in fall aerial moose surveys together with observations of moose distribution on Fort Richardson during early winter will be used to determine the number of moose to be taken.

PREPARED BY:

David B. Harkness
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

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*

* Corrected for absence of reminder letters

PREPARED BY: David Harkness, Game Biologist III

APPENDIX II

Comparison of success among persons hunting bull moose excluding airport and Fort Richardson hunts.

<u>Year</u>	<u>Bull Kill</u>	<u>No. Hunters</u>	<u>Percent Success</u>
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

* Corrected for absence of reminder letters.

PREPARED BY: David Harkness, Game Biologist III

APPENDIX III

14C Moose Road Kill - Poaching Fatalities, June 1977 - May 1978

Date	Automobile	Poached	Other (Train etc.)	Total
June 1977	0	0	1	
July	6	0	0	6
August	6	0	0	6
September	3	1	1	5
October	9	0	0	9
November	5	0	0	5
December	3	0	0	3
Jan. 1978	13	0	0	13
February	4	0	1	5
March	6	0	2	8
April	7	0	0	7
May	<u>5</u>	<u>0</u>	<u>0</u>	<u>5</u>
	67	1	5	73

PREPARED BY: David Harkness, Game Biologist III

APPENDIX IV

Moose sex and age ratios 1966-1977 - 14C

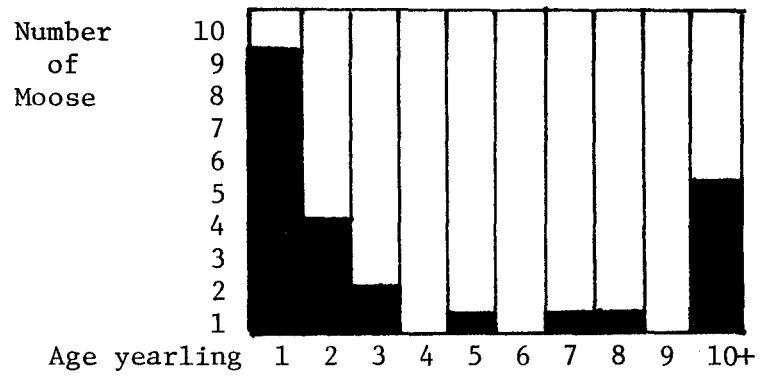
Date	Tot. M per 100 F	Sm. M per 100 F	Sm. M per 100 Lg. M	Sm. M % in herd	Sm. M per 100 M Calves	Calves per 100 F	Incidence of twins per 100 F 2/calf	Calf % herd	Animals per hour	Total sample
1966	18.2	9.9	118.8	6.3	53.5	37.0	4.5	23.7	43	300
1967	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	25	128
1968	22.9	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*

* Includes 2 additional drainages for the first time.

PREPARED BY: David Harkness, Game Biologist III

APPENDIX V

Age structure of road killed cow moose - 14C - June 1, 1977-May 31, 1978.



PREPARED BY: David Harkness, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1977-78

Game Management Unit 15(A) - Kenai

Seasons and Bag Limits

Unit 15(A)	Sept. 1 - Sept. 20	One bull
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Harvest and Hunting Pressure

Harvest report returns indicated that 151 moose were killed by 762 hunters in GMU 15(A) during the 1977-78 season (Appendix I). Because harvest report reminder letters were not sent in this year, these data were corrected by the technique described in the moose S&I report for Unit 7. The extrapolated data indicate that 182 moose would have been reported harvested (+51, $p=.05$) and that 1301 hunters would have reported (+568, $p=.05$), had harvest report reminder letters been sent (Appendix I). An excellent fit was obtained for the harvest extrapolation in Unit 15 ($r^2=1.0$), but only a poor fit for the extrapolation of numbers of hunters ($r^2=.89$).

Hunter effort has increased from 695 in 1975, to 993 in 1976 and to an extrapolated estimate of 1301 in 1977. Hunter success rate was 14 percent in 1977 compared to 17 percent in 1976 and 14 percent in 1975.

Composition and Productivity

In Subunit 15(A), aerial surveys to determine moose composition were flown in eight of 13 count areas during November, 1977.

The areas surveyed represent the best known moose habitat in Subunit 15(A) (Appendix II). These surveys revealed ratios of 11 bulls and 27 calves per 100 cows, unchanged from the 1976 ratios (Appendix II). The total number of animals observed was down and the animals observed per hour has steadily declined from 42/hr in 1974 to 34/hr in 1976 to 24/hr in 1977. Although subject to many variables, these ratios do relate to moose densities and suggest a significant population decline.

A spring survey to determine the extent of moose calf survival was flown in a portion of Subunit 15(A) on April 28, 1978. This revealed excellent calf survival (79%) during the winter of 1977-78. However, the sample size was low (99) compared to previous years (Appendix III). Yearlings made up 15 percent of the herd in 1977-78 compared to 13 percent in 1976-77. Both of these figures represent excellent overwinter survival of those calves present in the fall.

Management Summary and Conclusions

The estimated 182 moose harvested in 1977 represents the highest harvest since the late season was eliminated in 1974. Estimated hunter numbers were also higher than in the preceding 3 years. Thus, the relatively high harvest in 1977 may be attributed to high calf survival through the past three winters and to increased hunter pressure.

Studies indicate that the 1947 burn has reached the end of its productive life as a provider of browse for moose. However, moose habitat is beginning to benefit from the 1969 burn and the crushing program by the Kenai National Moose Range. Although crushing and controlled burning are continuing under the auspices of the KNMR, the net result of succession has been a decline in moose habitat quality in GMU 15(A) in recent years.

Recommendations

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

PREPARED BY:

Ted H. Spraker and Dave Hardy
Game Biologist III and Game Biologist II

SUBMITTED BY;

James B. Faro
Regional Management Coordinator

MOOSE - GMU 15 (A) - KENAI

APPENDIX I

Moose Harvest and Hunting Pressure - Subunit 15 (A) (Harvest Ticket Return Data)

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

* Data not available

^{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: Dave Hardy, Game Biologist II

MOOSE - GMU 15(A) - KENAI

APPENDIX II

Moose Sex and Age Composition Counts - GMU 15A

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*	17	7.9	89	4.8	36	44	14.1	27	--	1,568
1/64*	--	--	--	--	--	--	6.3	24	--	2,171
2/1-12/64*	12	3.8	46	2.7	25	30	5.1	21	--	2,480
6/65**	44	--	--	--	--	33	8.3	19	11	1,200
6/66**	51	--	--	--	--	25	3.7	14	--	795
10/3-16/67**	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***	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#	16	3.2	26	2.0	16	41	4.6	26	39	1,723
11/21-27/73##	9	1.5	19	1.0	8	37	5.4	25	45	1,677
11/20-24/74###	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####	11	5.4	95	3.9	40	27	3.5	19	24	458

* Varied count areas.

** Lowlands only.

*** 9A, 11, 12A, 12B, 18A, 18B.

C.A. 19F was never completely covered; All of the area in Mystery Creek drainage and the area south of Mystery Creek was covered. ## 19D not surveyed. ### CAs 19C, 19D, 19E and 19F not covered.

Above CAs plus 19A not covered.

Prepared by: Dave Hardy
Game Biologist II

MOOSE - GMU 15 (A) - KENAI

APPENDIX III

Moose Calf Survival as Determined by Fall and Spring Aerial Surveys

Date	Bulls/* 100 Cows	Yearlings/* 100 Cows	Calves/ 100 Cows in Fall	Yrlg. % of Herd	Calf % of Fall Herd	% Calf Winter Mortality	Total Sample
4/14-5/4/70 ^{1/}	21	25	43	16	30	45	744 ^{2/}
5/14/71 ^{3/}	16	14	32	11	22	50	245
5/15/72 ^{4/}	17	5	32	4	21	81	302
5/10/73	--	--	41	7	26	73	142
5/7/74 ^{5/}	--	--	37	7	25	72	277
5/3/75 ^{6/}	--	--	42	4	28	86	195
5/10/76	--	25	--	19	--	--	182
5/12/77	--	--	27	13	20	35	210
4/28/78	--	--	27	15	19	21	99

* Use only if survey is conducted late enough to distinguish bulls, if not, work with calf % in herd, $\frac{A - B}{A} (100)$

^{1/} From data compiled on tagging recon flights. Data compiled by Bob LeResche.

^{2/} Includes 30 antlerless long yearlings. Data compiled by Bob LeResche.

^{3/} Area surveyed included only Moose River Flats.

^{4/} Area surveyed included Moose River Flats and area between Kenai River and Skilak Lake Loop, Sterling Highway

^{5/} Area surveyed Beaver Creek, Swanson River, Moose River Flats and area between Skilak Loop Road and Kenai River.

^{6/} Area surveyed included Moose River Flats, Swanson River and Swan Lake Road rehab area.

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT FOR REGULATORY YEAR - 1977-1978

Game Management Unit 15(B) - Soldotna

Seasons and Bag Limits

Unit 15(B) West	Sept. 1-Sept. 20	One bull
Unit 15(B) East, that portion of Subunit 15(B) 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 random drawing. See 5AAC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

Harvest report returns indicated that 21 bull moose were killed by 95 hunters in GMU 15(B) West during the 1977 season. Because harvest report reminder letters were not sent in this year, these data were corrected by the technique described in the moose S&I report for Unit 7. The extrapolated data indicate that 25 moose would have been reported harvested (± 7 , $P=0.05$) and that 162 hunters would have reported hunting (± 71 , $P=0.05$) had harvest report reminder letters been sent (Appendix I). An excellent fit was obtained for the harvest extrapolation in Unit 15 ($r^2=1.0$) but only a poor fit for the extrapolation of number of hunters ($r^2=0.89$).

Hunter numbers have remained relatively constant in Unit 15(B) West at 182 (1975), 167 (1976), and 162 (1977). However, success has varied from 13 percent (1975), to 23 percent (1976), to 15 percent (1977).

In Subunit 15(B) East, 13 of 40 (33%) permit hunters were successful (Appendix I). The mean antler spread of harvested bulls was 50 inches. Successful hunters reported little difficulty in finding bulls and were generally pleased with the hunt.

Composition and Productivity

Moose composition surveys were flown in Subunit 15B during November, 1977 and a total of 505 moose were counted. The proportion of bulls in the total moose observed remains high at 41 bulls/100 cows. This is lower than last year's bull ratio and higher than in any preceding surveys since 1967 (Appendix II). The percentage of bulls with an antler spread of 45 inches or greater declined from 61 percent in 1976 (95/155) to 49 percent in 1977 (52/105). Nevertheless, the remaining high bull ratios suggest that hunting is not the cause of any population change. This is supported by the low harvest of only 38 bulls in the subunit.

Calf ratios declined significantly in the 1977 survey, reaching an all time low of seven calves:100 cows with a calf percentage of five percent in the herd (Appendix II). This level of recruitment is inadequate to replace mortality and is cause for serious concern. However, yearling survival remains high and constant, as shown in the small males in the herd (Appendix II).

Spring surveys indicate low levels of calf mortality during the winters of 1976-1977 and 1977-1978 (Appendix III), although these surveys are based on low sample sizes.

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 similarly found in surveys flown in 1978, 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 agreement will be difficult to achieve for efforts to retard succession or to control predators.

Under the current restricted seasons, the impact of hunting on 15B moose populations is negligible. Hunter effort has been relatively constant over the past three 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

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

PREPARED BY:

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Game Biologist III and Game Biologist II

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

MOOSE - GMU 15(B) - SOLDOTNA

Appendix I

Moose harvest and hunting pressure - Subunit 15(B) - Soldotna

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

1 Data derived from harvest reports.

2 Data derived from registration permit returns.

3 Data derived from field observations.

4 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.

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE - GMU 15(B) - SOLDOTNA

Appendix II

Moose sex and age ratios - Subunit 15(B)

<u>Year</u>	<u>Total MM per 100 FF</u>	<u>Small MM per 100 FF</u>	<u>Sm. MM per 100 Lg. MM</u>	<u>Sm. MM % in Herd</u>	<u>Sm. MM per 100 MM Calves</u>	<u>Calves per 100 FF</u>	<u>Twins per 100 FF w/calf</u>	<u>Calf % in Herd</u>	<u>Animals Per Hour</u>	<u>Total Sample</u>
1962	43	6	16	3	33	37	8	20	-	1832
1963	N O	C O U N T S	M A D E							
1964	44	5	14	3	52	22	6	13	65	1437
1965	N O	C O U N T S	M A D E							
1966	N O	C O U N T S	M A D E							
1967	29	4	14	2	44	16	2	11	-	457
1968	N O	C O U N T S	M A D E							
1969	N O	C O U N T S	M A D E							
1970	38	3	9	2	47	15	3	9	79	817
1971	N O	C O U N T S	M A D E							
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	N O	C O U N T S	M A D E							
1976	48	6	14	3	44	28	4	16	53	644
1977	41	10	32	7	272	7	4	5	40	505

MOOSE - GMU 15(B) - SOLDOTNA

Appendix III

Moose productivity (spring-fall survival), Ratios and Percentages.

<u>Date</u>	<u>Calves/ 100 cows in fall</u>	<u>Yrlg. % of herd</u>	<u>Calf % of fall herd</u>	<u>% calf winter mortality</u>	<u>Total sample</u>
5/11/73	27	16	17	4	92
5/08/74	30	15	18	21	127
5/06/75	35	3	22	86	62
5/11/76	-	21	-	-	159
5/12/77	28	17	16	0	107
5/11/78	7	7	5	0	102

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1977-78

Game Management Unit 15(C) - Homer

Season and Bag Limits

Unit 15(C)	Sept. 1 - Sept. 20	One bull
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Harvest and Hunting Pressure

Harvest report returns indicated that 84 moose were taken by 457 hunters in Unit 15(C) during the 1977 season (Appendix I). Because harvest report reminder letters were not sent this year, these data were corrected by the technique described in the moose S&I report for Unit 7. The extrapolated data indicate that 101 moose would have been reported harvested (± 28 , $P = 0.05$) and that 780 hunters would have reported hunting (± 240 , $P = 0.05$) had harvest report reminder letters been sent (Appendix I). An excellent fit of the data was obtained for the harvest extrapolation in Unit 15 ($r^2 = 1.0$) but only a poor fit for the extrapolation of numbers of hunters ($r^2 = 0.89$).

The number of moose hunters remained relatively constant in Unit 15(C) during the 1975 (658) and 1976 (638) seasons, but increased to 780 in 1977. Success has varied from 14 percent (1975) to 18 percent (1976) to 13 percent (1977). Residents harvested 75 (89%) of the reported take of 84 animals.

Composition and Productivity

In 1976 and 1977 sex and age composition counts were conducted in the following areas: Anchor Point, Homer, 3, C and I. The overall bull:cow ratio remained unchanged at 15 to 100 cows (Appendix II). The mean from 1969 through 1977 was 17 bulls:100 cows.

The calf:cow ratio declined from 28:100 in 1976 to 19:100 in 1977. The bulk of this drop occurred in the Anchor Point and Caribou Hills areas. The Caribou Hills ratio of 8 calves:100 cows closely approximates the Unit 15(B) east ratio of 7:100 cows recorded in 1977. Productivity does not appear adequate to replace mortalities in either area (Appendix II).

The winter of 1976-77 was one of the mildest on record. This should have allowed cows to allocate maximal resources to calf growth and feeding. The observed decrease in the 1977 fall calf:cow ratio suggests substantial calf mortality during the summer of 1977.

The spring survival survey was conducted in May of 1978 and showed 20 short yearlings:100 cows in a sample of 161 moose. This suggests excellent overwinter calf survival.

Management Summary and Conclusions

A moderate drop in harvest occurred in 1977 despite increased hunter effort in Unit 15(C), when compared to reported harvest in 1976. Calf production also dropped to 19/100, equalling the previous low recorded in 1971.

Efforts to set back plant succession by burning would be desirable in 15(C). However, Borough, native selection, and lands already in private hands are so interspersed with state lands that large scale burning may not be feasible. Predator control offers the only other tool available to help the 15(C) moose recover.

The moose population in 15(C) is being held at an unnaturally low level. The primary reason for this is believed to be predation. Current levels of hunter harvest are not a factor preventing recovery of this population, since legal harvest takes bulls only.

Recommendations

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

PREPARED BY:

Ted Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

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

<u>Year</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unk. Sex</u>	<u>Total</u>	<u>Hunters</u>	<u>Percent Success</u>
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)	(780) ⁴	(13)

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: David Hardy, Game Biologist II

Appendix II. Moose sex and age ratios, Subunit 15C totals

<u>Year</u>	<u>Total MM Per 100 FF</u>	<u>Sm MM Per 100 FF</u>	<u>Sm MM Per 100 Lg. MM</u>	<u>Sm MM % in Herd</u>	<u>Sm MM Per 100 MM calves</u>	<u>Calves Per 100 FF</u>	<u>Twins Per 100 FF w/calf</u>	<u>Calf % in Herd</u>	<u>Animals Per Hour</u>	<u>Total Sample</u>
1964	22	8	54	5	6	24	2	30	52	1848
1965	33	10	42	6	61	32	6	19	57	1889
1966	17	6	60	4	41	31	5	20	62	794
1967	21	7	46	4	34	40	7	25	160	3038
1968	21	6	42	4	30	40	7	25	61	1883
1969	14	7	88	5	47	28	6	19	54	1636
1970	20	3	19	2	27	24	4	17	151	1992
1971	26	8	42	5	83	19	8	13	48	1436
1972	10	1	9	1	6	25	2	19	73	2073
1973	19	7	60	5	51	28	4	19	63	1833
1974	14	5	57	4	33	32	7	22	31	960
1975	NO COUNTS MADE									
1976	15	6	65	4	42	28	5	20	57	869
1977	15	4	40	3	45	19	4	14	62	837

PREPARED BY: Dave Hardy, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

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 to Sept. 20.

Harvest and Hunting Pressure

A total of 485 moose were reported harvested by 1,465 hunters in Unit 16 during the 1977 season (Appendix I). As harvest report reminder letters were not sent in 1977, these data were extrapolated to provide estimates comparable to previous year's data (Appendix I). The regression technique used in making these extrapolations is described in the Moose S&I report for Unit 7.

The extrapolated data indicate that 603 moose (± 186 , $p = 0.05$) would have been reported taken, and that 2,274 hunters ($\pm 1,545$, $p = 0.05$) would have reported hunting if reminder letters had been sent. A close fit was obtained for the extrapolated harvest ($r^2 = 0.94$), but not for the number of hunters ($r^2 = 0.75$).

Of the 485 moose reported taken, 348 were bulls (72 %), 136 were cows (28 %) and one was of unknown sex. The extrapolated harvest of 603 moose was 32 percent higher than the 1976 total of 456. The extrapolated number of hunters afield was a 35 percent increase over 1976. Hunter success declined slightly to 27 percent. Trend line analysis indicates that both the number of hunters and the number of moose taken are increasing steadily, although the number of hunters is increasing at a faster rate.

The harvest chronology indicates that the moose harvest was evenly distributed throughout the season with slightly more animals taken during the first half of the season than in the second half (Appendix II). The antlerless season in 16B closed Sept. 20 and this was at least partly responsible for the decline in harvest later in the season.

Transportation means used by hunters are shown in Appendix III. Aircraft remain the primary means of transportation for successful hunters (58 %). A shift to an increasing use of boats in Unit 16 was noted in 1976 when the lower portion of 16A was open to the taking of

antlerless moose. Boat use declined slightly in 1977 when the lower portion of 16A was open to the taking of antlerless moose only by permit. The use of horses decreased from three percent (12) of the successful hunters in 1976 to one percent (5) in 1977. Although the 1976 restriction on taking antlerless moose within 5 miles of roads was reduced in 1977 to 3 miles along the Parks Highway, Petersville and Oilwell Roads; little change was noted in the use of highway vehicles for transporting moose hunters.

Unit 16 was surveyed Labor Day weekend to determine hunting pressure in the area. Pressure appeared moderate throughout the unit with the exceptions of Cache Creek, the Kahiltna Flats, and the Yentna River below the mouth of the Kahiltna. Hunters were more concentrated in these areas. Aircraft were concentrated on the several landing strips and gravel bars of the Kahiltna Flats; boats and aircraft were both numerous along the Yentna River, and off-road vehicle activity was noted in Cache Creek and Black Creek Summit.

Composition and Productivity

Intensive sex and age composition surveys were conducted during the fall of 1977 in both subunits 16A and 16B. A total of 3,547 moose were surveyed in Unit 16 in 64.4 hours. The average number of moose seen per hour (55) was the highest recorded since 1968. The unit-wide bull:cow ratio increased from 14.0 to 27.7.

Three areas in Subunit 16A were surveyed in addition to the Peters-Dutch Hills: Kroto Creek Slough, Bunco-Swan Lakes, and Peters Creek-Oilwell Road. A total of 857 moose were seen in Subunit 16A, yielding a calf:cow ratio of 41.4 and a bull:cow ratio of 34.8. These ratios were slightly lower in the Peters-Dutch Hills subsample of 621 moose (38.5 and 32.1 respectively). The increased sample size, number of moose seen per hour and the high calf percent in the herd suggest a growing population in the Peters Hills (Appendix IV). The incidence of twins was the highest recorded since 1973.

All areas in Subunit 16B that had been previously surveyed were counted in 1977. Two additional areas were also surveyed, Rainy Pass and Lone Ridge. A total of 2,690 moose was counted in Subunit 16B. The bull:cow ratio was 38.8 and has been increasing steadily since 1972 when it was 17.2. The calf:cow ratio was 23.7 and was lower than is usual for this subunit.

The Beluga-Susitna area was counted for the first time since 1973 (Appendix V). Indications are that this population is approaching the level it reached in the fall of 1971 when 1,139 moose were counted. The 1977 sample size of 824 moose is the largest since 1971 and more moose were seen per hour (62) than in any year since 1971 when 62 moose per hour were also seen. Both bull:cow and calf:cow ratios have been consistently high since 1972.

Sunflower Basin continues to exhibit a declining calf:cow ratio (16.7 in 1977), and an increasing bull:cow ratio (45.3) (Appendix VI). Although the sample size is the largest on record for this area, the

declining calf:cow ratio and the extremely low incidence of twins suggests the possibility that a decline in this population may be expected or is occurring.

A significantly greater number of moose was found in the Mt. Yenlo count area in the fall of 1977 than during any previous survey (Appendix VII). Snow depths were ideal for counting and the moose had not begun their seasonal migration out of the area. Sex and age ratios obtained during the latest survey probably reflect the true condition of the herd more accurately than do any of the previous surveys.

Management Summary and Conclusions

The extrapolated harvest of 603 moose in Unit 16 during the 1977 season was slightly below the average harvest of the 1970's (632) in this unit. The harvest has steadily increased since 1975, however, when 244 moose were taken. Hunter pressure has increased at a disproportionately higher rate. An estimated 2,274 hunters were afield in Unit 16 during the 1977 moose season, 35 percent more than in the previous year and more than ever previously recorded. Subunit 16B was the only area in southcentral Alaska to have an unrestricted either sex season in September, an attraction which may have had a significant effect on hunting pressure.

Aircraft use remains the most popular method of access throughout most of Unit 16, although a shift to other transport means is noticable. Aircraft use in combination with boats and ATV's appears to have increased considerably. ATV use has shown an upward trend since 1972 and the trend is expected to continue.

A closure in subunit 16A to the taking of antlerless moose in all areas within 3 miles of the Parks Highway, Petersville and Oilwell Roads was established as a condition of the 150 permits which were issued for antlerless moose. The number of hunters using highway vehicles as a method of access into 16A would probably have been higher had this condition not been in effect.

Sex and age composition counts reveal high bull:cow ratios throughout most of Unit 16, reflecting the low bull harvest and mild winters in most of the unit during the past three winters. Calf:cow ratios increased in many areas surveyed in 1977. Sunflower Basin, Rainy Pass and Lone Ridge exhibited calf:cow ratios below population maintenance levels, however, and the low calf ratios in these areas may result from severe snow depths at these higher altitudes during the winter of 1976-77.

Recommendations

Proposed wildlife management plans identify the area of Subunit 16B between the Kahiltna 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 and pursued.

ATV use is expected to increase substantially in this area. The detrimental effects of an extended trail network on the environment may outweigh the benefits derived from increasing the distribution of hunting pressure. Zoning restrictions on ATV use should be considered.

PREPARED BY:

Jack C. Didrickson and Kenton P. Taylor
Game Biologist III and Game Biologist II

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Moose Harvest and Hunting Pressure in Alaska's Game Management Unit 16,
West Side of Cook Inlet, 1972-1977.

		Bulls	Cows	Unid.	Total	Total Hunters	% Success
1972	8/20-9/30	142	0	1	143		
	Yentna 8/20-11/30	11	-	0	11		
	11/1-11/30	236	-	0	236		
16A -	8/20-9/30 Antlerless and	0	119	0	119		
16B -	8/20-9/30 & 11/1-11/30						
	Unknown Date	69	25	4	98		
	Total	458	144	5	607	1413	43
1973	8/20-9/20	303	128	10	441		
	Yentna 8/20-11/30	9	8	0	17		
16A -	11/1-11/10 and	265	143	5	413		
16B -	11/1-11/20						
16A -	Antlerless	Cancelled					
	Unknown Date	32	18	4	54		
	Total	609	297	19	925	1995	46
1974							
16A -	8/20-9/20 and	266	95	6	367		
16B -	8/20-9/30						
16B -	11/1-11/20	49	49	1	99		
16A -	8/20-9/20 Antlerless	0	30	0	30		
	Unknown Date	21	111	0	32		
	Total	336	185	7	528	1580	33
1975							
16A -	9/1-9/20	43	0	0	43		
16B -	9/1-9/20	110	0	2	112		
	11/1-11/10	83	0	0	83		
	Antlerless	Cancelled					
	Unknown Date	6	0	0	6		
	Total	242	0	2	244	879	28
1976							
16A -	Upper 9/1-9/20 and	65	32	1	99		
	Lower 9/1-9/30						
16B -	9/1-9/30	245	111	2	358		
	Total	310	143	3	456	1690	27
1977							
16A&16B -	9/1-9/30 raw data	348	136	1	485	1465	33
	(extrapolated data)				(603)*	(2274)**	(27)

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

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

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix II. Chronology of Moose Harvest from Harvest Reports in Alaska's Game Management Unit 16, 1977.

	<u>August</u>		<u>September</u>				<u>October</u>	<u>November</u>	<u>No Date</u>	<u>Total</u>
	<u>10-19</u>	<u>20-31</u>	<u>1-7</u>	<u>8-15</u>	<u>16-23</u>	<u>24-30</u>				
Male	1		104	56	87	92	0		8	348
Female	1		65	39	26	2	1		2	136
Unknown	0		0	1	0	0	0		0	1
Total	2		169	96	113	94	1		10	485

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix III. Hunter Success vs. Transport Means from Harvest Reports in Alaska's Game Management Unit 16, 1977.

<u>Transport Means</u>	<u>Successful Means of Transport</u>				<u>Unsuccessful Means of Transport</u>				<u>Total Means of Transport</u>
	<u>Res.</u>	<u>NR</u>	<u>Unk.</u>	<u>Total</u>	<u>Res.</u>	<u>NR</u>	<u>Unk.</u>	<u>Total</u>	
Aircraft	209	37	13	259	334	14	21	369	628
Horse	2	3	0	5	3	0	0	3	8
Boat	74	0	0	74	159	1	4	164	238
Motorbike	4	1	0	5	2	0	0	2	7
Snowmachine	0	0	0	0	0	0	0	0	0
Off-road vehicle	29	2	1	32	65	0	2	67	99
Highway vehicle	50	4	2	56	229	3	10	242	298
No means reported	11	1	0	12	164	4	7	175	187
Total	379	48	16	443	956	22	44	1022	1465

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix IV. Moose Sex and Age Ratios in Alaska's Game Management Subunit 16A, Peters-Dutch Hills Count Area, 1967-77.

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
1967	25	8	43	4	39	40	13	24	126	1121
1968	20	9	53	5	46	40	88	24	58	587
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

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix V. Moose Sex and Age Ratios in Alaska's Game Management Subunit 16B, Mt. Susitna-Mt. Beluga Count Area, 1968-77.

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

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix VI. Moose Sex and Age Ratios in Alaska's Game Management Unit 16, Sunflower Basin Count Area, Subunit 16B, 1973-77.

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 x/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
1977	45	11	33	7	135	17	4	10	112	504

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

Appendix VII. Moose Sex and Age Ratios in Alaska's Game Management Unit 16, Mt. Yenlo Count Area, Subunit 16B, 1974-77.

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 x/calf	Calf % in Herd	Animals per Hour	Sample
1974	50	22	78	12	112	39	4	21	86	121
1975	46	8	22	5	200	8	0	5	163	130
1976	49	13	37	7	67	40	0	21	59	100
1977	40	13	46	8	90	28	12	17	152	455

PREPARED BY: Jack C. Didrickson, Game Biologist III and Kenton P. Taylor, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Unit 17 - Bristol Bay

Seasons and Bag Limits

Sept. 10 - Sept. 20

One bull

Dec. 10 - Dec. 31

Harvest and Hunting Pressure

The reported harvest during 1977 was 54 bulls, with 47.8 percent hunter success (Appendix I). Unlike previous years, harvest report reminder letters were not sent for the 1977 season. It was estimated that 67 bulls would have been reported harvested, had reminder letters been sent ($+11$, $p = 0.05$) and that 173 hunters would have reported ($+44$, $p = 0.5$) yielding a success rate of 38.7 percent (Appendix I).

Alaska residents accounted for 33 bulls, 72.2 percent of the reported harvest. Thirteen of the harvested bulls, or 24 percent, were reported taken during the December season.

Composition and Productivity

No work accomplished during this reporting period.

Management Summary and Conclusions

The reported moose harvest in GMU 17 is believed to be substantially below the true unit harvest. Most moose hunting pressure within the area is by village residents. These hunters are reluctant to comply with the provisions of the harvest report program because of a basic hostility to the restrictive seasons and bag limits. Reports by persons familiar with the villages indicate that extensive illegal harvest occurs during the winter months and is probably having an adverse impact on the abundance of moose.

Moose are now basically restricted to the areas of the unit remote from human settlements. Residents of the unit report difficulties in locating moose and the population is believed to be declining.

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.

PREPARED BY:

SUBMITTED BY:

Nick Steen
Game Biologist II

James B. Faro
Regional Management Coordinator

MOOSE - GMU 17 - BRISTOL BAY

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 17

<u>Year</u>	<u>Bulls</u>	<u>Cows*</u>	<u>Unknown Sex</u>	<u>Total</u>	<u># Hunters</u>	<u>Percent Success</u>
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

Prepared by Sterling Miller, Game Biologist II

* No legal cow season has been held.

** Extrapolated to correct for absence of reminder letters.

MOOSE
SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 18 - Yukon-Kuskokwim Delta

Period Covered July 1, 1977-June 30, 1978

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

Twenty-two bull moose were reported harvested in Unit 18 during the 1977 fall season. This represents a slightly larger take than in past years, although it may only reflect increased compliance with the harvest ticket regulation. Fourteen of the hunters were Alaskan residents and seven were nonresidents. Seventeen animals were taken in September and five in October. Of the people who returned harvest tickets, nineteen were unsuccessful. Six moose were reported harvested from the Lower Yukon River, seven from the Lower Kuskokwim and nine animals from undesignated areas.

It is likely that the unreported harvest is at least three times the reported harvest in this Unit. Piamute and Twelve Mile Sloughs on the Yukon River received relatively heavy hunting pressure from the residents of the ten down-river villages, as well as from hunters who use aircraft for access from Bethel. Two moose were reported taken in this area, however based on information gained from local residents regarding the unreported harvest, it is likely that 20 to 25 animals were taken in this area. The unreported harvest in other parts of Unit 18 does not seem to be of such magnitude, and the total harvest for GMU 18 was probably around 75 moose. Reports from local residents in March of 1978 revealed an additional two cows and three calves taken by Akiakchuk villagers using snowmachines for access.

Range and Habitat

As reported in the past, range and habitat conditions remain excellent along the flood plains of the Kuskokwim and Yukon Rivers. Excessive year-round hunting pressure continues to prevent moose from becoming established in these areas.

Population Trends

No formal moose surveys have been conducted in Unit 18, although general observations indicate that the population is increasing slightly.

Management Summary and Recommendations

Greater efforts must be made to educate local hunters regarding the consequences of continual abuses of the existing game regulations. Lack of compliance with the present regulations is seriously curtailing establishment of moose in this Unit.

Residents in the Yukon-Kuskokwim Delta area are beginning to show a concern about the moose population particularly in the Kalsak Controlled Use Area and on the Piamute Slough on the Yukon River. Conflicts exist in these areas between local hunters using boats and hunters from the other sections of the state using aircraft. These conflicts resulted in several proposals to the Board of Game for additional restrictions in the existing Controlled Use Areas and to establish several subsistence hunting areas in Unit 18.

Hunting during the winter using snowmachines is very effective in Unit 18 because the terrain is so open. Efforts should be made to control this form of take and inform the residents of the effects that excessive hunting will have on their moose populations.

It is recommended that annual surveys be established to monitor population trends in Unit 18.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 19 - Middle and Upper Kuskokwim

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

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

Harvest and Hunting Pressure

The reported harvest for Unit 19 was 177 males, 5 females and 3 of undetermined sex, for a total take of 185 moose. This year's harvest represents a considerable decrease over that of 1976; however, since no reminder letters were sent out this year and inclement weather during the fall reduced hunting pressure considerably, the full effect of hunting in Unit 19 is difficult to assess. Nevertheless, the estimated harvest of moose in Unit 19 for 1977 was probably in excess of 450 moose. Over one-half of the moose harvested were taken in Subunits 19C (83) and 19B (25). Hunters took 24 moose in Subunit 19A and 48 in Subunit 19D. Resident hunters (183) had about 50 percent hunting success, while 84 nonresidents (largely guided European hunters) fared much better, with 75 percent success. Sixty-six percent of the successful hunters used aircraft as a means of transportation; 27 percent used boats; and the remaining 7 percent used ATV's, snow machines and road vehicles.

Reduced season lengths, inclement weather and a delay in leaf drop combined to hold the 1977 harvest to a lower level than in 1976. However, no decrease in hunting pressure in Unit 19 is expected over the next few years, especially in the Alaska Range subunits. Float trips are becoming very popular and guides as well as residents are beginning to use this means of access to hunt streams originating in the Alaska Range.

Composition and Productivity

Aerial surveys of moose conducted in Unit 19 in November 1977 were confined to the Alaska Range Subunits 19B and 19C. Review of these data suggests that the bull moose segment of this sample may not accurately reflect the true composition of bulls in this herd. This condition is thought to be a result of differential migration movements of bulls in late fall and early winter. In 1976 the bull:cow ratio was 111 bulls:100 cows. The 1977 data revealed that this ratio was 135 bulls:100 cows,

a remarkable herd structure for such a heavily hunted population. Calf production and survival for the Alaska Range population seems better than that observed in prior counts. In 1976 there were 24 calves:100 cows present in the population sample. This figure rose to 30 calves:100 cows in 1977. Comparison of yearling survival from 1976 (7 yearlings:100 cows) with that of 1977 (23 yearlings:100 cows) certainly points to much improved survival.

Considering the fact that this population is receiving the brunt of harvest and hunting pressure and that this population is very vulnerable, further liberalization of seasons in Subunits 19B and 19C is not advisable. Furthermore, data concerning seasonal and sex-related movements of this population are needed to properly manage these moose.

February moose counts on the Aniak and Holitna River drainages were not satisfactory. No moose were seen along the Aniak due to absence of snow cover and poor observation conditions. Counts on the Holitna were likewise poor and may not be representative of this drainage's moose population. Calf composition in the moose herd located near McGrath was somewhat better than in 1976 (23% vs. 21%), but this figure was derived from a small sample and is of dubious value.

Range and Habitat

The winter of 1977-1978 was mild with light snowfall over the entire unit. Such conditions have aided calf survival. Consequently, moose did not concentrate in areas normally used in late winter and spring. Wolf predation was light to moderate and has seemingly declined over the past several years.

Population Trends

Generally, moose subpopulations in Unit 19 are low to moderate in numbers and perhaps increasing slightly. The Alaska Range population is exhibiting improved survival and is increasing although it is being hunted heavily. Moose in the southwestern portion of the unit (Holitna and Aniak Rivers) seem low in numbers but stable in growth at this time. The upper Kuskokwim population (Subunit 19D) appears to be increasing slowly and is at a moderate level.

Management Summary and Recommendations

Restrictive seasons initiated in 1977 resulted in fewer moose being taken in Subunit 19A. These restrictions are still considered necessary. Caution is suggested in regard to manipulation of season lengths in Subunits 19B and 19C. These subunits are hunted heavily and relaxing present season lengths might result in overharvests. Changes in the Subunit 19D seasons are not necessary as long as moose in this area continue to be harvested at present rates.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 20A - Tanana Flats, North Slope of Alaska Range

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 20(A) Sept. 1 - Sept. 10 One bull

Harvest and Hunting Pressure

Harvest ticket information indicate that 32 moose were taken in Unit 20A during 1977, a decline of 21 percent from 1975 and 1976 harvests. Current regulations are intended to minimize harvests while the moose population recovers from the recent population decline.

Reminder letters were not mailed to hunters failing to return harvest tickets during 1977; therefore, the reported harvest should be considered minimal. A correction factor of 12 percent was incorporated; this is the percentage the reported harvest normally increases after delinquent reports are received. The extrapolated harvest of 36 moose represented a 9 percent decline from 1975 and 1976.

The number of hunters (137) who reported hunting in Unit 20A was nearly unchanged from 1976 (131). Residents killed 31 moose or 87 percent of the harvest. Residents comprised 83 percent of the total number of hunters.

Aircraft and boats continued to be the favored transportation means. Twenty-eight percent of aircraft hunters were successful while the success rate for hunters using boats was 29 percent (Table 1).

Table 1. Transportation modes used by moose hunters in Unit 20A, 1977.

Mode of transportation	No. of hunters	Moose harvested
Aircraft	50	16
Horse	3	1
Boat	48	14
Offroad vehicles	10	1
Highway vehicles	8	0

Although the harvest was concentrated along traditional access corridors throughout the unit, the distribution was somewhat different than during 1976. The reasons for the shift are not clear but may relate to weather, river levels and boating conditions, and changes in moose distribution. The Blair Lakes, Salchacket Slough, Richardson-Clearwater and Dry Creek areas accounted for 70 percent of the harvest.

One-third of the harvest consisted of yearling animals, a reflection of the improved calf survival and subsequent recruitment since 1976.

Composition and Productivity

November sex and age composition surveys resulted in figures comparable to 1976 (Table 2) which showed significant improvement over 1975 calf survival rates.

Table 2. Unit 20A moose sex and age composition, 1977.

<u>Bulls per</u> <u>100 cows</u>	<u>Calves per</u> <u>100 cows</u>	<u>Percent</u> <u>calves</u>	<u>Percent</u> <u>yrlyg. bulls</u>	<u>Percent</u> <u>large bulls</u>
61	40	20	9	21

Differential survival rates were noted between the Tanana Flats and foothills, with the yearling segment most noticeably affected. Survival was higher in the Flats (24 yearling bulls:100 cows) than in the foothills (6 yearling bulls:100 cows). The reasons for the differences in survival rates are likely related to the relative number of wolves removed from the two areas; a higher percentage of wolves was removed from the Flats than the foothills.

Pre-calving surveys were conducted during mid-May to assess overwinter calf survival. These surveys are conducted annually on standardized count areas in the Tanana Flats. With the mild winter experienced during 1977-1978 and the continued wolf reduction program in Unit 20A, moose calf survival was high (Table 3).

Table 3. Moose parturition counts, Unit 20A, May 1978.

<u>Yrlgs. per</u> <u>100 cows</u>	<u>% Yrlgs.</u> <u>in herd</u>	<u>Bulls per</u> <u>100 cows</u>	<u>% Bulls</u> <u>in herd</u>	<u>Total</u> <u>moose</u>
30	20	24	15	351

Because of unusually early leaf emergence, the counts were conducted approximately 10 days earlier than usual. Antler growth on some younger bulls was not sufficiently advanced for the antlers to be conspicuous when viewed from a Super Cub; therefore, some bulls were likely classified as cows. The yearling:cow ratios obtained should be considered minimum figures because of this situation.

Management Summary and Recommendations

Calf survival has increased significantly in Unit 20A since the moose rehabilitation program was initiated in 1976, resulting in an increasing moose population throughout most of the area. In addition, recent mild winters have favored calf survival. The number of productive females remains relatively low, however, and several years will be required before the population substantially increases. Future increases in moose numbers will depend primarily on predator populations and winter conditions.

Bull:cow ratios have improved, mostly as a result of decreased hunter harvests and high recruitment. Current restrictive seasons have significantly reduced both hunting pressure and total harvest.

Continued restrictive seasons in Unit 20A have maintained the harvest at a relatively low level for the third consecutive year. Hunter density also has not changed appreciably since 1975. Hunters utilizing aircraft continue to be the most successful and account for about half of the harvest.

If the moose rehabilitation program and low hunter harvests continue in Unit 20A, the moose population will continue to increase, unless there are unusually hard winter conditions.

Continuation of the present conservative season is recommended until a wolf:moose ratio of 1:100 is achieved and maintained.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 20B - Fairbanks, Central Tanana Valley

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Fairbanks Metropolitan Area No open season

Remainder of Unit 20B Sept. 1 - Sept. 20 One bull

Harvest and Hunting Pressure

Since reminder letters were not sent out to encourage the return of harvest tickets, the moose harvest estimate was determined by incorporating a 12-percent correction factor calculated from previous years' returns. The resulting harvest estimate of 55 bull moose represents a 57 percent increase over the 1976 harvest. This is most likely due to the increased season length in a portion of Unit 20B that resulted from a printing error in the regulations. Hunter success increased slightly; however, the total number of hunters participating remained at about the same level as the preceding year (Table 1).

Table 1. Unit 20B moose hunting pressure and success, 1977.

<u>Year</u>	<u>Total hunters</u>	<u>Successful hunters</u>			<u>Percent success</u>
		<u>Res.</u>	<u>Nonres.</u>	<u>Unk.</u>	
1977	475	38	7	3	10

Harvest in Unit 20B was concentrated in areas accessible by road vehicles (Table 2). The highly accessible Yukon Command Training Area continued to be a popular hunting area, accounting for 46 percent of the total kill.

Table 2. Areas contributing to the majority of Unit 20B moose harvest, 1977.

<u>Location</u>	<u>Number of moose</u>	<u>Percent of harvest</u>
South Fork Chena River	12	25
Chena Flats, Eielson AFB	10	21
Chena Hot Springs Road	12	25
Steese Highway	5	10
	39	81

Analyses of transportation types utilized by hunters in 1977 revealed considerable hunting effort by hunters using highway vehicles (Table 3). Forty-seven percent of the hunters used highway vehicles, and an additional 21 percent used off-road vehicles. The early season precluded use of snow machines.

Table 3. Comparison of transportation methods used by hunters in Unit 20B, 1977.

<u>Mode of transportation</u>	<u>Number of hunters utilizing mode</u>	<u>Number of moose harvested</u>
Aircraft	14	2
Horse	10	0
Boat	37	8
Motorbike	4	0
Off-road vehicle	98	16
Highway vehicle	225	22

Composition and Productivity

Intensive aerial surveys were conducted on traditional count areas within Unit 20B during November 1977 (Table 4). Calf survival to 6 months of age was markedly improved (47 calves:100 cows), reversing the downward trend recorded previously. However, overwinter survival of the 1976 cohort was extremely poor (3 yearling males:100 cows), as has been the case for each cohort since 1970. The bull:cow ratio remained adequate; however, due to relatively low moose densities, overall availability of bull moose was poor.

Table 4. Moose sex and age ratios for portions of Unit 20B, November 1977.

<u>Area</u>	<u>Total M per 100 F</u>	<u>Small M per 100 F</u>	<u>Small M % in herd</u>	<u>Calves per 100 F</u>	<u>Incidence of twins per 100 cows w/calf</u>	<u>Calf % in herd</u>	<u>Moose per hour</u>	<u>Total moose</u>
Little Chena River	40	2	1	38	7	21	14	75
Chena Hot Springs Road	31	7	4	53	15	29	17	107
20B Total	30	5	3	47	12	26	15	182

Population Trend

Poor survival of successive calf crops since 1970 has resulted in a steady decline in moose numbers. Old bulls are relatively scarce in the harvest and seldom seen during fall surveys, indicating that those older cohorts from pre-1970 years have been lost through attrition and are not being replaced. The small legal harvest of bulls may seem insignificant; however, this loss alone exceeds the recruitment of bulls to the population. In addition, poaching, road kills and losses to predation are contributing substantially to the population decline.

Several sites were visited in May 1978 to assess browse availability and utilization. On the basis of these observations it appeared that moose were widely dispersed during the winter of 1977-1978 and, consequently, light browse utilization occurred on all sites investigated. Many of the areas were progressing toward a tree stage which will adversely affect future browse production. Excessive fire suppression efforts in recent years have reduced the overall amount of browse that is available.

However, with the present low moose density, habitat conditions do not appear to be limiting growth of the population.

Management Summary and Recommendations

A printing error in the regulations resulted in a longer season in Unit 20B than intended. Consequently, more moose were killed than during the previous year. The harvest data suggest that hunting pressure was rather intense; 40 percent of the bulls killed were yearlings, although only 14 percent of the bulls in the population are of this age class. In view of the fact that the legal harvest alone may be exceeding the annual recruitment of bulls to the population, it is imperative that human utilization be kept minimal. The present 20-day season has not been successful in keeping the harvest within acceptable bounds; therefore, further restrictions should be considered. At the very least, the 10-day season that was in effect in 1976 should be reinstated. Concurrent efforts should be made to reduce the illegal take and road kill.

Poor recruitment continues to be the underlying cause for the decline in moose numbers in Unit 20B. The recent improvement in recruitment on the nearby Tanana Flats (Unit 20A) subsequent to the reduction of wolf numbers in that area has provided some insight into the problem. Fall calf:cow ratios in portions of Unit 20B adjacent to the Tanana Flats have greatly increased. This increase seems related to the degree with which cow moose in Unit 20B migrate to 20A to calve. While there, these cows and their offspring are subjected to a greatly reduced level of predation by wolves. Moose that remain in Unit 20A throughout the winter are faced with a much lower density of wolves than are moose that move back into Unit 20B to overwinter. It is likely that this difference in wolf abundance is accounting for the vastly different yearling:cow ratios that are observed in the two areas. Preliminary wolf surveys in Unit 20B indicate that wolves are abundant within traditional moose winter range. It appears that a reduction in wolf densities would be the first prerequisite for reversing the downward trend in moose numbers in this unit.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 20C - Fortymile, Tanana, Kantishna Rivers

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 20(C), that portion draining into the south bank of the Tanana River from the confluence of the Tanana and Kantishna Rivers, and all drainages of the Toklat River to the western boundary of Unit 20(A)	Sept. 1 - Sept. 10	One bull
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Unit 20(C), that portion draining into the south bank of the Yukon River upstream from and including the Charley River drainage	No open season	
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Remainder of Unit 20(C)	Sept. 1 - Sept. 20	One bull
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Harvest and Hunting Pressure

Based on harvest ticket returns, 130 moose were reported harvested in Unit 20C during the 1977 season, a decline of 44 percent over the 1976 harvest. The number of hunters reporting from Unit 20C also declined from 1,211 in 1976 to 790 in 1977, a decrease of 35 percent. However, since reminder letters were not sent to hunters failing to return harvest tickets in 1977, the reported harvest should be considered minimal. Based on previous reporting for this unit, the reported harvest increased about 12 percent after delinquent reports had been received. Therefore, the extrapolated harvest for Unit 20C is 146 animals.

No attempt was made to extrapolate the number of hunters hunting in Unit 20C. Factors were too variable in 1977 for an accurate comparison with previous years. In addition, the eastern portion of Unit 20C was closed to moose hunting in 1977 and many people who usually hunted the Taylor Highway probably hunted elsewhere.

Table 1 summarizes moose hunting harvest data for the 1977 season.

Table 1. Unit 20C moose hunting effort and extrapolated harvest, 1977.

<u>Total hunters</u>	<u>Extrapolated harvest</u>	<u>Successful hunters</u>		
		<u>Res.</u>	<u>Nonres.</u>	<u>Unk.</u>
790	146	133	8	4

Hunters utilizing horses, boats and off-road vehicles experienced the highest success rate, while motorbike and highway vehicle users had the lowest success.

Analysis of the reported harvest disclosed two major shifts in distribution from the 1977 season; the northern and western portions experienced harvest reductions of 40 and 45 percent, respectively, while the remaining portions of Unit 20C showed approximately a 20-percent reduction. The reduced harvests experienced throughout Unit 20C probably reflected depressed and declining moose populations.

Antler spread data derived from harvest tickets disclosed a relatively high proportion of yearling animals comprising the harvest from areas adjacent to Unit 20A (assuming that yearling moose have antler spreads of 30 inches or less and that the antler spread information provided by hunters is accurate). The relatively high proportion of yearlings in the harvest was probably influenced by the moose rehabilitation program in Unit 20A and the resulting high proportion of yearling bulls in the population. For example, 47 percent of the harvest in central Unit 20C, which is the area from the Robertson River to the Salcha River, was comprised of yearlings. Much of this area is adjacent to and influenced by moose movements from Unit 20A.

In contrast, the yearling bull harvest in northern and western Unit 20C was only 10 percent. Survey data substantiated the low proportion of yearlings in these populations.

Composition and Productivity

November sex and age composition surveys revealed continued low recruitment in most areas of Unit 20C. Moose numbers in eastern portions of the unit, including the Taylor Highway area, continued the downward trend typical of the past several years. For the fourth consecutive year calf survival through November was nearly nonexistent (8 calves:100 cows). Recruitment was below the level necessary to maintain the population.

Most other sections of Unit 20C appeared to be in a similar condition. Surveys in the Yanert River disclosed 10 calves:100 cows while the ratio in McKinley Park was 18:100. The Salcha River had 27 calves:100 cows with calves constituting 16 percent of the herd, but surveys were limited to Ninety-eight Creek and may not accurately reflect calf survival for the entire drainage. Samples sizes in other parts of Unit 20C including the Manley area, Beaver Creek and the Goodpaster River were too small to be reliable indicators.

Recruitment, as indicated by the percentage of yearling bulls observed during surveys, was low in all areas surveyed, ranging from a high of 9 percent yearling bulls in the Salcha drainage to a low of 3 percent in the Yanert drainage.

Unfortunately, surveys were not conducted in most portions of Unit 20C which are adjacent to Unit 20A. In these areas a relatively high proportion of the harvest was comprised of yearlings which may indicate higher than average recruitment in these portions of Unit 20C. Seasonal movements of moose from Unit 20A to 20C may have some influence on these figures, since some movement between these areas is known to occur.

Bull:cow ratios remain relatively high in the unit except for the Yanert Fork where the observed sex ratio was 15 bulls:100 cows. Elsewhere in the unit it ranged from 39:100 in the Salcha drainage to 51:100 in the Taylor Highway area. However, in terms of actual numbers the bull population is low.

Management Summary and Recommendations

Moose populations in most areas of Unit 20C are low, probably declining even in McKinley Park and in eastern areas where the season was closed during 1977. Except for possibly the lower Salcha drainage, recruitment is below the level necessary to maintain present population levels. The low level of harvest is accelerating the rate of decline, although the rate is slower in inaccessible areas which sustain light hunting pressure. Areas adjacent to Unit 20A may have benefited from the moose rehabilitation program there. The percentage of yearling bulls in the harvest was relatively high in these areas, but whether this was due to seasonal movements out of Unit 20A or to improved survival of Unit 20C calves is unknown.

Except for the Yanert Fork, sex ratios remain adequate in most of the unit, but the number of bulls is low.

Until the population trend reverses, it may become necessary to close other areas to moose hunting to slow the rate of decline and to provide a larger prey base for predators, which may tend to reduce predation on the reproductive portion of the population.

Based on the response to the moose rehabilitation program in Unit 20A, a similar program should be initiated in portions of Unit 20C which currently sustain heavy hunting pressure. Without a positive program aimed at minimizing the impact of predation in conjunction with habitat rehabilitation, no relief can be expected in the foreseeable future from the decline moose populations are currently experiencing.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 20D - Delta Junction, North Slope of the Alaska Range

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 20(D) east, that portion of Subunit 20(D) east of the west bank of the Gerstle River	Sept. 1 - Sept. 20	One bull
Unit 20(D) west, the remainder of Subunit 20(D)	Sept. 1 - Sept. 20*	One bull by permit; 15 antlered moose may be taken. Conditions of the hunt will be described by commissioner's announcement

* Unit 20(D) west was closed September 14 by field announcement when the 15-bull quota was reached.

Harvest and Hunting Pressure

Information obtained from permits and harvest ticket returns indicated that 233 hunters took 25 bulls in Unit 20D during the 1977 season. Hunter success was 11 percent. Most of the harvest, 17 bulls, was taken in Unit 20D west. The permit area was closed by field announcement when the 15-bull quota was reached 5 days before the end of the scheduled season. A registration type permit hunt was necessary to maintain an accurate daily account of the harvest. Poor compliance with the check-out reporting requirements of the registration hunt resulted in a 52 percent return of the permits issued. Six percent of the reporting permittees were successful.

Nonhunting Mortality

Known mortality other than hunting in Unit 20D during 1977 totaled 13 moose: five road kills (1 yearling and 4 adult cows); a cow and a calf taken illegally; four probable drownings found immediately following breakup in the Tanana River (2 cows and 2 bulls); and two cows known to have been taken by wolves.

Composition and Productivity

November composition counts indicated overall calf production (34 calves:100 cows) continued to improve and was higher than had ever been recorded for the unit. However, production was not uniform throughout the unit; in western areas adjacent to the moose rehabilitation program

in Unit 20A, production was very encouraging (43 calves:100 cows). In the eastern portion, 20 to 30 miles from Unit 20A, calf production was 22 calves:100 cows, which closely approximates the 8-year average of 22.5 calves:100 cows for the unit as a whole.

Bull:cow ratios (25:100) and moose density (29 moose/hour) remained stable over the past 8 years.

Spring calf survival counts showed a reduction from 21 percent calves in the population in November 1977 to 11 percent in April 1978. Predation appeared to be the major source of mortality. Snowfall was only slightly higher than average on moose winter ranges. Maximum snow depth at three sites averaged 16.5 inches during January through March, while the 10-year average snow depth was 13.8 inches for the same period.

Habitat

Current land management practices have resulted in a long-term decline of available moose habitat. Browse production is declining and moose numbers are still below range carrying capacity.

Population Trends

The Unit 20D moose population appears to have stabilized after a 3-year decline. The 1977 pre-hunt estimate of 650 moose remained unchanged from 1976, but is still down considerably from the 1974 and 1975 estimates of 800 and 750, respectively. All estimates were derived using bull:cow ratios before and after harvest.

Yearling survival (6 yearling bulls:100 cows) improved slightly over the 8-year average (5 yearling bulls:100 cows). The apparent improvement in yearling survival may not be significant. If it does accurately reflect yearling survival, it is still not enough to produce a population increase.

Management Summary and Recommendations

The Unit 20D moose population has declined over the long term, primarily because moose habitat is deteriorating. Overwinter loss through predation is still the immediate factor limiting the moose population. Based on current moose and wolf population estimates in the unit, an April 1978 wolf:moose ratio of 1:21 exists.

Wolf control conducted by the Department in adjacent Unit 20A is believed responsible for arresting the population decline in western Unit 20D. Moose numbers, and yearling and calf survival have increased in the western portion of the unit adjacent to Unit 20A. This portion of the moose population in Unit 20D is probably increasing. However, in the eastern portion 20 to 30 miles from Unit 20A the population is probably still declining. Considered together, the eastern and western portions of Unit 20D represent a stable population.

The predator population must be reduced through hunting, trapping or other means if we are to allow a larger human harvest from the existing moose population and increase the population to the carrying capacity. A habitat improvement program should be initiated to provide for a long-term increase in moose numbers, even though the population is presently below the carrying capacity of the range.

Bulls-only hunts have not reduced the bull:cow ratio and limited bull harvests should continue.

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SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 21 - Middle Yukon

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

The drainage of the Innoko River upstream from the mouth of the Iditarod River and including the Iditarod River drainage	Sept. 10 - Sept. 30	One bull
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Remainder of Unit 21	Sept. 10 - Sept. 30	One bull
	Nov. 1 - Nov. 30	

Harvest and Hunting Pressure

The reported harvest from Unit 21 during the 1977 season was 227 bull moose. This probably did not represent a real decrease from the 1976 reported harvest of 305 moose because moose hunter report reminder letters were not sent out in 1977. The total annual take of moose from the unit was probably at least two or three times greater than the reported harvest since almost all local residents of the unit do not report their harvest of moose. In addition, poor compliance with existing regulations has resulted in illegal harvests which occur after the season closes in November.

Local residents of the unit hunt primarily by boat, utilizing the Yukon River, its sloughs, and major tributary streams and rivers. Boat access varies from year to year depending on water levels. Snow machines are also used for taking moose from November through March. The greatest take occurs after February when supplies of salmon and moose are low and when many local residents are actively trapping beaver or gathering meat for various spring festivities.

Hunting pressure throughout the unit was similar to past years. Use by non-unit residents and nonresidents was heaviest along the Nowitna, Koyukuk, Innoko and Iditarod Rivers. Residents of the Anchorage area utilized the Innoko and Iditarod Rivers extensively, while Fairbanks area resident hunters concentrated their hunting efforts along the Nowitna, Melozitna and Koyukuk Rivers. Nonresident guided hunters from Sweden hunted the Iditarod and Koyukuk Rivers and substantially aggravated the growing problem of local versus nonlocal use of the moose resource in Unit 21.

Composition and Productivity

Condition and trends of moose subpopulations were variable throughout the unit. The winter of 1976-1977 was mild with little snow accumulation

throughout most of the unit. The Yukon River flooded during spring breakup and this may have contributed to poor calf survival in some areas.

Late winter surveys along the Koyukuk River since 1969 indicate low survival rates of calf moose. Poor survival was also apparent during fall 1977 surveys along the Koyukuk between the Kateel and Dulbi Rivers when only 21 calves:100 cows were observed. Poor calf survival in this area was probably a result of predation by wolves, which are numerous. The Koyukuk moose herd has also been subjected to heavy and increasing hunting pressure in recent years and the herd is decreasing at this time. In contrast, the moose population in the Galena area exhibited excellent calf survival (61 calves:100 cows). Wolf numbers were low in this area due to hunting and trapping activities of local residents.

The Nowitna River moose population, as indicated by spring counts, is in better condition (28% calves) than the Koyukuk population. The Nowitna is a very important hunting area for local people from Tanana, Ruby and Manley, and urban residents from the Fairbanks area. Wolves are numerous throughout the drainage and in the near future the Nowitna may require special management practices.

Moose numbers in the upper Innoko and Iditarod drainages appear to have stabilized, but bulls are being harvested heavily by fly-in hunters. Calf survival was poor (13% calves) during 1977-1978 as suggested by an aerial survey flown in late February 1978. The reason for this poor survival is unknown, although wolves are still abundant in this area and may have contributed significantly to calf losses.

The population of moose in the Paradise Controlled Use Area appears to be stable or increasing slowly. Calf survival over the winter of 1977-1978 was also poor (12% calves) in this area. High water and predation by bears or wolves are most likely responsible for these losses.

Management Summary and Recommendations

Hunting pressure and moose subpopulations are variable in Unit 21. Out-of-season hunting practices and poor harvest reporting by unit residents make management, by the conventional means of adjusting open seasons and bag limits, difficult and impractical. Human populations are increasing in many bush villages. Increasing populations place greater demands on the moose resource. Because individuals are better equipped to hunt moose each year, the harvest increases disproportionately to the increase in human population. The Division of Fish and Wildlife Protection should be encouraged to initiate an aggressive posture throughout Unit 21 before some moose herds are reduced to low population levels.

Wolf surveys and moose composition counts in portions of Unit 21 indicate that, where wolves are abundant, calf percentages are generally low. Several areas which support high wolf densities receive heavy hunting effort from local and nonlocal residents. These high use

areas should be delineated and investigated as potential locations for wolf population management in the near future.

Two major moose management problems must be resolved. Increased hunting pressure by local residents, nonlocal residents and nonresidents, especially those utilizing aircraft, is causing serious social conflicts. The conflict between human use and predation is causing serious moose population declines which aggravate the problems between human user groups. Moose populations and moose habitat must be managed to increase moose numbers in key areas in the near future.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 22 - Seward Peninsula

Period Covered: July 1, 1977 - June 30, 1978

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-Oct. 31	One moose; antlerless moose may be taken by permit only from Sept. 15. - Oct. 31. See 5 AAC 81.055 and separate hunt supplement.
Remainder of Unit 22	Aug. 1-Jan. 31	One moose; antlerless moose may be taken by permit only from Sept. 1 - Jan. 31. See 5 AAC 81.055 and separate permit hunt supplement.

Harvest and Hunting Pressure

During the period 1974 through 1976, Unit 22 had a uniform hunting season from August 1 through January 31. The 1977-1978 hunting season was the first time the Seward Peninsula was divided into four "management areas," each with different hunting regulations. The season was lengthened 2 months in the northern Seward Peninsula, was shortened 3 months in the central Seward Peninsula, and closed in the immediate area of Nome. Throughout the rest of the Unit the hunting season remained the same. Despite these regulatory changes, the recorded moose kill was the highest in Unit 22 since records have been kept. The minimum known harvest was 244 moose (up from 240 in 1976-1977), 151 bulls (62%), 88 cows (36%), and 5 animals of unspecified sex (2%). The published state-wide harvest for the Unit, as determined from moose harvest tickets, listed the total kill as 205 moose. There were two reasons for this discrepancy. The hunting season in a portion of Unit 22 extended to the

end of March, 2 months after the cut-off date for tabulating the data on the final computer run. From Unit 22 there were 17 successful hunters who returned harvest tickets after the cutoff date. Secondly, there were 22 successful hunters who reported the taking of a cow on their antlerless moose permit, but failed to turn in their harvest ticket. (This was determined by comparing the successful antlerless moose permits against the hunter success log on the computer printout). Although it is known that 39 moose were taken in addition to the 205 reported on the computer printout, the total harvest was certainly more than 244 animals. From an analysis of the known harvest, it appeared that hunters in rural communities (villages other than Nome) consistently failed to report a substantial percentage of the moose that were actually taken. From the computer printout hunters from all the rural villages reported a total kill of 70 moose, or only 29 percent of the known harvest. The combined population of these communities was greater than Nome, their hunting season was generally 3 to 5 months longer, and the availability of moose was usually greater. It seems logical that the reported harvest should have been higher. Data obtained from the antlerless moose permits as well as conversations with some of the conscientious villagers bear out this fact. It is likely that the reported harvest from village residents was less than half the actual harvest. Therefore, extrapolating from the known kill, the total harvest during the 1977-1978 season was estimated to be 275-325 moose.

Based strictly on the known harvest, 41 percent of the total kill occurred in the central Seward Peninsula, principally in the Kuzitrin, Kougarok, and Pilgrim drainages. A well maintained gravel road traverses most of this area in a north-south direction, and provides ready access from Nome. There are over 2500 permanent residents in this community, many of them avid hunters. The hunting pressure along the road system was intense particularly during the snow-free months. Nome residents spent literally hundreds of man-hours driving the roads in search of a legal moose.

Road hunters using highway and offroad vehicles accounted for 77 percent of the harvest in the Kuzitrin area. Of the remaining successful hunters, boats were used in 18 percent of the cases, snowmachines 2 percent, and aircraft 1 percent. Other forms 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, road hunters accounted for 38 percent of the harvest, followed by hunters using boats 27 percent, and using snowmachines 25 percent. Some local residents have expressed great concern about excessive competition from hunters using aircraft. The reported data, however, do not bear out this claim. Only 8 percent (20 moose) were taken in this manner. Considering that most aircraft hunters killed moose in the early fall in areas that were not readily accessible by other forms of transportation, the competitive problem was probably more psychological than real.

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 long as March 31. During this 30-week period, a total of 457 antlerless permits were issued; approximately 400 were obtained in the first 4 weeks of the season. Moose numbers on the

Seward Peninsula were very low twenty years ago, but as the population increased moose hunting has become very popular with local residents. The large number of antlerless permits issued (compared to the human population base) is testimony to the demand by the hunting public to participate in a moose hunt. Hunters took a total of 88 cows; however, this figure does not tell the whole success story, as 34 bulls were killed by hunters holding valid antlerless permits. Table 1 shows the number of permits issued by area of residency, and shows the success rate for bulls and cows combined versus cows alone.

Table 1

<u>Area Residency</u>	<u>No. of Permits Issued</u>	<u>No. of Unsuccessful Hunters</u>	<u>No. of Successful Hunters (♀ + ♂)</u>	<u>No. of Successful Hunters ♂ Only</u>
Nome	288 (63%)	22 (77%)	66 (23%)	46 (16%)
Unalakleet	50 (11%)	35 (70%)	15 (30%)	13 (26%)
Other Areas	119 (26%)	77 (65%)	42 (35%)	29 (24%)
Total	457 (100%)	334	123	88

The table illustrates two noteworthy points. Nome residents obtain a substantial majority of the permits, 63 percent. Coupled with its urban character one would assume the hunter success rate would be substantially lower than rural areas where the hunting pressure was less. However, the percentage of successful hunters in each of the three categories is not markedly different; 23 percent for Nome versus 35 percent for other (rural) areas. These data suggest that the opportunity for taking a moose is somewhat similar throughout the Unit. Differential terrain features, accessibility, and data from aerial moose surveys indicate this was not the situation, however. Note that only 119 antlerless permits were issued to all other areas. There were certainly more than 119 hunters from the villages of Unit 22 who wanted to (or did) take a moose. Probably the success rate in the rural areas of Unit 22 was much higher than the data indicate, but hunters failed to obtain an antlerless moose permit and/or a moose harvest ticket.

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 74 percent of the annual harvest (180 moose). During the next 16 weeks (beginning October 10) 11 percent of the harvest was taken (26 moose). The remaining 15 percent of the harvest occurred during the last 10 weeks of the "spring" season.

From 1973 through 1977 incisor teeth were collected from moose to assess changes in the age structure of the population. Age data by year and by sex from a sample of 632 bulls and cows appear in Appendix I. Because of biases in the sample (hunter selectivity, age determination, and others), there are inherent dangers in a strict interpretation of the data. However, two trends are apparent. During the 5-year period, the percentage of yearling bulls in the sample slowly declined. (Fall composition counts detected the same trend). Note, yearling bulls comprised 44 percent of the sample in 1973 and only 17 percent in 1977. Second, the percentage of bulls older than 6 years increased within the

population. In 1973 there were no bulls judged to be over 8 years of age, and 5 years later 10 percent of the population were in this category.

These two trends are not unexpected, since the population may have approached the carrying capacity of the winter range in some areas. If this is the case one can soon expect a decline in the rate of recruitment, and a corresponding increase in the proportion of older animals. In general, however, age data suggest that the Seward Peninsula moose population is relatively young and maintaining relatively high rates of production and survival.

Composition and Productivity

Aerial surveys were conducted in March 1978 when moose were concentrated along the major river valleys. In a sample of 980 moose from the central Seward Peninsula, short yearlings (1977 calves) comprised 19 percent of the population. Comparable counts in the same area during the spring of 1976 and 1977 revealed 25 and 21 percent short yearlings, respectively. Assuming the bull:cow ratio has remained relatively constant, the data indicate a slight decline in calf production and recruitment to the age of 1 year. Fall composition counts were not conducted in consecutive years during this period. However, in the fall of 1974, calves of the year comprised 30 percent of the population in the Kuzitrin drainages. Two years later (1976) only 18 percent of the fall population were calves. As pointed out earlier, this general trend was also evident in the age structure of the fall harvest. Composition counts were not conducted in the fall of 1977, but surveys the previous years revealed excellent bull ratios from a low of 56 bulls to 100 cows in the Kuzitrin to a high of 77 bulls to 100 cows in an unhunted area. Based on spring surveys during 1977 and 1978 the total moose population in Unit 22 was estimated to be in excess of 2000 animals.

Management Summary and Recommendations

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

It has been a well known fact that a significant number of rural hunters in northwestern Alaska (as well as other areas of the State) consistently fail to turn in their moose harvest ticket, even when they obtained one and were successful. To put this statement in perspective, during the 1977-78 season, the Nome Fish and Game office issued 457 antlerless permits; yet there were only 369 successful and unsuccessful hunters who reported by harvest ticket (including the late returns not tabulated on the computer printout). Obviously, then, the data from the computer must be interpreted with a great degree of caution, since they represent only a minimum harvest. Using these data as a management tool may have been acceptable in the rural areas where hunting pressure was relatively low, but as the demand for game increases, the compliance with

the harvest ticket program must be improved or some other reliable method of accessing the harvest must be implemented. Experience with the antlerless moose permits, where follow-up letters and citations were issued when hunters failed to report, has shown that 100 percent compliance can be obtained if enough time is devoted to the project. When it is important to obtain accurate data (such as the harvest of cows by drainage) it appears that a closely monitored permit system is the most effective method to meet this objective. To improve compliance with the harvest ticket program and to complement annual harvest data, it is recommended that the antlerless permit should be retained in Unit 22. Permits should be issued from September 15 to the end of the appropriate season. When a desired harvest is obtained in a specific drainage, the antlerless season should be terminated by field announcement.

Aerial surveys during the past seven years have shown a substantial increase in the Seward Peninsula moose population. Annual recruitment has been relatively high and, although seasons have been liberal, harvests in many areas have been well below the number of animals that were recruited into the population annually. Although winter range is primarily restricted to a narrow belt along the major rivers, the density of moose has exceeded 10 animals per square mile during the period from February-April. A concentration of this magnitude may be adversely affecting winter browse. Spring surveys, as well as the age composition of moose harvested, suggest there has been a gradual decline in annual recruitment. Winter browse is limited on the Seward Peninsula, and in some areas this decline may in part be related to overcrowding and excessive competition for food.

With the exception of the central Seward Peninsula (Kuzitrin area), it is recommended that the season dates and bag limits in Unit 22 remain the same in all management areas. In the Kuzitrin it is recommended that the season be lengthened one month to the end of November. Local hunters have expressed an interest in having a longer season and the winter density of moose appears to warrant it. Although the hunting seasons are long in three of the management areas (up to eight months in the northern Seward Peninsula), the limited winter browse, the relatively high density of moose, and the low annual harvest justify this action. However, the moose population is extremely vulnerable to over-hunting (due to the open terrain and accessibility by aircraft and snowmachine), and this management program should be carefully reviewed on an annual basis.

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Appendix 1: Percentages of Moose in various Age Classes comprising Annual Harvests, Unit 22

Year/Sex	AGE IN YEARS								Sample Size
	1	2	3	4	5	6	7	8+	
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
Total Males	27	26	16	14	7	4	3	3	476
Total Females (1974,1976,1977)	22	12	19	15	6	6	4	16	156
Total Males-Females	25	22	16	14	7	5	4	7	632

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 23 - Kotzebue Sound

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 23	Aug. 1 - Dec. 31	One moose; antlerless moose may be taken by permits only from Sept. 1-Oct. 15 See 5 AAC 81.055 and separate permit hunt supplement.
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Harvest and Hunting Pressure

Reminder letters were not sent to moose harvest report card holders this year so that only those hunters who voluntarily returned their report cards were tabulated. In previous years, final computer runs included additional data derived from these reminder letters. An analysis of the influence of reminder letters to moose hunters on the final harvest figures was conducted by Sterling Miller of the Department of Fish and Game. For the fall season of 1976, he estimated a harvest of 153 moose from data in which 128 hunters reported taking moose prior to the reminder letter and a total of 149 hunters reporting successful after the reminder letter. Miller estimated the 1977, Unit 23 harvest, at 212 moose based on a reported harvest of 180 animals. This represents an increase of 41 percent over the 1976 harvest using data obtained both years without sending reminder letters. The 1977 antlerless harvest of 28 cows was the largest of record exceeding the earlier high of 24 cows in 1970 based on harvest report cards. Permits were required prior to hunting antlerless moose and 296 were issued and all were accounted for. Based on data from the permits, 35 antlerless moose were taken compared to the 28 reported on harvest reports.

The largest number of hunters of record (285) reported hunting in Unit 23. The increase was almost entirely due to increased hunting pressure from resident hunters, as only 11 were nonresidents. During the last 9 years the number of resident hunters has steadily increased from a low of 66 to the record high. This increase is undoubtedly a reflection of greater compliance with the harvest report system and a definite increase in moose hunting pressure due in part to the decline of the Western Arctic Caribou herd. Hunter success was 68 percent, based on data from harvest reports without the use of reminder letters. As seen in Table 1, hunter success was variable throughout the Unit but the harvest was greatest on the middle portion of the Kobuk and Noatak Rivers.

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

Drainage	Male	Female	Hunter Success %
Buckland to Goodhope River	12	2	73
Selawik River	9	1	83
Upper Kobuk (above Pah River)	9	0	69
Middle Kobuk (Kiana to Pah River)	37	4	75
Squirrel River	4	2	67
Lower Kobuk (below Kiana)	8	4	57
Upper Noatak (above Nimiuktuk)	4	2	67
Middle Noatak (Kelly to Nimiuktuk)	21	2	96
Lower Noatak (below Kelly)	14	7	57
Wulik and Kivalina Rivers	6	0	100
Unknown area	56	4	-

Composition and Productivity

The density and productivity of moose populations in various drainages of Unit 23 have been variable (Table 2). In general there appears to be a decline in most areas of the Unit, however, because of varying survey conditions the trends are not well defined.

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

Drainage	1974		1975		1976		1977		1978	
	moose/	%	moose/	%	moose/	%	moose/	%	moose	%
	hour	calves	hour	calves	hour	calves	hour	calves	hour	calves
	in herd		in herd		in herd		in herd		in herd	
Goodhope	38	32					38	25		
Kugruk & Pinnel	73	16					43	9		
Kivalik			70	21			27	7		
Buckland			51	11			20	17	24	15
Selawik			97	19			21	24		
Upper Kobuk (above Kobuk village)	21	14					37	25		
Lower Kobuk (Kiana to Delta)					60	40			16	23
Middle Noatak (Kelly to Nimiuktuk)			71	22	93	22	41	16	74	17
Lower Noatak (Kelly to Aggie)			41	30	30	20	16	17		

Management Summary and Recommendations

The reported harvest in 1977 increased noticeably to 180 animals, compared to an average of 108 animals for the years of 1972 through 1976, especially since no reminder letters were sent in 1977.

Moose surveys conducted yearly on similar areas and at the same time may not give actual trends because of weather conditions (high snow accumulations may drive animals living at higher elevations into the protected river valleys) which are not identical each year. This accounts, in part, for the variability in survey data from the Unit.

The estimated harvest of 212 animals in 1977 (Miller, 1978) is probably maximum for the GMU. Future changes in activities allowed on federal lands probably will shift hunting pressure to areas with fewer animals such as the Selawik and areas south of the Selawik River. In view of these changes, the record harvest, the increased hunting pressure and apparent decline of moose density in some portions of the Unit, the seasons and bag limits must be carefully monitored in case more conservative seasons should be implemented.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 24 - Koyukuk Drainage

Period Covered: July 1, 1977 - June 30, 1978

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
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Remainder of Unit 24	Sept. 10 - Sept. 30	One bull
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Harvest and Hunting Pressure

A total of 57 bull moose were reported taken in GMU 24 during the 1977 season. The harvest is probably not a real decrease over the reported harvest of 67 moose in 1976 since no moose hunter report reminder letters were sent out for the 1977 season. The total harvest from the unit is probably two or three times the reported harvest since most local residents do not report their take of moose. Local unit residents harvest some moose out of season from November through April with the aid of snow machines. Cows are preferred because local residents consider bulls to be inedible during these months.

Composition and Productivity

No fall composition counts were conducted during 1977. One late winter moose survey was conducted from the headwaters of the South Fork of the Huslia River downstream to the confluence of the Koyukuk River, then downstream along the Koyukuk River to the confluence of the Dulbi River. Forty moose (90% adults, 10% calves) were observed along the Huslia River and 120 moose (88.4% adults, 11.2% calves) were observed along the Koyukuk River. The low observed calf percentages in this portion of Unit 24 are similar to that observed in an adjacent portion of Unit 21 between the Kateel and Dulbi Rivers (refer to Unit 21 Moose S&I Report). Predation may be an important factor since both wolves and black bears are abundant in this area. The moose population in the southern portion of the unit is declining due to a combination of poor recruitment, while the annual harvest remains relatively constant.

Management Summary and Recommendations

The shortening of the season in the northern portion of Unit 24 had little impact on the harvest of moose. This area is utilized primarily

by hunters from outside the unit gaining access by aircraft. Hunting during November by aircraft is not very popular since the adoption of the same-day-airborne regulation. The problems associated with over-nighting in the bush in below-zero temperatures have reduced the popularity of the November season.

Poor compliance with existing regulations by local residents in the southern portion of the unit creates a situation where management by conventional means is difficult. Enforcement officers should be encouraged to take an aggressive posture in this area.

It is recommended that the Koyukuk River downstream from Hughes be closed to the use of aircraft for hunting moose. This area is utilized intensively by local residents hunting by boat, and restricting aircraft should reduce conflicts between user groups.

No changes in seasons and bag limits are recommended.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 25 - Chandalar and Eastern Yukon Drainages

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 25, that portion drained by the Yukon River upstream from Fort Yukon	Sept. 1 - Sept. 20	One bull
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Remainder of Unit 25	Sept. 10 - Sept. 30	One bull
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Harvest and Hunting Pressure

Based upon harvest reports, 120 hunters took 50 bull moose in Unit 25 during the 1977 season. Overall hunter success for those reporting was 42 percent. It is probable that the actual harvest was greater than 50 bulls because many residents of the unit are not in the habit of submitting harvest reports and reminder letters were not sent out to those hunters failing to report during 1977. By applying a correction factor of plus 23 percent to make the 1977 reported harvest figure comparable to previous years when reminder letters were sent out, an adjusted harvest figure of 60 to 65 bull moose was obtained. Using this adjusted harvest figure, it appears that the harvest decreased 19 percent from the previous season and was approximately the same as that during 1975.

The moose season in the western and northern portions of the unit was shortened by 3 months, while the season in that portion of the unit draining into the Yukon River upstream from Fort Yukon remained the same as during 1976. Boats were the most common means of transportation in the southern portion of the unit and aircraft the most common in the Brooks Range.

Composition and Productivity

Aerial surveys were conducted in the Sheenjek and Coleen drainages during fall 1977 (Table 1). Three hundred twenty-three moose were classified during 19.2 hours of survey. Calves comprised 24 percent of this sample. At the time of the survey moose were distributed throughout the upper reaches of the drainages. Some interchange between drainages was evident.

Table 1. Results of aerial surveys conducted in the northern portion of GMU 25 during fall 1977.

Area	Total M per 100 F	Small M per 100 F	Small M % in herd	Calves per 100 F	Incidence of twins per 100 cows w/calf	Calf % in herd	Moose per hour	Total moose
Coleen River ¹	59	8	4	57	21	27	24	219
Sheenjek River	77	8	4	40	12	18	10	104

¹ U.S. Fish and Wildlife survey.

No surveys were conducted in the southern portion of the unit.

Management Summary and Recommendations

Poor compliance with the harvest ticket program precludes any meaningful assessment of hunter distribution and the effect of hunting on the resource. Given the absence of adequate harvest data, the Department should continue to seek conservative seasons and bag limits.

Preliminary survey results indicate that the high bull:cow ratios observed in the Sheenjek and Coleen River drainages are not indicative of a heavily exploited moose population. This is consistent with the State's proposed management goal for the area; therefore, management efforts should be directed toward retaining the existing conditions. Calf survival to 6 months of age was excellent; however, overwinter survival may be barely adequate to maintain the population. Surveys should be repeated in this area until evidence of population trend is obtained, then scheduled periodically to detect changes that may occur. It is likely that moose densities on the south slope of the eastern Brooks Range are relatively low due to the limited habitat available. Since moose occupy rather open upland valleys during the fall, the potential for overexploitation is perhaps greater than in other locations in the state. Population trend and hunter harvest should be carefully monitored as further access sites are developed by the public.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

Game Management Unit 26 - Arctic Slope

Period Covered: July 1, 1977 - June 30, 1978

Seasons and Bag Limits

Unit 26	Sept. 10 - Dec. 31	One bull
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Harvest and Hunting Pressure

During the 1977-78 season, 48 hunters reported taking 36 moose in Unit 26, which was down from the 66 reported killed in 1976 and only nine more than the mean reported harvest for 1963-1976. A small number of additional moose were probably killed by residents of the unit but were not reported. Reconnaissance flights on the Colville River between Aupuk Creek and Nuiqsut and on the Anaktuvuk, Chandler and Killik Rivers between 10-14 September 1977 indicated that there were fewer hunters and aircraft than during the same period in 1976. A later season opening, bulls only hunting, and poor flying weather on both north and south sides of the Brooks Range probably contributed to the decrease in hunting intensity in 1977 compared to 1976.

Composition and Productivity

On April 14-15, 1978, aerial surveys were conducted by the U.S. Fish and Wildlife Service on the Canning and Kongakut Rivers in Subunit 26C; on April 25-27, 1978, surveys were conducted by Department biologists on Anaktuvuk, Chandler, Colville and Killik Rivers in Subunit 26A. No sexual distinction between adults was made during these surveys since, most bulls were without antlers. No fall surveys were conducted during 1977.

Of 43 animals observed on the Canning River, 34 were adults, and nine were calves (short yearlings); calves represented 21 percent of the sample. Of 58 moose observed on the Kongakut River, 48 were adults, 10 were calves (17 % of the herd). Of 827 animals observed in the Colville drainage, 677 were adults, and 150 were calves (short yearlings); calves represented 18 percent of the total population, but the percentage of calves varied between tributaries from 10 percent to 26 percent (Appendix 1.).

Comparison of spring survey results for the past five years, 1974 through 1978, for the Anaktuvuk, Chandler and Colville Rivers (Killik River to Anaktuvuk River) suggests that the total moose population in the Colville River system is remaining stable or has been increasing (1974: 544, 1975: 556, 1976: 650, 1977: 802, 1978: 767). The percentage of short yearlings in the population appears to have decreased slightly during the last three years (1974: 16%, 1975: 31%, 1976: 24%, 1977: 21%,

1978: 19%) after reaching a high of 31 percent in 1975. This apparent decrease could be an artifact of sampling. In October, 1975, 19 cow moose were collared on the Colville River and most of these have been resighted each year; one animal is known to have died. During the April, 1978 survey, 15 of these collared animals were seen. Based on this small sample of cows and their calves, there were 47 short yearlings/100 cows in spring 1978. Thus, some portions of the Colville River system continue to have high productivity and good overwinter survival of calves.

Management Summary and Recommendations

Survey data indicate that the moose population on the Arctic Slope, particularly in the Colville River system, the most heavily hunted area, is healthy and productive. Recruitment and overwinter survival of calves remains favorable. For the past two years the population in the Colville River system has been high.

Since winter habitat on the Arctic Slope is limited and predator populations, particularly wolves, are low at this time, the moose population should be carefully monitored for any signs that it is exceeding the carrying capacity of its winter range. This year the harvest was low in the Colville River system, less than 3 percent of the estimated moose population of 1200 to 1300 animals (1254 moose were counted in an extensive survey conducted by the department in April, 1977). In the absence of significant predation, and with continued low hunter harvest, moose-range relationships need to be monitored carefully. In addition, although hunter harvest was low in fall, 1977, close monitoring of the harvest should be continued because of the high vulnerability of moose to over-hunting in this area of low cover and easy aircraft access. Given the healthy population and high recruitment in some drainages of the Colville River system, a slight increase in harvest is probably desirable. To effect this, an earlier season opening in Unit 26 is recommended. Moving the opening of the season to September 1 would add 10 days to the existing season during a time of the year when day length is longer and weather is usually less rigorous, thereby providing better conditions for hunting.

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Appendix 1. Counts of Moose from April, 1978 aerial surveys on the
Anaktuvuk, Chandler, Colville and Killik Rivers.

River/Sector	Total	Adults	Calves	%Calves
Colville, Killik to Umiat	238	177	61	26
Colville, Umiat to Anaktuvuk	98	77	21	21
Anaktuvuk R., incl. Tuluga R.	164	143	21	13
Chandler R., incl. Siksikpul R & Aiyak R.	267	226	41	15
Killik R., <u>not</u> incl. Okomilaga R.	<u>60</u>	<u>54</u>	<u>6</u>	<u>10</u>
TOTALS	827	677	150	MEAN 18

ELK

SURVEY-INVENTORY PROGRESS REPORT - 1977-78

Game Management Unit 8 - Kodiak and Adjacent Islands

Seasons and Bag Limits

Unit 8, Raspberry Island and that portion of Afognak Island west and south of a line from the head of Malina Bay to the head of Back Bay.	Oct.1-Oct.31	One elk by permit only. 124 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder of Unit 8	Aug.1-Dec.31	One elk by permit only.

Harvest and Hunting Pressure

Two hundred hunters reported taking 24 elk during the 1977 elk season (Appendix I). The harvest was composed of 15 males (63%) and nine females (37%). Seven elk were killed in the Duck Mountain-Kioti Lakes area and nine came from the Tonki Peninsula-Seal Bay area. Overall hunter success was only 12 percent.

Eight of the 24 elk killed were taken during the Oct. 15-29 drawing hunts on Raspberry Island and Southwest Afognak Island. Twenty permits were available for the Raspberry Island hunt and 45 were available for the Southwest Afognak hunt. Four bulls were killed on Raspberry Island by 11 hunters (36% success). Two cows and two bulls were taken on Southwest Afognak by 15 hunters (27% success). Extremely high winds during the first week of this season hampered hunting efforts and prevented some permittees from initiating their hunts.

Hunters returned seven lower jaws from elk taken in the two drawing hunts. The jaws were aged by tooth replacement and wear. The four bulls killed on Raspberry Island included one calf, one yearling, one 4-year-old, and one animal over 5 years old. A yearling male and two females over 5 years old came from Southwest Afognak.

Composition and Productivity

Aerial composition surveys were done during July, August and September. During 8.8 survey hours, 501 elk were classified. Partial duplicate counts of the Raspberry Island herd inflated this total by about 10 percent. The calf:cow ratio was slightly improved over the previous year with 38 calves to 100 cows (Appendix II). The total number of calves observed also increased. In 1977, 122 calves were counted including a probable duplicate count of 14 calves on Raspberry Island.

The Raspberry Strait-Afognak Lake herd continued a gradual increase (Appendix III). Eleven elk observed in the Malina Lakes area were included in the Raspberry Strait herd total (Appendix IV). The 1977 sighting of one bull, nine females, and one calf in this area may mark the return of elk to the Malina Lakes area, once a major elk range. This herd declined and ultimately disappeared after the 1969-70 and 1970-71 winters. The calf crop of 22 animals remained close to what was recorded during the previous 2 years (Appendix III).

The Raspberry Island herd was surveyed on 14 July and 9 September 1977 (Appendix IV). The September survey yielded the highest total count of 81 animals. Of the herds surveyed, this herd had the highest frequency of bulls (26%). The calf crop was comparable to that recorded in the 2 previous years (Appendix V). This herd also shows an increasing trend.

No mortality was documented during the 1976-77 winter. Only light snow persisted at low elevations during the winter. Frequent rains melted much of the snow within a short time. Bear hunters frequently report finding dead elk in the spring, but no such reports were received in 1977. High survival of the 1976 calf crop is apparently reflected in the relatively higher total count in 1977.

Management Summary and Recommendations

Hunter success remains low and the reported harvest of 24 elk in 1977 is equivalent to only five percent of the composition count total. Access into the Duck Mountain area provided by the Kazakof Bay-Discoverer Bay logging road has been somewhat improved, but elk harvest has not yet been greatly influenced. No harvest was recorded from the Waterfall Lake or Paramanof Bay areas. Inaccessibility of the elk herds during the season keeps harvest well below sustainable levels.

Harvest during a 2-week season on Raspberry Island and Raspberry Strait-Afognak Lake herds was less than expected because of severe weather. Hunter success was higher for this hunt than that for the remainder of Afognak Island. Additional harvest could be sustained in both these herds.

Open wintering conditions permitted good survival during the 1976-77 winter. Calf production remains near average. A general upward trend in the elk population is indicated by the 1977 surveys.

It is recommended that the season be extended to run from 1 October through 31 October for the Raspberry Island and Southwest Afognak hunts. The number of permits for both these hunts should be increased in 1978 if good survival occurs through the 1977-78 winter.

PREPARED BY:

Roger B. Smith
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Unit 8 - General Elk Season Harvest Statistics, 1970-1977 from Hunter Permit Reports

Year	No. Hunters	Reported Harvest	Male Harvest	Female Harvest	Hunter Success	Season Length (days)
1970	184	62	43 (69%)	19 (31%)	34%	153
1971	190	27	15 (56%)	12 (44%)	14%	153
1972	112	18	8 (50%)	9 (50%)	16%	153
1973	116	18	8 (44%)	10 (56%)	16%	153
1974	118	30	16 (53%)	14 (47%)	25%	153
1975	123	23	7 (30%)	16 (70%)	19%	153
1976	239	26	14 (54%)	12 (46%)	11%	153
1977*	200	24	15 (63%)	9 (37%)	12%	153

* Includes Drawing Hunts No. 701 & 702

PREPARED BY: Roger B. Smith, Game Biologist III

APPENDIX II

Unit 8 - Elk Composition Counts 1967-1977

Date	Year	M	%	F	%	Calves	%	Calves 100/Cows	Total
8/0	1967	55	8%	522	73%	135	19%	25	712
8/0	1968	124	18%	432	62%	136	20%	31	692
---	1969	48	11%	288	65%	104	24%	36	408
8/0	1970	171	21%	467	57%	186	23%	40	824
8/0	1971	71	16%	277	64%	84	19%	30	432
8/19;9/13	1972	28	8%	239	67%	88	25%	37	355
8/0;9/0	1973	32	9%	250	69%	80	22%	32	362
8/9,8/16 8/20,9/12,9/18	1974	44	11%	243	63%	99	26%	41	386
7/21,7/30,8/23 8/29,9/4,9/12	1975	47	8%	383	69%	125	22%	33	555
8/11,8/12,8/22 9/6,9/10	1976	28	8%	228	68%	80	24%	35	336
7/14,8/14,8/28, 8/15,9/09	1977	55	11%	324	65%	122	24%	38	501

PREPARED BY: Roger B. Smith, Game Biologist III

APPENDIX III

Raspberry Strait - Afognak Lake Herd Composition Counts, 1968-1977

Date	Year	M	%	F	%	Calves	%	Calves 100/Cows	Total
	1968	13	8.8	101	68.7	33	22.4	33	147
	1969	4	5.0	22	25.0	61	70.0	36	87
	1970	18	18.7	60	62.5	18	18.7	30	96
	1971	14	17.3	50	61.7	17	20.9	34	81
	1972	2	4.4	32	71.1	11	24.4	34	45
	1973	5	11.6	31	72.1	7	16.3	23	43
	1974	4	7.4	37	68.5	13	24.0	35	54
	1975	5	6.8	48	64.9	21	28.3	44	74
	1976	5	7.5	42	62.7	20	29.9	48	67
	1977	4	4.0	73	74.0	22	22.0	30	99

APPENDIX IV

Raspberry Straits - Afognak Lake Elk Composition Counts, 1977

Date	Year	M	%	F	%	Calves	%	Calves 100/Cows	Total
7-14	1977	3	-	64	-	21	-	-	88
8-14	1977	1	-	9	-	1	1	1	11
		4	4%	73	74%	22	22%	30	99

Raspberry Island Elk Composition Counts, 1977

Date	Year	M	%	F	%	Calves	%	Calves 100/Cows	Total
7-14	1977	11	-	38	-	15	-	-	64
9-09	1977	21	-	46	-	14	-	-	81
		32	22%	84	58%	29	20%	35	145

PREPARED BY: Roger B. Smith, Game Biologist III

APPENDIX V

Raspberry Island Herd Composition Counts, 1969-1977

Date	Year	M	%	F	%	Calves	%	Calves 100/Cows	Total
	1969	8	25.0	21	65.6	3	9.3	14	32
	1970	15	39.5	16	42.1	7	18.4	44	38
	1971	12	41.4	14	48.3	3	10.3	21	29
	1972	7	15.6	20	44.4	18	40.0	90	45
	1973	10	28.6	17	48.6	8	22.9	47	35
	1974	10	29.4	16	47.0	8	23.5	50	34
	1975	15	26.8	28	50.0	13	23.0	46	56
	1976	11	19.6	32	57.1	13	23.2	41	56
	1977	32	22.0	84	58.0	29	20.0	35	145

PREPARED BY: Roger B. Smith, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT FOR 1978-79

Game Management Units 1A and 2--Ketchikan and Prince of Wales Island

Seasons and Bag Limits

Units 1A and 2	Aug. 1-Nov. 30	Three deer, provided that only one deer may be antlerless and that antlerless deer may be taken only from Nov. 1-Nov. 30
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Harvest and Hunting Pressure

Harvest and hunting data for the 1977 season were obtained from a hand tabulation of the harvest ticket report cards and the reminder letters sent to non-responding harvest ticket holders.

In Unit 1A, 250 deer were taken during the 1977 season. Twenty-six percent of the harvest were does. One hundred sixty-one deer (11% antlerless) were taken in Unit 2 during the 1977 season. The 160 people who hunted in Unit 2 averaged 3.2 days of deer hunting and 1.0 deer per hunter. In Unit 1A, 514 people hunted deer and they spent an average of 3.1 days in the field. Deer per hunter was 0.49, half the success rate of Unit 2 hunters.

Chronology of the harvest in Unit 1A shows a heavy distribution of harvest to November when the rut is in progress, snowfall starts and the antlerless season opens. Sixty-three percent of the harvest occurred in November, 19 percent in October, 10 percent in September and 8 percent in August. This distribution is very similar to that of 1976 for Unit 1A.

In Unit 2, the harvest was more evenly spread throughout the season. Nineteen percent occurred in August, 13 percent in September, 27 percent in October, and 41 percent in November.

Gravina Island was once again the best deer-producing area in Unit 1A, as 53 percent of the harvest occurred there. In comparison, Revilla Island produced 38 percent of the harvest. In terms of man-days of hunting, Revilla Island received 57 percent of the effort while Gravina received 33 percent.

Composition and Productivity

No data were collected.

Management Summary and Recommendations

The winter of 1977-78 was another extremely mild winter and the mortality transects in winter range areas were not walked in the spring of 1978. Mortality due to winter weather conditions was certainly very light.

The harvest data from this year compared to 1976 indicates a slight increase in deer taken in Unit 1A and a substantial increase in Unit 2, but it is difficult to say the increase in harvest was due to a change in population. Hunting conditions were better in November 1977 than in 1976 and in addition, more of the logging road system on Prince of Wales Island was open to hunters.

Several winter surveys (track counts) flown in early 1978 primarily for information on wolf numbers on Revilla Island indicated deer populations on the northeastern half of the island may have declined since the last surveys in 1975, while the deer population on the southwestern half of the island was approximately the same level as 1975. Because deer numbers are thought to be below carrying capacity, it is recommended that the current bag limit be three antlered deer.

PREPARED BY:

Robert E. Wood
Game Biologist III

SUBMITTED BY:

N. P. Johnson
Regional Research/Management Coordinator

DEER

SURVEY-INVENTORY PROGRESS REPORT FOR 1977-78

Game Management Unit 1C-Juneau

Seasons and Bag Limits

Unit 1C	Aug. 1-Dec. 31	Four deer; provided that antlerless deer may be taken only from Sept. 15 to Dec. 31.
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Harvest and Hunting Pressure

Harvest ticket returns for the 1977 deer season showed 449 hunters took 152 deer for a success rate of 22 percent. A summary of harvest statistics for Unit 1C is contained in Appendix I.

Hunting pressure was restricted to three major areas: 1) the mainland area behind Juneau (Bishop Point to Berners Bay) where 97 hunters took 23 deer for a success rate of 18.5 percent; 2) Douglas Island where a 21.1 percent success rate was achieved when 260 hunters bagged 81 deer; 3) the Lynn Canal islands where 48 deer were taken by 79 hunters for a 31.6 percent success rate.

Compared to the 1976 season, the deer harvest from Unit 1C increased 37 percent from 98 deer in 1976 to 154 in 1977. Hunter numbers increased 4.4 percent (429 to 449) and hunter success also increased from 15.6 percent to 22.0 percent. The increases in harvest and hunter success may be attributed to the onset of winter weather in mid-November and December. The cold weather was responsible for the movement of deer into areas more accessible to hunters.

Winter weather in Unit 1C has been relatively mild for the past five years with the winters of 1976 and 1977 being exceptionally warm. The cold of November and December 1977 was followed by intermittent warming and thawing the remainder of the winter. Deer continue to benefit from the mild winters and the populations are assumed to be increasing.

Management Summary and Recommendation

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

PREPARED BY:

David L. Beaudin
Game Biologist I

SUBMITTED BY:

N.P. Johnson
Regional Research/Management Coordinator

APPENDIX I

1977-78 Unit 1C Deer Harvest and Hunting Pressure as Derived From Hunter Report Cards.

Area	Male	Female	Total Harvest	Successful Hunters	Total Hunters	% Success
Cape Fanshaw to Taku Rv.	0	0	0	0	0	0
Taku River to Eldred Rock	16	7	23	18	97	18.6
Douglas Is.	49	32	81	55	260	21.2
Lynn Canal Islands	27	21	48	25	79	31.6
Unit 1C Unknown	2	0	2	1	13	7.7
Total Unit 1C	94	60	154	99	449	22.0

DEER

SURVEY-INVENTORY PROGRESS REPORT - FISCAL YEAR 1977-1978

Game Management Unit 4 - Admiralty, Baranof, Chichagof, and Adjacent Islands

Seasons and Bag Limits

Unit 4, that portion of Admiralty Island including all drainages into Frederick Sound and Stephens Passage on southeast Admiralty Island between Pleasant Bay and Point Gardner	Aug. 1-Nov. 30	Four deer, provided that antlerless deer may be taken only from Nov. 1-Nov. 30
Remainder of Unit 4	Aug. 1-Dec. 31	Four deer, provided that antlerless deer may be taken only from Sept. 15-Dec. 31

Harvest and Hunting Pressure

A hand compilation of harvest tickets showed a reported harvest of 2,945 deer for Unit 4 in 1977. That compilation was made from the 2,432 harvest tickets for persons who reported hunting in Unit 4. These persons expended 7,681 hunter days afield. Chronologically, 3 percent of the kill was taken in August, 4 percent in September, 13 percent in October, 45 percent in November, and 34 percent in December. Three areas, Peril Straights, the immediate Sitka area, and northern Admiralty, contributed over 50 percent of the Unit 4 harvest. These are, of course, the primary hunting areas of the unit's major population centers of Sitka and Juneau.

Combining all hunters reporting, each person took 1.2 deer, and each person expended 1.6 days afield.

These harvest statistics are just about average for Unit 4 over the past several years.

Statewide, there were about 13,000 deer harvest tickets issued and only about 6,500 returned. At this point in time, it appears that harvest figures provided by the harvest tickets suggest trends only.

Composition and Productivity

No data obtained.

Winter mortality transects were conducted over 12 of the 23 established units in late spring of 1978. No instances of mortality were observed. As was noted in 1977, there appeared to have been less use during the previous

winter, presumably due to the very mild winter. Consequently, Vaccinium along the beach fringe appeared to be in somewhat better condition for the past 2 years as compared to earlier years.

Management Summary and Conclusion

It would appear that the Unit 4 deer population is at about the carrying capacity of its range. Hunting success is high, and there are few complaints from the hunting public. The high deer population and overall chronically poor condition of the winter range (and that winter range is being reduced annually through logging) bring us to a situation that would indicate a winter die-off is eminent.

Recommendations

There are no changes in seasons or bag limits at this time.

PREPARED BY:

Loyal J. Johnson
Game Biologist III

SUBMITTED BY:

Nathan Johnson
Regional Research/Management Coordinator

DEER
SURVEY-INVENTORY PROGRESS REPORT FOR 1977-78

Game Management Unit 5 - Yakutat

Seasons and Bag Limits

Unit 5	Aug. 1-Dec. 31	Four deer; provided that antlerless deer may be taken only from Sept. 15-Dec. 31
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Harvest and Hunting Pressure

Deer hunter reports indicate that 12 individuals hunted in Unit 5 during the 1977-78 season. Hunter success was 16.7 percent (2 hunters) with four deer killed (3 males, 1 female). Days of hunting effort could not be accurately computed due to incomplete hunter reports, but the resource provided a minimum of 50 days of recreation. According to past seasons and the local Fish and Wildlife Protection Officer, this figure probably represents at least 80 percent of the hunting effort expended.

Composition and Productivity

No data were gathered on herd composition or productivity for deer in Unit 5.

Management Summary and Conclusions

Deer densities in Unit 5 are low. Deer are present along the mainland and the islands of Yakutat Bay, all of which are accessible by boat. Increased efforts will be made this winter to determine population parameters and to reevaluate the current hunting regulations including season lengths and bag limits.

Recommendations

No changes are recommended for the 1978 season.

PREPARED BY:

SUBMITTED BY:

Ronald E. Ball
Game Biologist II

N. P. Johnson
Regional Research/Management Coordinator

DEER

SURVEY-INVENTORY PROGRESS REPORT - FOR REGULATORY YEAR 1977-78

Game Management Unit 6 - Prince William Sound

Season and Bag Limit

Aug. 1 - Dec. 31

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

Harvest and Hunting Pressure

Harvest information was gathered from hand compiled harvest report data and by interviewing 100 Cordova hunters (Appendix I). According to the harvest report data, 795 hunters took 1,347 deer. Extrapolations from the 100 interviews indicate that 448 Cordova hunters took 992 deer. Hunter success was 63 percent statewide; 45 percent of the local hunters interviewed were successful. Statewide harvest data revealed the majority of deer were taken in November and on Montague Island. Cordova hunters took their deer primarily on Hinchinbrook and Hawkins Island and in November and December.

Composition and Productivity

Age data* were obtained from 206 deer jaws taken by Cordova hunters:

Age*	<u>F</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5+</u>	<u>Total</u>
Number	30	93	14	28	16	25	206
Percent	15	45	7	14	8	12	101
Born in							
Spring of:	1977	1976	1975	1974	1973	1972	
First							
Winter	'77-78	'76-77	'75-76	'74-75	'73-74	'72--	

* Age was determined by tooth eruption and wear

Management Summary and Conclusions

The 1977 Prince William Sound deer harvest is the largest to occur since the late 1960's. Deep snow in early November drove the deer onto

the beach and timbered beach fringe where they were readily accessible to hunters. Snow kept them on their winter range through most of November and December resulting in an unusually high harvest. Warm, rainy weather in January allowed the deer to retreat from the beach to inland areas where adequate food was available.

A Prince William Sound deer reconnaissance in late January and early February revealed very little winter mortality. However, an estimated 80 to 90 percent of their major winter range food source (*Vaccinium* spp.) had been consumed. The remainder of the winter was mild and little winter mortality should have occurred.

Analysis of the age data indicates a good age distribution of the Prince William Sound deer population going into the fall. The high percentage (45%) of yearlings in the harvest is a reflection of the previous mild winter.

The large harvest of deer that occurred in 1977 was beneficial; without it a larger winter kill would have occurred. However, the reduced herd size will be reflected in a smaller deer population in the fall of 1978. If heavy snow fall occurs in November of 1978, it may be necessary to close the season by emergency order to avoid an excessive harvest.

Recommendations

Retain the current season and bag limit.

PREPARED BY:

Julius Reynolds
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

1977 Deer Harvest Data

Unit 6

	<u>Harvest Report Data</u>		<u>Cordova Interview*</u>	
	<u>Number</u>	<u>Percent</u>	<u>Extrapolated Number</u>	<u>Percent</u>
License Buyers	Unknown		800**	100
License Buyers not Hunting	Unknown		352	44
Hunters Afield	795		448	56
Successful Hunters	501	63	360	45
Deer Harvested	1,347		992	
Males Harvested	777	58	592	60
Deer per Hunter Afield	1.7		2.2	
Days per Deer	Unknown		1.6	
Total days Hunted	Unknown		1,584	
Harvested:				
1 deer	134	27	80	22
2 deer	88	18	72	20
3 deer	79	16	64	18
4 deer	200	40	144	40
Chronology:				
August	25	2	16	2
September	64	5	16	2
October	155	12	120	12
November	693	52	496	50
December	380	28	344	35
Unknown	30	2	0	0
Location:				
Hawkins Is.	150	11	296	30
Hinchinbrook Is.	267	20	456	46
Montague Is.	737	55	192	19
Naked, Peak, Storey Is.	62	5		
Knight - Eleanor Is.	48	4		
Other	44	3	48	5
Unknown	39	3		

* Personal interviews with 100 Cordova hunters who obtained deer harvest tickets. Harvest figures were extrapolated from this estimated 12.5 percent sample of Cordova hunters.

** Estimate of Cordova license buyers in 1977 (807 actual licensed hunters in 1976).

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1977-78

Game Management Unit 8 - Kodiak and Adjacent Islands

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Deer harvest statistics were extrapolated from telephone interviews of 164 Kodiak hunting license purchasers (Appendix I). The total harvest was 1,857 deer, including 1,344 males (72%) and 513 females (28%).

The 1977 harvest was the highest recorded in several years (Appendix II). Hunter success was unusually high with 81 percent of the hunters taking one or more deer. Seventy percent of the hunters took two or more deer in 1977 compared to 59 percent in 1976. An average of 2.3 days were required for a hunter to bag a deer.

A comparison of harvest data compiled from hunter reports with that extrapolated from telephone interviews is shown in Appendix III. The deer harvest as indicated by the telephone interview technique was 14 percent higher than harvest reports indicated. Both methods, however, show similar percentages of males and females killed. The telephone survey sampled only Kodiak hunters while the hunter report is required of all hunters. A steady increase in hunting pressure by mainland Alaskan hunters has occurred in the last 5 years. It was desirable therefore that harvest report data be used to supplement data obtained from telephone interviews.

Distribution of the deer harvest as derived from harvest reports and telephone interviews is shown in Appendix III and IV. The largest harvest was taken from Afognak and Shuyak Islands (subunit 10). Upper

Ugak Bay (subunit 6) showed the greatest difference in harvest between the two methods; telephone interviews 14.7 percent, hunter reports 3.5 percent. Since this area receives heavy hunting pressure from local hunters, it is not surprising that the telephone interview method indicated a higher harvest since it samples only Kodiak residents.

It was estimated that with the additional unreported take, the Unit 8 harvest in 1977 was 2,000-2,500 deer.

Composition and Productivity

No sex or age composition data were collected in 1977.

No evidence of winter mortality was found in searching 12.5 miles of coastal winter range on Afognak Island, Whale Island, Raspberry Island, and upper Ugak Bay and Chiniak Bay areas on Kodiak Island. Periodic rains throughout the 1977-78 winter prevented lasting snow accumulations at lower elevations in most areas.

Management Summary and Conclusions

A series of rainy winters with little snow at low elevations allowed excellent deer survival. Favorable climatic conditions have therefore contributed to an increasing trend in the deer population throughout Unit 8. The high deer population is reflected in high hunter success and in the increasing percentage of hunters taking two or more deer. The indicated harvest in 1977 was the highest since 1968.

Although Kodiak's reputation for good deer hunting continues to attract more mainland Alaskan hunters, annual harvest is well below what could be sustained. Poor weather conditions and the expense of air transportation preclude significantly higher harvests even with further liberalization of seasons and bag limits.

Recommendations

No changes in seasons or bag limits are recommended.

PREPARED BY:

Roger B. Smith
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Unit 8 - Deer Harvest Statistics, 1977*

	<u>No.</u>	<u>Percent</u>
License buyers	1868	-
License buyer interviews	164	8.8%
License buyers not hunting	911	49%
Hunters afield	957	51%
Females harvested	513	28%
Males harvested	1344	72%
Total deer harvested	1857	100%
Hunter success	775	81%
Days hunted per deer	2.3	-
Deer per hunter afield	1.9	-
Deer per successful hunter	2.4	-
Total days hunted	4317	
Number and percent hunters taking:		
One deer	228	29%
Two deer	205	27%
Three deer	148	19%
Four deer	<u>194</u>	<u>25%</u>
	775	100%

* From telephone hunter interviews; harvest figures extrapolated from 8.8 percent sample of Kodiak license buyers.

PREPARED BY: Roger B. Smith, Game Biologist III

APPENDIX II

Unit 8 - Deer Harvest Statistics, 1968-1977

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Number of hunters	2,300	1,441	658	925	689	1,127	1,141	1,068	1,088	957
Number of deer harvested	2,100	1,420	870	915	587	1,166	1,754	1,057	1,111	1,857
Percent hunter success	74%	43%	55%	45%	46%	47%	61%	47%	51%	81%
Mean number of deer per hunter	0.9	1.0	1.3	1.0	0.9	1.0	1.5	1.0	1.5	1.9
Mean number of hunting days per deer	5.0	6.3	2.4	4.5	5.2	5.0	3.7	4.8	3.8	2.3

PREPARED BY: Roger B. Smith, Game Biologist III

APPENDIX III

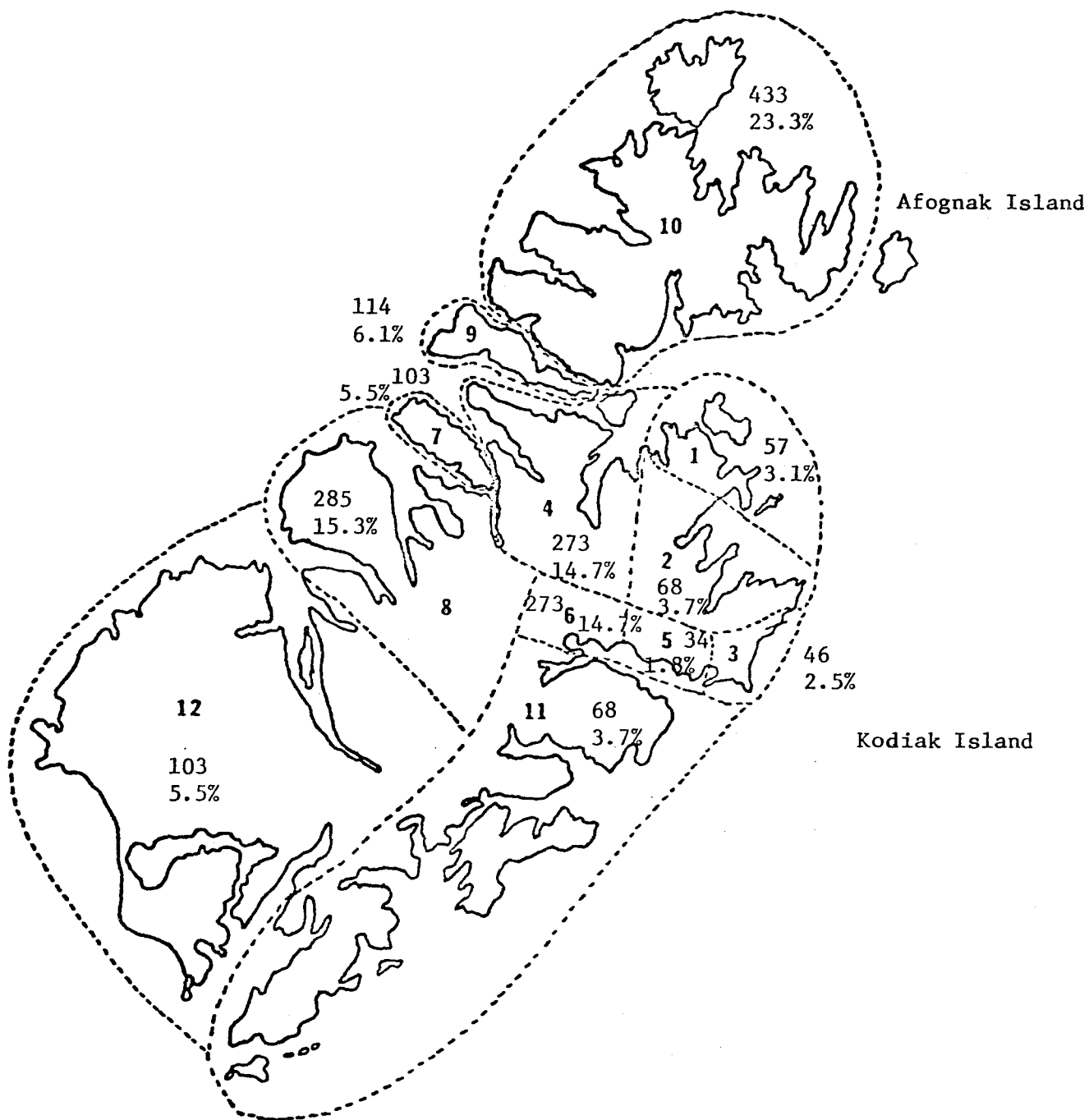
Comparison of 1977 Unit 8 deer harvest by area from telephone interviews and hunter reports.

Harvest Subunit	Telephone Interview		Harvest Reports	
	No.	%	No.	%
1	57	3.1	36	2.3
2	68	3.7	50	3.1
3	46	2.5	6	0.4
4	273	14.7	298	18.6
5	34	1.8	29	1.8
6	273	14.7	56	3.5
7	103	5.5	162	10.1
8	285	15.3	203	12.7
9	114	6.1	107	6.7
10	433	23.3	424	26.5
11	68	3.7	51	3.2
12	<u>103</u>	5.5	97	6.1
	1857		<u>80</u>	5.0 Kodiak Island
Total includes 1344 males (72%) and 513 females (28%)			1599 Total includes 1171 males (73%) and 428 females (27%)	

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APPENDIX IV

Distribution of Unit 8 Deer Harvest by Subunits, 1977



From telephone hunter interviews; harvest figures extrapolated from 8.8 percent sample of Kodiak license buyers.

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