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ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

STATE OF ALASKA
Jay S. Hammond, Governor

DEPARTMENT OF FISH AND GAME
James W. Brooks, Commissioner

DIVISION OF GAME
Frank Jones, Director

ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES
PART II. MOOSE

Edited and compiled by
Donald E. McKnight, Research Chief

Volume V
Federal Aid in Wildlife Restoration
Project W-17-6, Jobs No. 1 and 22

(Printed January 1975)

MEMORANDUM OF TRANSMITTAL

January 6, 1975

TO: James W. Brooks, Commissioner
Alaska Department of Fish and Game

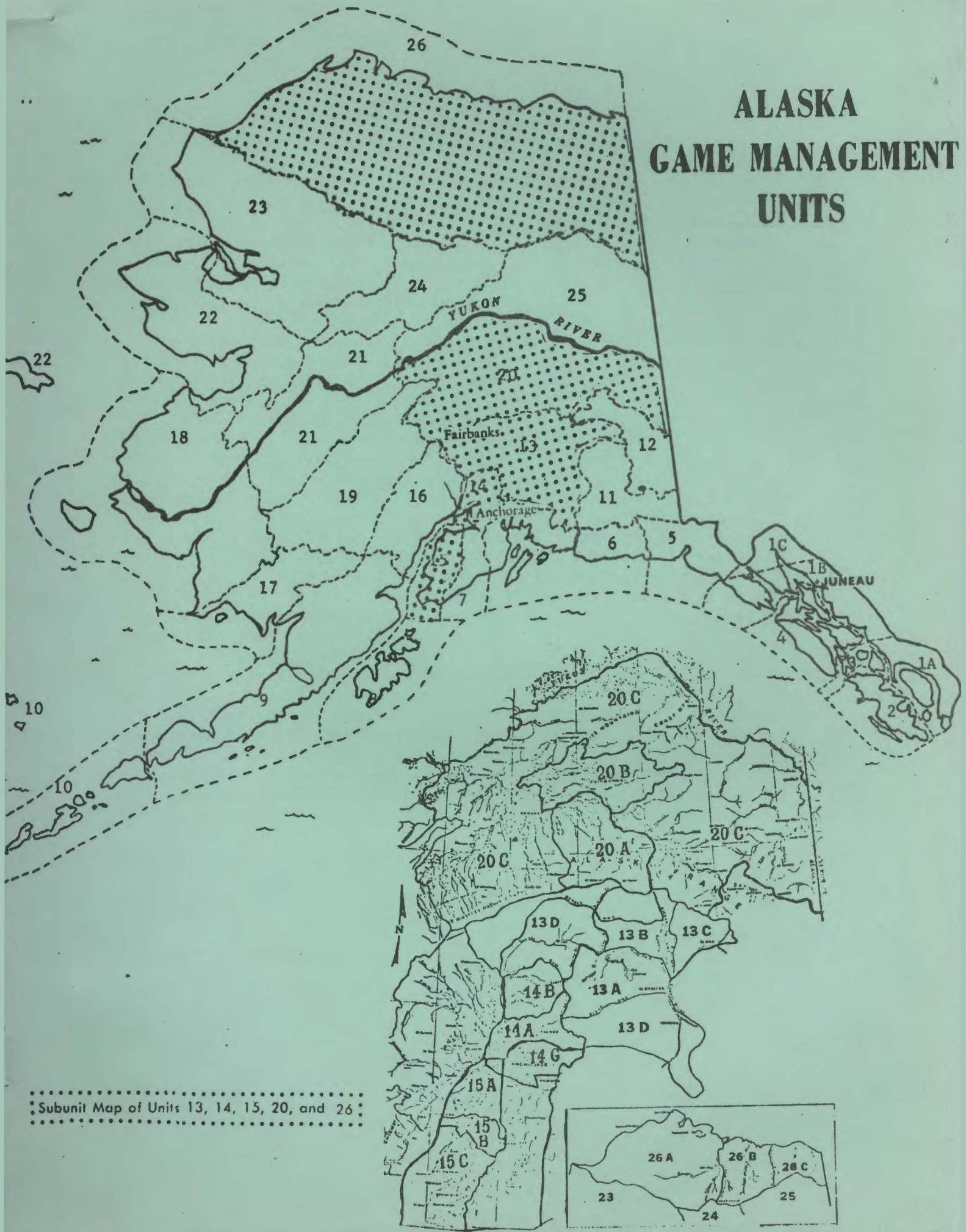
FROM: Franklin F. Jones, Director
Division of Game
Alaska Department of Fish and Game
Juneau

SUBJECT: Annual Report of Survey-Inventory Activities

In 1969 the Game Division initiated a series of annual reports related specifically to survey and inventory activities conducted by staff biologists each year. Surveys and inventories include all routine data collections directed toward assessment of the status of game populations and toward the determination of annual game harvests. These reports include study results and conclusions and, when applicable, recommended hunting regulation changes.

Because experience has shown that these reports are of interest to citizens unfamiliar with Alaska game management unit boundaries, a map showing these boundaries is included in each report. Information in these reports is organized by game species and management units. This year a brief summary of report contents has been added.

ALASKA GAME MANAGEMENT UNITS



Subunit Map of Units 13, 14, 15, 20, and 26

STATEWIDE HARVESTS AND POPULATION STATUS

Moose

Data derived from the harvest ticket program indicated that 7,482 moose were legally harvested in Alaska during the 1973-74 hunting season. This reported harvest, consisting of 5,451 males, 1,874 females and 157 moose of unknown sex, was slightly greater than the previous 5-year average (7,175 moose/year). Unreported harvests in portions of the state where subsistence use of moose is great undoubtedly inflated total harvest figures by several thousand animals.

As a result of intensive hunting pressure brought about by high beef prices Alaska's moose herds, many of which are still recovering from severe 1970-71 and 1971-72 winters, sustained relatively high harvests in 1973. Resident hunters showed willingness to travel far afield for their moose, as evidenced by record harvests on the Alaska Peninsula (GMU 9) of 839 animals and the west side of Cook Inlet (GMU 16) of 925 animals. Harvests from readily accessible herds of Southcentral Alaska, which were hard hit by successive severe winters in the early 1970's, remained much below average. Game Management Units 13 (Nelchina Basin), 14 (Matanuska Valley) and 15 (Western Kenai Peninsula), for example, produced only 618, 586 and 843 moose, respectively, in 1973. For the same reason the Yakutat area (GMU 5) sustained a harvest of only 147 animals, its lowest reported harvest since the harvest ticket program was initiated in 1963. On the other hand, the 1973 harvest of 1,660 moose in Game Management Unit 20 (Upper Tanana) was the largest ever reported for that unit.

With few exceptions, moose herds statewide appeared to be recovering substantially from losses incurred during severe 1970-71 and 1971-72 winters. Poor calf production and/or survival resulted in continued low moose populations in Game Management Unit 13 (Nelchina Basin) and part of Game Management Unit 5 (Yakutat Forelands). Because of the extensive reductions in these areas and the relatively depressed condition of herds in other areas, it must be considered that overall Alaska moose populations were somewhat lower in 1973 than in years past.

D.E.M.

CONTENTS

1973 Statewide Moose Harvest Data
(from harvest ticket returns)

Game Management Unit	Males	Females	Unreported Sex	Total
1	142	77	1	220
5	94	51	2	147
6	30	0	0	30
7	114	43	0	157
9	607	206	26	839
11	105	77	5	187
12	131	55	6	192
13	604	4	10	618
14	532	40	14	586
15	581	247	15	843
16	609	297	19	925
17	39	2	1	42
18	10	0	0	10
19	170	41	7	218
20	1093	534	33	1660
21	169	64	6	239
22	103	32	1	136
23	81	17	5	103
24	74	20	3	97
25	105	46	2	153
26	24	7	0	31
Unknown	34	14	1	49
Total by Sex	5451	1874	157	
TOTAL				7482

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 1B - Southeast Mainland from Cape Fanshaw to the Cleveland Peninsula

Seasons and Bag Limits

Subunit 1B except the Stikine River drainage	Sept. 15 - Oct. 15	One bull
Stikine River drainage	Sept. 15 - Sept. 30	One antlerless moose by permit only
	Oct. 10 - Oct. 25	One bull

Harvest and Hunting Pressure

The 1973 season was the second year for a limited antlerless season and an open bull season in the Stikine River area. Thirty antlerless permits were drawn from 650 applications on August 20.

Twenty-six of the 30 permittees hunted, killing 22 antlerless moose. Fish and Game personnel monitoring the hunt estimated that about 54 people participated with the permittees. Fifteen reproductive tracts and 17 jaws were collected, plus one reproductive tract and jaw from an illegal kill.

Approximately 160 hunters reported taking 25 bulls during the bull-only season from October 10-25. Hunting effort was heaviest during the first week with 19 bulls reported taken by October 18. Hunting was more difficult during the last week of October when the water level dropped making access into sloughs from the main river channel difficult.

Harvest in the remainder of Subunit 1B was 4 bulls. Three were taken in Thomas Bay and one at Aarons Creek.

Lower jaws were collected from 13 bulls in the Stikine River area and one from Aarons Creek.

Composition and Productivity

Aerial composition surveys were conducted in the Stikine River area between August 1, 1973 and June 21, 1974. The results of these surveys are summarized in Appendix I.

The ratio of cows with twin calves:cows with calves decreased slightly between fall (33.3:100) and late winter (22.2:100) counts, but slight differences were noted between the December 1973 and February 1974 counts, indicating good twin calf survival through this period. Calf-adult ratios from February counts conducted in 1973 and 1974 were 50.0:100 and 52.4:100, respectively.

The mean cementum age of 27 moose, excluding calves, harvested in 1973 on the Stikine River was 5.0 years. The mean age of 10 bulls and 17 cows was 1.4 years and 7.1 years, respectively. The young age class for bulls reflects heavy hunting mortality.

Management Summary and Recommendations

The late bull season appears to have improved calf production in the Stikine River. The carrying capacity for moose in the Stikine River area is not thoroughly known, however, the population is believed to be near optimum numbers. Antlerless hunts on a limited basis should be continued. The harvest of 18 cows in 1972 and 22 cows in 1973 from this area has not adversely affected the female segment of the population as shown by post-season aerial surveys and cementum age distribution data. Additional restrictions of the bull harvest would be desirable if bull:cow ratios do not improve.

PREPARED BY:

David Zimmerman
Game Biologist II

SUBMITTED BY:

Harry Merriam
Regional Research/Management Coordinator

APPENDIX I

Moose, sex and age composition count summaries for the regulatory year 1973-74, Stikine River, GMU 1B, Southeastern Alaska.

DATE	TOTAL MM	FF W/O	FF W/1	FF W/2	TOTAL FF	TOTAL ADULT	LONE CALVES	TOTAL CALVES	UNID. SEX AGE	TOTAL SAMPLE	FLYING TIME (HRS:MIN)
1 Aug. 73	6	13	1	1	15	21		3	4	28	2:03
2 Aug. 73	6	18	6	3	27	33	1	13		46	2:17
28 Nov. to											
1 Dec. 73	2	40	17	5	62	64	1	28	4	96	2:40
11 Dec. 73	2	14	9	3	26	28	1	16		44	2:10
11 Feb. 74			21	6	27	63		33		96	2:40
29 May 74		1							8	9	1:44
21 Jun. 74		14	2		16	16		2		19*	1:53

1973-74 Sex and Age Ratois - Stikine River, GMU 1B

DATE	TOTAL MM PER 100 FF	CALVES PER 100 FF	TWINS PER 100 FF W/CALVES	CALF % IN HERD	TOTAL SAMPLE
1 Aug. 73	40.0	20.0	50.0	10.7	28
2 Aug. 73	22.2	48.1	33.3	28.3	46
28 Nov. to					
1 Dec. 73	3.2	43.5	22.7	29.2	96
11 Dec. 73	7.7	57.7	25.0	36.4	44
11 Feb. 74			22.2	34.4	96
29 May 74					9
21 Jun. 74		12.5	0.0	10.5	19

* One moose identified as a yearling

Prepared by: Dave Zimmerman, Game Biologist II

APPENDIX II

1973 Cementum Age Data from Harvested Moose, Stikine River Drainage, GMU 1B, Southeastern Alaska

	FEMALE		MALE	
AGE	NO.	%	NO.	%
Calf	1	9.1	1	5.6
1	6	54.5	2	11.1
2	4	36.4	4	22.2
3			0	
4			0	
5			0	
6			1	5.6
7			2	11.1
8			0	
9			3	16.7
10			0	
11			1	5.6
12			2	11.1
13			0	
14			2	11.1
TOTAL	11	100.0	18	100.1
Mean Age		1.4*	7.1*	

* calves not included

Prepared by Dave Zimmerman, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 1C - Juneau

Seasons and Bag Limits

Subunit 1C except Berners Bay drainages	Sept. 15 - Oct. 15	One bull
Berners Bay drainages	Sept. 15 - Oct. 15	One moose by permit only; 50 permits will be issued

Harvest and Hunting Pressure

Harvest data since 1963 are summarized in Appendix I. The 1973 harvest of 63 moose is the highest on record. This included 30 bulls from the Taku River drainage and 15 bulls and 18 cows from Berners Bay. Hunter success for Berners Bay was 78.6 percent compared to 62.9 percent in 1972. The Taku drainage hunters had 20.8 percent success in 1973.

The Berners Bay drainage moose permit hunt in 1973 had 1,244 qualified applicants compared to 416 applicants in 1972. Of 50 permittees, 42 actively hunted the area compared to 35 in 1972.

Composition and Productivity

Sex and age composition surveys were conducted within the Taku and Berners Bay drainages in November and December (Appendices II, III and IV). The total of 111 moose counted includes 23 from the Taku drainage and 88 in the Berners Bay area. In 1972 the total count was 183 moose with 92 from the Taku drainage and 91 from the Berners Bay area. The Taku herd's bull:cow ratio of 5.0:100 was low, but similar to ratios recorded for this herd for the last 12 years. The ratio for Berners Bay was 13.8 bulls:100 cows compared to 20 bulls:100 cows in 1972. Production was high for Berners Bay, but there was a noticeable drop in the Taku herd. In 1973 Taku herd production was 22.2 calves:100 cows while Berners Bay had 37.9 calves:100 cows compared to 50.9 and 45.5 calves:100 cows, respectively, in 1972.

No age data are available for the Taku herd, but the Berners Bay herd was hunted under a permit system and successful hunters were required to turn in moose jaws. As a result, 28 of the 33 moose harvested at Berners Bay were aged by counting annual cementum lines (Appendix V). The age of harvested cows ranged from one to seven years with the majority being in the two-year-old age class. The mean age for cows (4.0 years) has increased from a 2.4-year mean age in 1972 and is identical to the 1971 mean age. The mean age for bulls was 3.0 years, an increase over the last two years. From 1963 through 1971 the Berners Bay herd was regulated by a bulls-only season. This resulted in a bull:cow ratio so low that reproduction was probably affected (Appendix IV).

Management Summary and Recommendations

The Berners Bay herd originated from transplants of 21 calves in 1958 and 1960. The potential moose habitat was, and remains, limited. The population increased rapidly and bull hunting was first allowed in 1963. By 1969, it was apparent that the sex ratio was becoming distorted with too few bulls to assure good reproduction. Since 1971 limited either-sex harvests have been allowed.

The Taku River herd has been regulated by a one-month hunting season for bulls only with annual harvests ranging from 10 to 30 animals. It is evident that hunters are now capable of harvesting most of the bulls (56 bulls in two years) on the Alaskan side, plus effecting a noticeable drop in the number of bulls in the adjacent Canadian portion. Productivity will probably drop if hunters continue to harvest only bull moose in the Taku drainage.

Composition, survival and production are good in the Berners Bay herd. The issuance of either-sex permits for the harvest of moose in Berners Bay should be continued.

The Taku and Chilkat Range moose herds (Subunit 1C excepting Berners Bay) are the only herds in Region I still managed by a bull-only harvest. The Chilkat Range moose herd consists of only 10 to 20 animals, ranging from the Sullivan River to St. James Bay, of which no significant harvest has been recorded. The Taku herd, like the Stikine River herd further south, has an interchange of some moose between Canada and Alaska. About 10 to 30 bulls are taken each year from the Taku herd; this bull-only harvest for a long period has resulted in low bull:cow and calf:cow ratios, and most animals taken are less that three years old. Either-sex hunting would balance sex ratios and probably result in increased productivity.

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SUBMITTED BY:

Harry Merriam
Regional Research/Management Coordinator

Moose GMU 1C - Juneau

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 1C - Berners Bay

Year	Male	Female	Total	Hunters	Success Percentage
1963	3	-	3	-	-
1964	6	-	6	-	-
1965	11	-	11	-	-
1966	10	-	10	-	-
1967	18	-	18	-	-
1968	21	-	21	-	-
1969	14	-	14	-	-
1970	10	-	10	-	-
1971*	3	20	23	28	82.1
1972*	5	17	22	35	62.9
1973*	15	18	33	42	78.6

* Harvest as reported by permittees.

Moose Harvest - Unit 1C - Taku River

Year	Male	Hunters	Success Percentage
1963	15	-	-
1964	35	-	-
1965	25	-	-
1966	29	-	-
1967	30	-	-
1968	14	-	-
1969	17	-	-
1970	14	-	-
1971	19	-	-
1972	26	-	-
1973	30	144	20.8

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

Moose - GMU 1C - Juneau

APPENDIX II

Moose Sex and Age Composition - Taku River - 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	Count Time (Hr)
4/1/64	-	-	-	-	-	-	-	-	-	5	54	59	2.5
1965-1968*													
11/24/69	4	0	4	26	11	3	40	44	5	22	1	67	1.6
11/20/70	2	0	2	19	10	3	32	34	0	16	0	50	2.5
1971*													
11/14-15/72	3	2	5	33	19	5	57	62	1	30	0	92	3.07
11/14-15/72***	13	5	18	80	31	5	116	134	0	41	0	175	5.13
12/21/73	0	1	1	14	4	0	18	19	0	4	0	23	3.25
12/21-22/73***	3	7	10	79	22	1	102	112	0	24	0	136	5.66

Moose Sex and Age Ratios - Taku River - Unit 1C

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1961	-	-	-	-	-	-	-	-	-	38
1962	2.9	-	-	-	-	17.1	-	14.3	-	42
1963	-	-	-	-	-	-	-	8.5	23.6	59
1964-68*										
1969	10.0	0.0	0.0	0.0	0.0	55.0	21.4	32.8	42.0	67
1970	6.3	0.0	0.0	0.0	0.0	50.0	23.1	32.0	20.3	50*
1971*										
1972	6.8	3.5	66.6	2.2	13.3	50.9	20.8	32.6	30.0	92
1972***	15.5	3.7	38.5	2.9	24.4	35.3	13.9	23.4	34.1	175
1973	5.0	5.0	N/A	4.3	50.0	22.2	0.0	17.4	7.1	23
1973***	8.9	6.3	233.3	5.1	58.3	23.5	4.3	17.6	24.0	136

*Insufficient data.
**1/3 of area not surveyed.
***U.S. and Canadian portion of herd.

Prepared by: David A. Johnson, Game Biologist III, June 14,1974

Moose - GMU 1C - Juneau

APPENDIX III

Moose Sex and Age Composition - Berners Bay - Unit 1C

Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time-Hr
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

* No sex differentiation made.

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974.

Moose - GMU 1C - Juneau

APPENDIX IV

Moose Sex and Age Ratios - Berners Bay - Unit 1C

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1960	-	-	-	-	-	-	-	50.0	-	8
1961	-	-	-	-	-	-	-	6.3	-	17
1962	200.0	-	-	-	-	33.3	-	10.0	-	20
1963	-	-	-	-	-	-	60.0	32.0	-	25
1964*										
1965	-	-	-	-	-	-		35.1	38.5	37
1966*										
1967*										
1968	23.5	20.6	700.0	10.4	56.0	73.5	20.6	37.3	25.5	67
1969	9.6	0.0	0.0	0.0	0.0	19.2	11.1	14.9	83.8	67
1970	4.7	1.6	50.0	1.3	22.2	14.1	28.6	11.8	24.8	76
1971	7.1	2.4	50.0	1.5	9.1	50.0	5.0	32.8	27.3	67
1972	30.0	14.5	266.6	8.8	88.0	45.5	28.0	27.5	34.3	91
1973	13.8	5.2	60.0	3.4	27.3	37.9	10.5	25.0	33.8	88

*Insufficient data.

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

Moose - GMU 1C - Juneau

APPENDIX V

1971, 1972 and 1973 Cementum Age Data, Unit 1C - Berners Bay

Age Structure Given in Percentages
Calves Not Included in Mean Ages

	Males				Females		
Age	1971	1972	1973	Age	1971	1972	1973
C	33.3	-	-	C	-	-	-
1	33.3	80.0	23.1	1	13.3	33.3	13.3
2	33.3	20.0	23.1	2	33.3	8.3	26.7
3	-	-	15.4	3	13.3	41.7	6.7
4	-	-	15.4	4	6.7	16.7	6.7
5	-	-	15.4	5	6.7	-	13.3
6	-	-	7.7	6	6.7	-	13.3
7	-	-	-	7	6.7	-	20.0
8	-	-	-	8	6.7	-	-
9	-	-	-	9	-	-	-
10	-	-	-	10	-	-	-
11	-	-	-	11	-	-	-
12	-	-	-	12	6.7	-	-
Mean	1.5	1.2	3.0		4.0	2.4	4.0
Sample Size	3	5	13		15	12	15

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 1D - Haines

Seasons and Bag Limits

Sept. 1 - Oct. 15 *One moose

*Antlerless season will be closed by Commissioner's announcement after 50 antlerless moose have been taken.

Harvest and Hunting Pressure

Harvest data since 1960 are summarized in Appendix I. The 1973 harvest of 115 moose was greater than the average for the past four years, but 15 percent lower than the average harvest for the years 1964 to 1968 (136) moose. Hunters had 23.0 percent success in 1973 compared to 28.3 percent in 1972 and 30.5 percent in 1971.

Composition and Productivity

Sex and age composition surveys were conducted in December 1973 (Appendices II and III). The total of 264 moose seen was similar to the total count for 1972 but 20 percent less than the 329 moose average for surveys made from 1965 through 1968. The bull:cow ratio (15.9:100) was low, but similar to ratios recorded for the last four years. This could be the result of a disproportionate harvest of bulls over the past twelve years. Production and survival continued to be poor; ratio of small males/100 cows was very low while the ratio of calves:cows (23.8:100) was similar to ratios recorded for the last four years.

The winter of 1973-74 was moderate.

The age structure was determined from 67 percent of the cows and 26 percent of the bulls harvested in 1973 (Appendix IV). The majority of the animals killed were in the one-year-old age class.

Management Summary and Conclusions

Based on harvest statistics, there has been a decrease in the average age of moose taken from the Haines herd during the past five years. Approximately 100 moose have been taken each year.

Either-sex hunting has been allowed in Subunit 1D since 1964. About 40 to 50 cows and slightly more bulls are taken annually. Population size appears to be lower than it was during the late 1960's. Bull:cow ratios are lower than desired and the age structure is distorted with too few cows in the productive age classes. All indications point to heavy utilization of the herd, indicating a reduction in harvest may be

desirable. A reduced harvest of 50 moose of either sex managed by hunter registration will be implemented for the 1974 season.

PREPARED BY:

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Game Biologist III

SUBMITTED BY:

Harry Merriam
Regional Research/Management Coordinator

Moose - GMU 1D - Haines

APPENDIX I

Moose Harvest

Year	Male	Female	Sex Unknown	Total	Hunters	Percent Success
1960	45	-	-	45	-	-
1961	63	-	-	63	-	-
1962	66	-	-	66	-	-
1963	81	-	-	81	-	-
1964	79	65	-	144	-	-
1965	66	34	1	101	-	-
1966	92	60	-	152	-	-
1967	90	47	-	137	-	-
1968	82	61	2	145	-	-
1969	52	24	2	78	-	-
1969*	62*	41*	-	103*	-	-
1970	48	48	-	96	-	-
1971	67	30	-	97	318	30.5
1971*	NA	43*	-	NA	-	-
1972	46	45	1	92	325	28.3
1973	69	46	-	115	501	23.0

*Reported to Haines Check Station

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

Moose - GMU 1D - Haines

APPENDIX II

Moose Sex and Age Cmposition - Haines - Unit 1D

Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time(Hr)
11/4/63	-	-	-	-	-	-	105	-	-	36	21	193	-
11/20/66	24	22	46	60	61	17	138	184	0	95	16	295	2.1
11/30-12/1/67	28	22	50	106	61	6	173	223	2	75	0	298	2.8
12/6-7/68	24	25	49	191	57	5	253	302	5	72	1	374	4.4
11/22/69	23	0	23	63	25	3	91	114	0	31	0	145	2.1
11/9-10-12-19/71	12	15	27	139	28	3	170	197	0	34	0	231	4.9
11/27-29/72 } 12/4-5/72	25	8	33	128	45	5	178	211	1	56	0	267	6.4
12/13-14-15/73	21	9	30	150	35	4	189	219	2	45	0	264	4.4

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

Moose - GMU 1D - Haines

APPENDIX III

Moose Sex and Age Ratios - Haines - Unit 1D

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1962	-	-	-	-	-	-	-	21.5	-	181
1963	30.0	-	-	-	-	-	-	18.7	-	172
1964*										
1965	41.2	15.5	-	6.6	-	49.3	19.2	20.9	-	349
1966	33.3	15.9	91.7	7.5	46.3	68.8	21.8	32.2	140	295
1967	28.9	12.7	78.6	7.4	58.7	43.4	8.9	25.2	91	298
1968	19.4	9.9	104.2	6.7	69.4	28.5	8.1	19.2	86	374
1969	25.3	0.0	0.0	0.0	0.0	34.1	10.7	21.4	69	145
1970*										
1971	15.9	8.8	125.0	6.5	88.2	20.0	9.7	14.7	47	231
1972	18.5	4.5	32.0	3.0	28.6	31.5	10.0	20.9	42	267
1973	15.9	4.8	25.0	3.4	39.1	23.8	10.3	17.0	60	264

* Insufficient data

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

Moose - GMU 1D - Haines

APPENDIX IV

1970, 1971, 1972 and 1973 Cementum Age Data

Age Structure Given in Percentages
Calves Not Included in Mean Ages

	Males					Females			
Age	1970	1971	1972	1973	Age	1970	1971	1972	1973
Calf	4.2	-	-	10.5	Calf	-	10.0	4.5	16.1
1	20.8	36.4	87.5	31.8	1	16.7	15.0	36.4	29.0
2	29.2	45.5	12.5	10.5	2	27.8	25.0	27.3	-
3	12.5	9.1	-	15.8	3	22.2	10.0	13.6	16.1
4	16.7	-	-	5.3	4	5.6	10.0	9.1	6.5
5	4.2	-	-	10.5	5	11.1	5.0	-	9.7
6	-	-	-	-	6	5.6	5.0	4.5	16.1
7	4.2	-	-	-	7	-	5.0	-	-
8	4.2	-	-	10.5	8	-	-	-	3.2
9	4.2	9.1	-	5.3	9	5.6	10.0	-	-
10	-	-	-	-	10	-	-	-	-
11	-	-	-	-	11	-	-	4.5	-
12	-	-	-	-	12	-	-	-	3.2
13	-	-	-	-	13	-	-	-	-
14	-	-	-	-	14	-	10.0	-	-
15	-	-	-	-	15	5.6	-	-	-
Mode	2	2	1	1		2	2	1	1
Mean	3.2	2.4	1.1	3.1		3.8	4.3	2.2	3.1
Sample Size	24	11	8	19		18	20	22	31

Prepared by: David A. Johnson, Game Biologist III, June 14, 1974

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 5 - Yakutat

Seasons and Bag Limits

Unit 5, that portion lying west of Yakutat Bay and Hubbard Glacier	Aug. 10 - Nov. 30	One moose
Remainder of Unit 5	Aug. 10 - Sept. 30	One moose

Harvest and Hunting Pressure

Harvest data since 1962 are summarized in Appendix I. The 1973 harvest of 147 animals was the lowest on record since either-sex hunting was initiated. The harvest trend has been downward since 1969. Males constituted 64 percent (94) of the total harvest in 1973 and a kill of 51 cows was reported. The cow harvest was 40 percent less than in 1972 (85) and 56 percent less that the average for the past 11 years (115).

About 19 percent of the harvest occurred during the last 10 days of open season. The first 21 days of open season produced 19.6 percent of the harvest and the month of September produced 61.6 percent.

Sixty-five percent (96) of the moose harvested were taken from the Malaspina Forelands (the area lying west of Yakutat Bay and Hubbard Glacier) and the remaining 35 percent (51) was harvested on the Yakutat Forelands.

Of 387 hunters reporting, 38.0 percent were successful.

Composition and Productivity

Sex and age composition surveys were conducted within established count areas in November and December 1973 (Appendices II and III). These counts were the lowest ever recorded for a complete survey on the Yakutat Forelands (278 moose), while the counts on the Malaspina Forelands (219 moose) were similar to previous counts. The Yakutat Forelands ratio of 14.4 bulls:100 cows was the lowest on record. The Malaspina Forelands ratio of 32.8 bulls:100 cows also shows a downward trend. These lower ratios could be partially due to the previous disproportionate harvest of bulls. Production continues to be poor on the Yakutat side (14.9 calves/100 cows) while the Malaspina Forelands show an increase in production (30.6 calves/100 cows).

The winter of 1973-74 was moderate (20 days with snow accumulations over 30 inches) in comparison to the winters of 1971-72 and 1972-73

which were very severe. Accumulated snow depth was over 30 inches for 68 days during the 1972-73 winter and for 156 days during the 1971-72 winter. Coinciding with the severe winters of 1971-72 and 1972-73 were very low calf and bull survival ratios, as revealed by the 1972 and 1973 fall sex and age composition data.

Age structure was determined from 35.4 percent and 27.5 percent, respectively, of the Malaspina Forelands and Yakutat Forelands moose harvested. The Malaspina Forelands herd shows a high proportion of three- and four-year-old animals in both sexes, indicating a healthy herd, but also shows the loss of the yearling age class from the winter of 1971-72. The dominant age for cows on the Yakutat Forelands was seven to nine years and three to four years for bulls. The winters of 1971-72 and 1972-73 affected the age distribution by high mortality of calves, yearlings and a significant number of bulls.

Management Summary and Conclusions

Moose first emigrated to the Yakutat Forelands from Canada during the 1930's and early 1940's. The population grew slowly at first and then increased rapidly until it peaked in the early 1960's. Since then, the population has shown a downward trend toward the actual carrying capacity of the range. Fall sex and age composition surveys indicate that poor reproductive success is one of the responsible factors. The severe winters of 1971-72 and 1972-73 also had an impact on the herd. Moose browse photo-repeat stations were checked in June 1973 on the Yakutat Forelands revealing that most browse plant species have recovered from the over-utilization which was recorded during a similar survey in 1970.

The Malaspina Forelands moose population is relatively recent with the first moose being reported in this area in the late 1950's. The population increased rapidly and appears now to have approached the carrying capacity of its range. During the winter of 1971-72 most of the calf crop was lost.

Hunter take for the Yakutat Forelands in the fall of 1973 was 51 moose while a total of 278 moose were counted during the fall sex and age composition survey. On the Malaspina Forelands 96 moose were harvested and 219 moose were counted during a similar survey.

To summarize, the Malaspina moose herd has a healthy age distribution with the exception of the loss of the younger age classes during the 1971-72 winter.

The Yakutat Forelands population is now below the carrying capacity of its range and has lost two age classes and also has a preponderance of cows in the 7 to 9 year age classes. This area will have no hunting season for the fall of 1974, which could help the recruitment of new animals into this herd.

The Malaspina Forelands moose herd is utilizing much of its available habitat, weather is less severe there than on the Yakutat Forelands, and wolf predation is nonexistent. The Russell Fiord moose herd is a small herd of about 100 animals which has not yet been utilized. The Malaspina Forelands and Russell Fiord herds will be combined under one hunting season regulation in which 70 animals may be harvested during the fall of 1974.

PREPARED BY:

David A. Johnson
Game Biologist III

SUBMITTED BY:

Harry Merriam
Regional Research/Management Coordinator

APPENDIX I

Moose Harvest and Hunting Pressure - GMU 5 - Yakutat

YEAR	BULLS	COWS	UNID.	TOTAL	HUNTERS	% SUCCESS
1959	-	-	-	55	-	-
1960	87	2	-	89	150	59.3
1961	-	-	-	-	-	-
1962	175	75	-	250	263	95.0
1963	189	111	2	302	-	-
1964	153	111	-	264	408	64.7
1965	153	125	4	282	-	-
1966	116	90	6	212	315	67.3
1967	154	108	1	263	426	61.7
1968	177	133	3	313	-	-
1969	163	161	-	324	514	63.0
1970	141	140	7	288	476	60.5
1971	104	124	2	230	472	48.7
1972	76	85	1	162	389	41.6
1973	94	51	2	147	387	38.0

Prepared by: David A.Johnson, Game Biologist III, July 3, 1974

APPENDIX II

Moose Sex and Age Composition - GMU 5 - Yakutat Forelands

Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calf	Total Calf	Unid. Sex and Age	Total Sample	Count Time-Hr
9/6/59	44	37	81	-	-	-	73	154	0	24	0	178	2.5
11/60	70	9	79	75	20	4	99	178	0	28	0	206	-
11/1-3-5-6/65	127	31	158	227	70	4	301	459	0	78	0	537	13.4
10/26-29/66	210	36	246	493	82	7	582	828	0	96	0	924	-
11/29-12/1/67	100	35	135	352	77	8	437	572	2	95	0	667	6.2
12/10-12/68	122	40	162	196	105	7	308	663	2	121	193	784	8.9
11/30-12/10/69	80	14	94	390	47	5	442	536	0	57	0	593	15.8
12/4-12-15-16/70	36	15	51	105	46	12	163	214	2	72	4	290*	11.0
11/30-12/8-9/71	29	14	43	169	43	11	223	266	3	68	0	334*	7.8
11/29-30/72	19	1	20	124	11	1	136	156	0	13	0	169*	5.6
12/18-27/72** 1/4/73	-	-	-	-	-	-	-	-	1	27	355	382	12.5
11/16-18-20/73 12/14-21/73	19	12	31	184	30	1	215	246	0	32	0	278	12.6

* Only half of the area surveyed.
**No sex differentiation made.

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

APPENDIX III

Moose Sex and Age Ratios - GMU 5 - Yakutat Forelands

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Animals per Hour	Total Sample
1959	111.0	50.7	84.1	20.8	308.3	32.9	-	15.6	71	178
1960*	79.8	9.1	-	4.4	-	28.2	16.7	13.6	-	206
1961-64*	-	-	-	-	-	-	-	-	-	-
1965	52.5	10.3	24.4	5.8	79.5	25.9	5.4	14.5	40	537
1966	42.3	6.2	17.1	3.9	75.0	16.5	7.9	10.4	-	324
1967	30.9	8.0	35.0	5.2	73.7	21.7	9.4	14.2	107	667
1968	52.6	13.0	32.8	5.1	66.1	39.3	6.2	15.4	88	784
1969	21.3	3.2	17.5	2.4	49.1	12.9	9.6	9.6	38	593
1970**	31.3	9.2	41.7	5.2	41.7	44.2	20.7	24.8	26	290
1971**	19.3	6.3	48.3	4.2	41.2	30.5	20.4	20.4	43	334
1972**	14.7	.7	5.3	.6	15.4	9.6	8.3	7.7	30	169
1972***	-	-	-	-	-	-	-	7.1	30	382
1973	14.4	5.6	63.2	4.3	75.0	14.9	3.2	11.5	22	278

* Insufficient data
** Only half of area surveyed
***No sex differentiation made

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

APPENDIX IV

Moose Sex and Age Composition - GMU 5 - Malaspina Forelands

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time-Hrs.
3/61*	-	-	-	-	-	-	-	-	-	-	-	40	1.7
12/10-11/69**	55	2	57	46	14	0	60	117	0	14	0	131	4.1
12/5-6/70 **	59	39	98	82	24	15	121	219	1	55	2	276	7.3
3/10-11/70 ***	-	-	-	-	-	-	-	200	-	97	-	297	8.3
11/27-28/71	73	13	86	81	22	8	111	197	1	39	0	236	3.7
11/7-8-9/72	53	1	54	96	4	0	100	154	0	3	0	157	6.6
4/16-17-18-19/73***	-	-	-	-	-	-	-	110	-	9	-	119	12.9
11/16-18-20/73	38	6	44	100	30	4	134	178	3	41	0	219	8.4
3/1-15/74***	-	-	-	-	-	-	-	141	-	18	-	159	6.2

Moose Sex and Age Ratios - GMU 5 - Malaspina Forelands

	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1961*	-	-	-	-	-	-	-	-	24	40
1969**	95.0	3.3	3.6	1.5	28.6	23.3	0.0	10.7	32	131
1970**	81.0	32.2	66.1	14.1	141.8	45.5	38.5	19.9	38	276
1970 Spring***	-	-	-	-	-	-	-	32.7	36	297
1971	77.5	11.7	17.8	5.5	66.7	34.1	26.7	16.5	64	236
1972	54.0	1.0	1.9	0.6	66.7	3.0	0.0	1.9	24	157
1973 Spring**	-	-	-	-	-	-	-	7.6	9	119
1973	32.8	4.5	15.8	2.7	29.3	30.6	11.8	18.7	26	219
1974 Spring***	-	-	-	-	-	-	-	11.3	26	159

* Sitkagi ot Bancas Point
** Area was not completely surveyed
***No sex differentiation made

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

APPENDIX V

Moose Sex and Age Composition - GMU 5 - Russell Fiord

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time-Hrs.
11/9/72	5	1	6	10	7	0	17	23	1	8	0	31	0.30
4/29/73	-	-	-	-	-	-	-	34	-	16	-	50	0.73
12/21/73	6	2	8	13	13	7	33	41	0	27	0	68	1.00
3/15/74	-	-	-	-	-	-	-	40	-	4	-	44	0.50

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1972	35.3	5.9	20.0	3.2	25.0	47.1	0.0	25.8	103.3	31
1973 Spring	-	-	-	-	-	-	-	32.0	68.5	50
1973	24.2	6.1	33.3	2.9	14.8	81.2	35.0	39.7	68.0	68
1974 Spring	-	-	-	-	-	-	-	9.1	88.0	44

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

APPENDIX VI

1969, 1970, 1971, 1972 and 1973 Cementum Age Data - GMU 5 - Yakutat Forelands

Age Structure Given in Percentages
Calves Not Included in Mean Ages

	Males						Females			
Age	1969	1970	1971	1972	1973	Age	1969	1970	1971	1972
Calf	5.7	2.9	5.7	-	20.0	Calf	6.5	0.8	12.5	-
1	10.2	6.6	11.4	25.0	-	1	5.4	8.0	14.6	6.7
2	23.9	8.0	31.8	50.0	-	2	10.9	5.1	20.8	20.0
3	13.6	10.2	11.4	25.0	40.0	3	10.9	6.6	8.3	26.7
4	8.0	5.1	11.4	-	20.0	4	7.6	2.2	12.5	20.0
5	4.5	1.5	5.7	-	-	5	5.4	4.4	8.3	6.7
6	6.8	1.5	11.4	-	-	6	5.4	2.2	2.1	6.7
7	9.1	2.9	-	-	-	7	5.4	5.1	6.3	-
8	8.0	2.9	2.9	-	-	8	5.4	2.9	2.1	6.7
9	2.3	1.5	8.6	-	20.0	9	7.6	1.5	2.1	-
10	4.5	0.7	-	-	-	10	13.1	4.4	4.2	-
11	2.3	1.5	-	-	-	11	6.5	5.1	-	6.7
12	-	0.7	-	-	-	12	4.4	3.7	2.1	-
13	-	0.7	-	-	-	13	2.2	-	2.1	-
14	-	-	-	-	-	14	2.2	-	-	-
15	1.1	-	-	-	-	15	-	0.7	2.1	-
16	-	-	-	-	-	16	1.1	0.7	-	-
Mode	2	3	2	2	3		2-3	1	2	3
Mean	4.6	4.3	3.7	2.0	3.8		6.7	6.1	4.5	4.1
Smpl.Size	88	64	35	8	5		92	73	48	15

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

APPENDIX VII

1972 and 1973 Cementum Age Data - GMU 5 - Malaspina Forelands

Age Structure Given in Percentages
Calves Not Included in Mean Ages

	Males			Females	
Age	1972	1973	Age	1972	1973
Calf	-	-	Calf	-	6.7
1	33.3	-	1	18.7	-
2	16.7	15.8	2	12.5	13.3
3	25.0	10.5	3	25.0	20.0
4	8.3	26.3	4	12.5	26.7
5	8.3	15.8	5	12.5	13.3
6	-	21.1	6	-	6.7
7	-	5.3	7	-	6.7
8	-	5.3	8	-	-
9	8.3	-	9	6.3	6.7
10	-	-	10	6.3	-
11	-	-	11	-	-
12	-	-	12	-	-
13	-	-	13	6.3	-
Mode	3	4		3	4
Mean	2.9	4.5		4.3	4.1
Smpl.Size	12	19		16	15

Prepared by: David A. Johnson, Game Biologist III, July 3, 1974

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 6 - East of the Copper River (Martin River Area)

Seasons and Bag Limits

August 20 - November 30*	One moose by permit; conditions and number of permits will be described by Commissioner's announcement.

*Season subject to closure by field announcement.

The conditions of this permit hunt were: (1) any person could obtain a permit at the Cordova Fish and Game office from July 2, 1973 throughout the season; (2) the harvest was restricted to the taking of approximately 20 bull moose and; (3) successful hunters were required to report their kill within 5 days.

Harvest and Hunting Pressure

The 1973 harvest east of the Copper River was 17 bulls which was the smallest harvest since 1968 (Appendix I).

The season was closed by field announcement August 25, 1973. Thus, only 6 days of hunting were allowed.

The Copper River highway was open to public travel during the moose season. This allowed auto and foot hunters access to a small portion of the hunting area for the first time since 1964. Of the 17 moose taken, 4 were taken by auto and foot hunters, 5 by airplane hunters and 8 by air boat hunters.

A total of 213 persons obtained permits to hunt east of the Copper River during the 1973 season. The success ratio was 8.0%.

Composition and Productivity

Three spring surveys were flown to determine productivity and check for winter mortality. The sample sizes were too small to determine productivity. No winter mortality was noted, although brown bear predation on calves was observed.

The total extent of wolf predation on moose during the winter of 1972-73 is unknown, but 6 kills were reported to Cordova Fish and Game personnel.

A sex and age survey was flown over the Martin River count area on February 26, 1974. General survey conditions were good and 132 moose were observed (Appendix II). Bull-cow and calf-cow ratios were not obtained, but the calf percent in the herd (15.9) indicated a slightly better calf crop than the past two years. Judging by the number of bulls observed during the spring surveys, the bull-cow ratio was probably comparable to the previous year (50.7%).

Cementum age data were obtained from 14 of the 17 moose harvested. Although the sample was small, 6 of the 14 moose were yearlings, possibly reflecting good calf survival through the winter of 1972-73.

Management Summary and Conclusions

Analysis of the available data indicates a slight increase in the moose population and a slight improvement of calf production.

Predation by wolves and brown bears may have impeded the recovery of the Martin River moose population.

Recommendations

The 1974 moose season should be restricted to a limited number of bulls as was the past season.

PREPARED BY:

Julius Reynolds
Game Biologist III

SUBMITTED BY:

John S. Vania
Regional Management Coordinator

APPENDIX I

Moose Harvest, Unit 6 - East of the Copper River - Martin River Area

Year	Bulls	Cows	Unid.	Total
1965	8	0	0	8
1966	3	0	0	3
1967	14	0	0	14
1968	15	0	0	15
1969	27	7*	0	34
1970	75**	26*	0	101
1971	39*	37*	0	76
1972	34*	32*	0	66
1973	17*	0	0	17

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

** Estimated harvest. Harvest ticket data was 23 bulls.

Prepared By: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - East of the Copper River - Martin River Area

APPENDIX II

Moose Sex and Age Ratios - Unit 6 - Martin River Count Area

Year	Total 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	Twins per 100 FF w/calf	Calf % in Herd	Survey Conditions	Total Sample
1964-65							36.4	26.0	UNK	52
1965-66							20.8	31.0	UNK	93
1966-67	Z E R O	D A T A								
1967-68	76.1	37.0	93.9	15.0	103.3	70.2	25.5	28.5	UNK	207
1968-69							25.0	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	37.6	14.1	60.0	9.2	177.8	15.9	13.6	10.3	EXCELLENT	261
1972-73	50.7	17.4	52.2	10.2	171.4	20.3	0.0	11.9	GOOD	120
1972-73							0.0	14.8	EXCELLENT	135
1973-74							5.0	15.9	GOOD	132

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU - 6 - East of the Copper River - Martin River Area

Appendix II continued

Moose Sex and Age Composition - Unit 6 - Martin River Count Area

Date	LG. MM	Sm. MM	Total MM	FF W/O	Ff W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex	Total Sample	Count Time (hrs.)	Moose per Hour
12/17/64	8	6	14	0	7	4	11	25	0	15	12	52	UNK	NA
1/27/66	8	8	16	1	19	5	25	41	0	29	23	93	2.6	NA
1966-67	Z E R O		D A T A											
12/11/67	33	31	64	37	35	12	84	148	0	59	0	207	3.1	NA
1/18/69	4	3	7	0	24	9*	3 3	158	0	43	118**	201	UNK	NA
2/13/70	1	0	1	0	19	4	23	110	1	28	86**	138	4.7	NA
12/8/70	35	19	54	84	44	3	131	185	0	50	0	235	2.8	NA
12/2/71	40	24	64	148	19	3	170	234	2	27	0	261	3.1	NA
12/21/72	23	12	35	56	13	0	69	104	1	14	2	120	3.6	NA
3/16/73					19	0		115	1	20	96**	135	3.7	NA
2/26/74					19	1		111		21	91**	132	2.7	NA

* One set triplets
** Included with total adults

Prepared by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 6 - West of the Copper River

Seasons and Bag Limits

September 10-15	One moose by permit; conditions and number of permits will be described by Commissioner's announcement.

The conditions of this permit hunt were: (1) any person could apply for a permit at the Cordova Fish and Game office from July 2 through August 10, 1973; (2) a drawing for 20 permits was held August 13, 1973; (3) successful hunters were required to report their kill to Cordova Fish and Game personnel within 2 days; and (4) the harvest was restricted to bull moose only.

Also, any person under the age of 16 who had their name drawn for a permit was required to pass a firearm safety test prior to receiving a permit. One of three persons tested did not pass the test and his permit was issued to an alternate.

Harvest and Hunting Pressure

The 1973 harvest west of the Copper River was 18 bull moose. It was the smallest harvest since 1964 and was the first bull-only season since 1967 (Appendix I).

A total of 437 applications were received for the 20 permits. Eighteen of the 20 permittees hunted. Thus, the hunter success ratio was 100 percent.

Weather during the six-day season was generally good.

Composition and Productivity

A moose parturition and survival survey was flown on June 6, 1973. The number of moose observed was too small to determine calving success. No natural winter mortality was observed, although three moose were killed by poaching and one road-kill occurred during 1973.

A sex and age survey flown January 19, 1974 revealed 177 moose west of the Copper River, indicating an increase in the moose population from the previous year (Appendix II). The bull-cow and calf-cow ratios (21.4% and 36.6%) were good and must be considered conservative due to the lateness of the survey.

Cementum age data were obtained from 15 of the 18 bulls harvested (Appendix III).

Management Summary and Conclusions

The limited bull harvest for 1973 was designed to allow for an increase in the moose population by protecting the female segment of the herd. As indicated by the sex and age survey (1/19/74), the moose population west of the Copper River is back up to the desired level. Barring significant winter mortality it will be necessary to harvest 50± moose of both sexes next year to stabilize the herd at the desired level of approximately 200 countable moose.

Recommendations

Retain the present season and bag limits.

PREPARED BY:

Julius Reynolds
Game Biologist III

SUBMITTED BY:

John S. Vania
Regional Management Coordinator

Moose - Game Management Unit 6 - West of the Copper River

APPENDIX I

Moose harvest, Unit 6 - West of the Copper River

Year	Bulls	Cows	Unid.	Total
1960*	25	0	0	25
1961		NO OPEN SEASON		
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

* First harvest since introduction of moose to Unit 6.

** Estimated.

Prepared by: Julius Reynolds, Game Biologist III

Moose - Game Management Unit 6 - West of the Copper River

APPENDIX II

Moose sex and age ratios - Unit 6 - West of the Copper River

Year	Total 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	Twins per 100 FF w/calf	Calf % in Herd	Survey Conditions	Total Sample
1962-63							10.0	32.8	Unknown	67
1963-64	Z E R O	D A T A								
1964-65							18.8	31.0	Unknown	121
1965-66	Z E R O	D A T A								
1966-67	Z E R O	D A T A								
1967-68	13.5	6.8	100.0	4.5	33.3	39.0	7.1	25.6	Excellent	117
1968-69							21.9	26.3	Excellent	156
1969-70							26.3	24.9	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

Prepared by: Julius Reynolds, Game Biologist III

Moose - Game Management Unit 6 - West of the Copper River

APPENDIX II Continued

Moose sex and age compositions - Unit 6 - West of the Copper River

Date	Lg. MM	Sm. MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & age	Total Sample	Count Time (hrs.)	Moose per hour
3/15/63	1	0	1	0	18	2	20	21	0	22	24	67	2.3	NA
1963-64	Z E R O	D A T A												
12/9-10 1964	5	6	11	9	26	6	41	52	0	38	31	121	4.7	NA
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	NA
1/15-16 1969	2	2	4	0	25	7*	33	37	1	43	76	156	UNK	NA
1/17/70	4	5	9	0	28	10	38	47	1	49	97	193	3.1	NA
11/27/70	11	4	15	94	26	12	132	147	1	52	0	199	3.4	NA
11/2/71	6	9	15	82	19	12	113	128	4	47	0	175	3.5	NA
12/22/72	21	7	28	75	17	1	93	121	0	19	0	140	3.0	NA
1/19/74	16	8	24	80	23	9	112	136	0	41	0	177	2.7	NA

* Plus 1 female with 3.

Prepared by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 7 - Seward

Seasons and Bag Limits

Unit 7 only that portion which includes the drainages of Resurrection, Little Indian, Big Indian, Juneau Creek and all Chickaloon drainages	Aug. 20-Sept.10	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.
Remainder of Unit 7	Aug.20-Sept.10	One bull

Harvest and Hunting Pressure

Harvest reports indicate that hunters took 114 bulls during the 1973-74 season (Appendix I). Permit returns show 47 cows were taken. The bull harvest was down 25.9 percent from 1972 and down 28.3 percent from the previous five-year average of 159. The antlerless harvest was the largest since 1964. One hundred and ninety-one antlerless permits were issued by drawing. The permits were valid from September 1 until closure of the season by field announcement. That portion of the area including the drainages of Juneau Creek, Thurman Creek and Swan Lake upstream from its outlet was closed on September 7. The remainder of the antlerless hunt area was closed September 23. Sixty percent (28/47) of the antlerless harvest came from the Juneau Creek, Trout Lake and Swan Lake area and 36 percent (17/47) from the remainder of the open area. Location of kill information was unavailable for 4 percent (2/47) of the harvest.

Harvest reports show hunter success in 1973 was 20.2 percent (157/779), down from 22.6 (176/780) in 1972.

Composition and Productivity

Sex and age composition surveys (Appendix II) were conducted over all of Unit 7 except count areas 2,3,4,7 and 19. Data from count areas not regularly surveyed are not included in the appendix because comparable data are not available. Composition data for areas not regularly surveyed are available in the Big Game Index File.

The bull/cow ratio for the aggregate of count areas 5-6, 8-10, 12, 20 and 21 increased from 12.2 in 1972 to 13.9 in 1973 (a 13.9% increase); calves per 100 cows decreased 5.5 percent from 29.3 to 27.7. Calf production has fluctuated with no apparent trend and the 1973 level of 27.7 calves per 100 cows was only slightly below the average for the preceding five years (28.1). The bull/cow ratio of 13.9 was 12 percent below the average for the preceding five years (15.8).

Since Unit 7 contains numerous subpopulations of moose in areas of varying habitat, more meaningful insight into population composition changes can be had by referring to individual count area changes (Appendices IV and V).

Count areas 5 (Placer River) and 6 (Twenty-Mile River) have consistently yielded the highest calf/cow ratios in the unit since 1972. Calf production dropped in both count areas in 1973 but continued to be high at 62.3/100 and 41.8/100, respectively. Count area 10 (Resurrection Creek) and count areas 8, 9, 20 and 21 combined (Little Indian Creek, Big Indian Creek, Chickaloon River and Mystery Creek) continue to yield the lowest calf/cow ratios with 19.9/100 and 20.0/100, respectively. Calf production was down 7.9 percent at 19.9 calves per 100 cows in count area 10 and up 19.0 percent at 20.0 calves per 100 cows in count areas 8, 9, 20 and 21 combined. Count area 12 (Juneau Creek) continued to be intermediate in calf production with 25.4 calves per 100 cows down 7.6 percent from 1972.

Age data from 34 cows, taken during the 1973 season, are presented in Appendix VI. The sample is too small for confident analysis.

Management Summary and Conclusions

The 25.9 percent decline in the bull harvest from 1972 was in part due to the greatly shortened season. Little change in the bull/cow ratio suggests that bulls were harvested at about the level of recruitment. Since the bull harvest was down considerably from 1972 it appears that calf survival through the winter of 1972-73 was not good, however, there were no quantitative data upon which to base such a conclusion.

As in 1972, the majority of the antlerless harvest came from the Juneau Creek drainage even though the season was closed September 7. In the future it will be necessary to divide this area into two hunting areas.

Recommendations

It is recommended that the season be shortened to September 1 - September 10.

PREPARED BY:

Paul A. LeRoux
Game Biologist III

SUBMITTED BY:

John S. Vania
Regional Managment Coordinator

MOOSE -GMU 7 - SEWARD

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 7

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	*	*	*		
	2nd	*	*	*	*		
	Comb.	60	1	0	61	*	*
1966	1st	*	*	0	*		
	2nd	*	*	0	*		
	Comb.	112	1	0	113	445	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	20.6[4]

* Data 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

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX II

Moose Sex and Age Composition - Unit 7

Year	Lg. MM	Sm. MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Ad.	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose Per Hour
1966*														
1967	32	19	51	122	50	7	179	230	0	64	3	297	3.40	87
1968 11 & 12/68 2/8/69	45	27	72	346	156	8	510	582	3	175	35	792	14.75	74
1969 11/12 12/13 1/2/70	22	9	31	217	67	15	299	330	3	100	0	430	8.15	53
1970 11/19-24 12/1-2	94	56	150	586	160	11	757	907	1	183	0	1090	12.4	88
1971 11/1-4	132	84	216	782	163	17**	962	1178	6	204	11	1392	15.7	88.5
1972 11/29-12/2	66	15	81	487	165	14	666	747	2	195	0	942	14.8	63.6
1973	69	16	85	455	149	6	610	695	8	169	2	866	13.7	63.2

* Data not available
** Includes one set of triplets

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX III

Moose Sex & Age Ratios - Unit 7

Year	Total MM per 100FF	Sm. MM per 100FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF W/Calf	Calf % in Herd	Count Areas	Animals Per Hour	Total Sample
1966	16.4	5.6	220.2	3.7	67.8	32.0	7.8	18.7	All	--	740
1967	28.5	10.6	59.4	6.4	59.4	35.8	12.3	21.5	10 & 6	87.0	297
1968	14.4	5.4	60.0	3.7	32.9	32.7	4.0	22.2	1,4,5,6,8,9,10 13,14,20	54.9	792
1969	10.3	3.0	40.9	2.1	18.0	33.3	18.3	23.2	5,6,8,9,12,20	51.8	430
1970	19.8	7.4	59.5	4.5	61.5	24.1	6.4	14.4	5,6,10,12,8,9 20,21	87.0	1090
1971	22.5	8.7	63.6	6.4	83.2	21.2	9.4	14.7	5,6,10,12,8,9 20,21	88.5	1392
1972	12.2	2.3	22.7	1.6	15.4	29.3	7.8	20.7	5,6,10,12,8,9 20,21	63.6	942
1973	13.9	2.6	23.2	1.9	18.9	27.7	3.9	19.6	5,6,10,12,8,9 20,21	63.3	866

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX IV

Moose Sex and Age Composition by Trend Area for 1970-72 - Unit 7

Trend Area	Year	Lg. MM	Sm. MM	Tot. MM	FF W/0	FF W/1	FF W/2	Total Cows	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time	Moose per Hour
5	11/24/70	5	1	6	58	21	5	84	90	0	31	0	121	1.2	100
5	11/1/61	1	4*	5	47	34	7	88	93	0	48	0	141	2.0	70.5
5	12/1/72	0	2	2	25	29	7	61	63	0	43	0	106	3.33	76.3
5	11/27/73	3	2	5	24	28	1	53	58	3	33	0	91	1.4	63.6
6	11/24/70	1	1	2	67	27	2	96	98	0	31	0	129	1.0	129
6	11/1/71	2	6*	8	55	11	6**	72	80	0	24	0	104	1.67	62.3
6	12/1/72	3	3	6	61	33	5	99	105	0	43	0	148	3.33	76.3
6	12/27/73	2	1	3	49	27	3	79	82	0	33	0	115	1.25	92.0
10	11/23/70	45	24	69	194	40	2	236	305	1	45	0	350	3.8	92
10	11/3/71	38	55	93	213	37	1	251	344	0	39	3	386	4.75	81.3
10	11/29/72	19	2	21	129	32	1	162	183	1	35	0	218	4.0	54.5
10	11/30/73	25	7	32	167	32	2	201	233	4	40	0	273	3.9	69.8
12	11/19/70	14	18	32	157	52	1	210	242	0	54	0	296	3.4	87
12	11/3/71	10	6	16	113	42	2	157	173	3	49	0	222	2.08	106.7
12	11/29/72	5	6	11	112	40	1	153	164	0	42	0	206	3.08	66.9
12	11/28/73	14	3	17	107	35	0	142	159	1	36	0	195	2.43	80.2
8,9 20,21	11/2/70	29	12	41	110	20	1	131	172	0	22	0	194	3.0	65.0
8,9 20,21	11/3-4/71	81	13	94	354	39	1	394	488	3	44	8	540	5.2	103.8
8,9 20,21	11/29-12/2/72	39	2	41	160	31	0	191	232	1	32	0	264	4.4	59.9
8,9 20,21	11/28-30/73	25	3	28	108	27	0	135	163	0	27	2	192	4.7	40.9

* Small bulls not properly identified
** Includes one set of triplets

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX V

Moose Sex and Age Ratios by Trend Area for 1970-72 - Unit 7

Year	Total MM per 100 FF	Sm. MM per 100 FF	Sm. MM per Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Count Area	Animals per Hour	Total Sample
1970	7.1	1.2	20.0	0.8	6.7	36.9	19.2	25.6	5	100.0	121
1971	5.7	*	*	*	*	54.5	17.1	34.0	5	70.5	141
1972	3.3	3.3	--	1.9	9.3	70.5	19.4	40.6	5	76.3***	106
1973	9.4	3.8	66.7	2.2	12.1	62.3	3.4	36.3	5	63.6	91
1970	2.1	1.05	100.0	0.8	6.7	32.3	6.9	24.0	6	129.0	129
1971	11.1	*	*	*	*	33.3	35.3**	23.1	6	62.3	104
1972	6.1	3.03	100.0	2.0	14.0	43.4	13.2	29.1	6	76.3***	148
1973	3.8	1.3	50.0	0.9	6.1	41.8	10.0	28.7	6	92.0	115
1970	29.2	10.2	53.3	6.8	88.9	18.0	4.8	12.8	10	92.0	350
1971	37.2	*	*	*	*	15.5	2.6	10.1	10	81.3	386
1972	13.0	1.2	10.5	0.9	11.4	21.6	3.0	16.1	10	54.5	218
1973	15.9	3.5	28.0	2.6	35.0	19.9	5.9	14.7	10	69.8	273
1970	15.2	8.6	128.0	6.1	66.7	25.7	1.9	18.2	12	85.0	296
1971	10.2	3.8	60.0	2.7	24.5	31.2	4.5	22.1	12	106.7	222
1972	7.2	3.9	120.0	2.9	28.6	27.5	2.4	20.4	12	66.9	206
1973	12.0	2.1	21.4	1.5	16.7	25.4	0.0	18.5	12	80.2	195
1970	31.3	9.2	41.4	6.2	109.1	16.8	4.8	11.3	8,9,20,21	65.0	194
1971	23.9	3.3	16.0	2.5	59.0	11.2	2.6	8.3	8,9,20,21	103.7	540
1972	21.5	1.1	5.1	0.8	12.5	16.8	0.0	12.1	8,9,20,21	59.9	264
1973	20.7	2.2	12.0	1.6	22.5	20.0	0.0	14.2	8,9,20,21	40.9	192

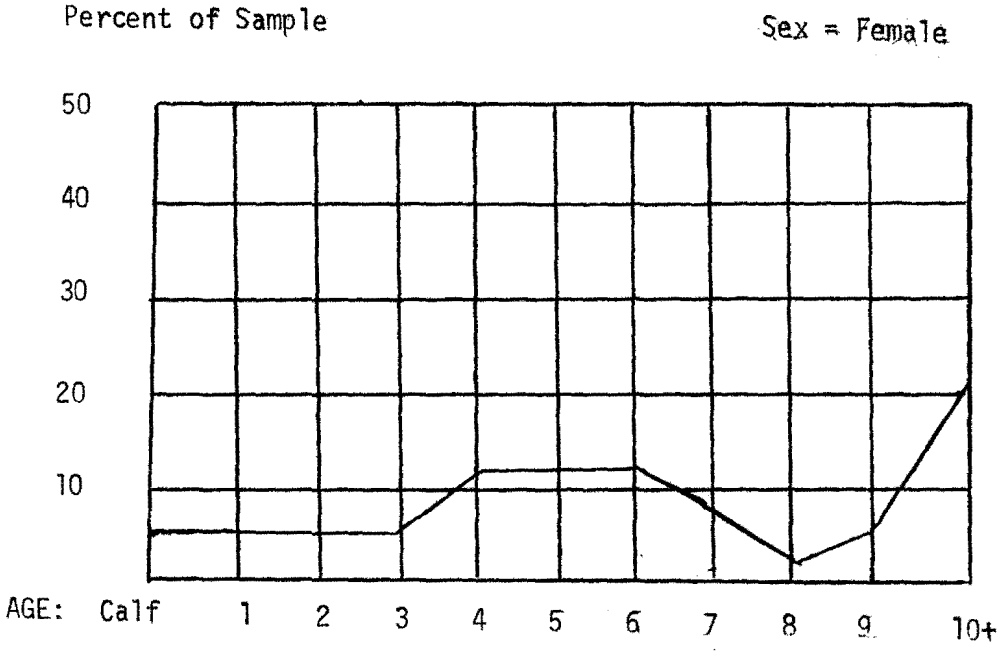
* Small bulls not properly identified
** Includes one set of triplets
*** Count areas 5 and 6 combined and totals divided by total count time.

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX VI

Age Structure of the Antlerless Harvest 1973-74 Season.



Sample Size = 34
Mean Age = 6.6
(exclude calves)
% Over 6 Years = 41.2

AGE	#	%
Calf	2	5.9
1 -	2	5.9
2 -	2	5.9
3 -	2	5.9
4 -	4	11.8
5 -	4	11.8
6 -	4	11.8
7 -	3	8.8
8 -	1	2.9
9 -	2	5.9
10 -	2	5.9

AGE	#	%
11 -	4	11.8
12 -	0	0
13 -	1	2.9
14 -	0	0
15 -	0	0
16 -	1	2.9
17 -	0	0
18 -	0	0
19 -	0	0
20 -	0	0
TOTAL	34	100.1

That portion of Unit 7 drained by Juneau Creek, Juneau Lake, Trout Lake, Thuman Creek, and Swan Lake upstream from its outlet was open Sept. 1-7.

The remaining portion of the antlerless hunt area was open from Sept. 1-23.

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 9 - Alaska Peninsula

Seasons and Bag Limit

August 20 - December 31	Two moose; provided that only one moose may be an antlered bull.

Harvest and Hunting Pressure

A record harvest of 839 moose was reported from Unit 9 in the 1973 season (Appendix I). This harvest represents a 51 percent increase over that of 1972, and a 92 percent increase over the mean reported harvest for the past five years. In numbers, the harvests of both sexes were at record highs. The bull take was 176 percent over the previous 5-year mean reported harvest; the cow harvest was 238 percent over the 5-year mean. Reporting residents took 469 moose (59.9 percent), and 90.2 percent of the harvest occurred prior to November 1.

A limited sample of 41 bull moose (five years old or older) from the unit averaged 198 points with the Boone and Crockett system. The majority of these moose were five or six years of age, with the oldest being ten years old. The largest mean score (207 points) occurred in the seven year age class, and the largest antlers measured (from a nine-year-old bull) scored 232 points. The small size of the sample precludes making definite conclusions concerning the age-trophy score relationship of Alaska Peninsula moose.

Composition and Productivity

A total of four spring calving surveys were flown in 1973 (Appendix II). As in past years, calf/cow ratios peaked in early June and were soon followed by a decline. Calf/cow ratios obtained from the fall sex and age class surveys (Appendices III and IV) support the spring data. The overall fall ratio of 8.6 calves per 100 cows was the lowest recorded since such data were first obtained in 1962 (Appendix V). This was the Peninsula's fourth year of poor calf production.

Fall sex and age composition data indicated a continuing decline in bull/cow ratios. The most marked decrease occurred in the Katmai trend area which dropped from 79 bulls per 100 cows in 1972 to 43 bulls per 100 cows in 1973. The late timing of the surveys (early December) may have allowed shed-antlered bulls to bias the data. However, the data are thought to accurately reflect the volume of hunting which occurred within the one trend area inside Katmai National Monument.

The overall bull/cow ratio of 30.5 bulls per 100 cows is lower than would have been the case had more lightly hunted trend areas been surveyed. Sport hunting on the Alaska Peninsula is continuing to alter the bull/cow ratio in almost all areas.

Management Summary and Conclusions

The hunting force afield during the 1973 moose season was the greatest in the unit's history (Appendix I). Most of the increase resulted from residents of other areas of the state coming to the Alaska Peninsula to hunt. The increase in resident hunters developed in response to high meat prices and restrictive seasons and bag limits on moose and caribou in the game management units readily accessible to their homes. The unit's liberal bag limit and high hunter success were the primary incentives responsible for attracting additional hunters.

The large amount of "meat" hunting had a marked effect upon the unit's nonresident guide industry. The pressure from residents fell primarily into the central Peninsula area making it difficult for guides in these areas to produce acceptable trophies for their clients. In response, some guides shifted their operations to the Pacific drainages or northward to the areas around Iliamna Lake and Katmai National Monument. That a few unethical guides turned to hunting within the boundaries of the Monument was evident during the season and was confirmed by the Katmai trend area data.

Recommendations

No changes should be made in the season dates. Antlered bulls should not be hunted the same day the hunter is airborne, and the bag limit should be reduced to one moose.

PREPARED BY:

James B. Faro
Game Biologist III

SUBMITTED BY:

John S. Vania
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	1175	71.4

PREPARED BY: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

Mother Goose to Dog Salmon

APPENDIX II

Moose Productivity, Unit 9 - Alaska Peninsula 1973

Date	Calves per 100 FF	Calves per 100 FF and Yearlings	Percent FF with Calves	Percent FF with Twins	Total Sample
May 28	13.1	10.1	8.2	60.0	105
June 3	40.0	30.6	25.3	57.9	156
June 8	25.0	19.4	16.7	50.0	250
June 14	15.2	13.0	10.5	45.5	187

	Total Calves	Total Cows & Yearlings	Total Cows	Total Cows w/Twins
May 28	8	79	61	3
June 3	30	98	75	11
June 8	33	170	132	11
June 14	16	123	105	5

PREPARED BY: James B. Faro, Game Biologist III

APPENDIX III

Moose Sex and Age Ratios, 1973 - Alaska Peninsula - Unit 9

Area	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Sm. 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
Mother Goose	24.0	5.6	30.3	4.2	133.3	8.4	16.7	6.3	113.3	238
Patch	15.6	4.6	41.7	3.7	111.1	8.3	14.3	6.7	270.0	135
Katmai	43.0	3.5	8.9	2.2	53.3	13.2	7.1	8.4	61.4	178
Ugashik	45.7	8.7	23.5	5.8	400.0	4.3	-	2.9	23.0	69
Meshik	47.4	5.3	12.5	3.5	400.0	2.6	-	1.8	30.0	57
TOTALS	30.5	5.1	20.3	3.7	119.0	8.6	11.1	6.2	65.1	677

PREPARED BY: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX IV

Moose Sex and Age Composition - Unit 9 - 1973

Area	Date	Lg. MM	Sm. MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Total Calves	Unid. Sex & Age	Total Sample
Mother Goose	Dec. 9	33	10	43	167	10	2	179	222	15	1	238
Patch	Dec. 9	12	5	17	102	6	1	109	126	9	0	135
Katmai	Dec. 10	45	4	49	100	13	1	114	163	15	0	178
Ugahik	Dec. 11	17	4	21	44	2	0	46	67	2	0	69
Meshik	Dec. 14	16	2	18	37	1	0	38	56	1	0	57
TOTALS		123	25	148	450	32	4	486	634	42	1	677

PREPARED BY: James B. Faro, Game Biologist III

APPENDIX V

Moose Sex and Age Ratios - Unit 9

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per. 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Sample
Nov., 1962	99.4	19.0	23.6	8.2	115.2	33.0	24.4	14.2	91.0	1,113
Nov., 1963	62.1	11.9	23.7	6.4	97.5	24.4	17.5	13.1	104.0	1,852
Nov., 1964	67.8	11.8	21.2	6.4	137.7	17.2	9.9	9.3	146.0	1,312
1965*	-	-	-	-	-	-	-	-	-	-
Nov., 1966	73.5	13.9	23.3	6.6	85.9	32.4	16.3	15.4	96.0	786
Oct., 1967	73.0	14.0	23.0	7.0	121.0	24.0	30.0	12.0	89.0	1,447
Oct., 1968	63.3	9.1	15.7	4.8	84.7	21.3	19.1	11.1	163.9	1,619
Nov., 1969	53.9	18.7	52.9	10.3	148.8	25.1	14.1	13.9	65.0	620
Nov. & Dec., 1970	44.9	14.7	48.7	9.4	118.8	12.4	11.3	7.9	93.2	1,016
Oct. & Nov., 1971	46.8	11.2	31.6	7.1	219.7	10.2	4.5	6.5	105.9	1,091
Nov. & Dec., 1972	51.0	11.8	30.1	7.1	170.0	13.9	6.8	8.4	91.3	954
Dec., 1973	30.5	5.1	20.3	3.7	119.0	8.6	11.1	6.2	65.1	677

* Sex and age composition counts were not conducted in 1965.

PREPARED BY: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

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

Seasons and Bag Limits

Unit 11, that portion east of the east bank of the Copper River upstream from the Slana River confluence, Tanada Creek, Tanada Lake, and the headwaters of Goat Creek to the Unit 12 boundary.	Aug. 20-Oct. 7 Nov. 1-Nov. 30	One moose; provided that bull moose only may be taken from Aug. 20-Sept. 30 and from Nov. 1-Nov. 30 and only antlerless moose may be taken from from Oct. 1-7.
Remainder of Unit 11	Aug. 20-Sept. 30 Nov. 1-Nov. 30	One moose.

During 1960 and 1961, the season was Aug. 20-Sept. 30 and Nov. 1-30 for one bull only. In 1962, a cow season of Oct. 1-Nov. 30 was added to the existing bull season. From 1963 through 1971, the season and bag limit was changed to one moose from Aug. 20-Sept. 30 and Nov. 1-30. The 1972 season was the same as is described above for 1973.

Harvest and Hunting Pressure

Harvest report data for Unit 11 are summarized in Appendix I. The annual harvests and sex composition of the harvests fluctuate without apparent trend. However, the number of hunters has been increasing with a consequent decline in hunter success.

The harvest data are further collated in Appendix II to provide a more detailed analysis. The following description of the Unit 11 harvesting pattern for the past 5 years is based on these data plus other relevant information. Successful hunters in Unit 11 have been roughly divisible into those who used ground vehicles and hunted along the Nabesna Road (mainly Alaskan residents) and those who used aircraft and hunted in the remainder of Unit 11. A large percentage of the aircraft users were nonresidents, and they were often guided or used air taxi operators with a resulting higher probability of success. Hunting pressure along the Nabesna Road has continuously increased during the 1960's, partly due to good hunting opportunities provided by both moose and caribou wintering in the area. Hunters have reported that moose were commonly seen along the Nabesna Road during the mid-1960's in late fall and early winter. The Nabesna Road was not kept open during winter prior to 1970, although

it has since been kept open. Consequently, moose movements into lower elevations during November, coupled with increased hunter access during 1970, resulted in a high harvest. Subsequent harvests along the Nabesna Road have decreased, fewer hunters using highway vehicles were successful, and an increasing percentage of successful hunters used ORV's or snow machines. Local pilots reported that once numerous moose herds around Tanada Lake were quickly reduced as use of snow machines increased (Bill Barnhardt, Windy Wendell, and Red James, personal communications). With closure of the Nabesna Road to hunting during November 1972, more ORV and snow machine users crossed upper Tanada Creek to hunt in the Upper Copper River and Drop Creek vicinity. As hunting pressure spread peripherally away from the road, fewer moose were available closer to the Nabesna Road. A check station was established along the Nabesna Road during October 1-7, 1973. Of 372 hunters interviewed, only 21 percent of the hunting parties saw a moose, and hunter success was only 6.5 percent. It is clear that improved access and transportation means available to hunters, especially since 1970, have resulted in high harvests, initially close to the road and subsequently spreading to more distant areas. There has been a resultant decreasing availability of moose to hunters.

Composition and Productivity

Composition data from various count areas in Unit 11 are presented in Appendix III. Perhaps the most significant aspect of the Mt. Drum composition data is the marked decrease in calf:cow and small bull:cow ratios since 1960. Although natality and calf survival have been low on Mt. Drum in recent years, the relatively low hunting pressure prior to 1972 (Appendix II) had not caused any marked changes in moose per hour values or sample sizes. There was an abrupt increase in hunting pressure on Mt. Drum and in the Chitina Valley during 1973 and a subsequent drop in moose per hour and sample size values for the Mt. Drum count area. It is possible, however, that low sample sizes for the Nabesna Road and Mt. Drum count areas during 1973 were the result of atypical moose distributions and poor counting conditions.

The composition data for the Nabesna Road vicinity show decreasing sample sizes and moose per hour values over a period of years. The number of calves born and surviving has declined since 1965. These changes are expected in view of the history of hunting pressure in the area.

A new count area was established in the Chitina Valley during 1973. The area is lightly hunted at present but is known to guides and air taxi operators. Of 107 moose counted, only one calf was seen.

These combined data indicate low birthrates or poor calf survival in Unit 11. Where hunting pressure was light, moose abundance was apparently stable or slowly decreasing. Where moose removal by harvesting was high, replacement of losses was so low that moose numbers declined rapidly.

Management Summary and Conclusions

Liberal bull and cow seasons have been in effect in Unit 11 since 1962. Winter road maintenance and increasing use of off-road vehicles including snow machines along the Nabesna Road have resulted in high harvests. Because of the low rate of replacement of losses, moose numbers have been declining rapidly along the Nabesna Road. Decreasing calf-cow ratios have existed in the Mt. Drum count area since 1960. Because hunting pressure has been relatively low and because both bulls and cows have been harvested (resulting in relatively healthy bull:cow ratios), the composition data do not reflect much impact from hunting. An increasing number of hunters from Southcentral Alaska will probably focus on Unit 11 as a hunting area in the future because of its moderately abundant moose herds and liberal seasons. However, recruitment is low and is not responding to decreasing moose density. An increase in harvests cannot be justified.

The moose situation in Unit 11 is similar to that of Unit 13, and programs in progress and proposed for Unit 13 will also largely apply to Unit 11. In Unit 11, however, low bull:cow ratios are not a potential cause of low conception rates, and there are fewer reports of grizzly bears and grizzly bear predation. Wolf predation on calves and some nutrition related problems are the more probable causes of sustained low natality or calf survival. However, if it is a range problem, it is difficult to explain the fact that calf:cow ratios have declined in most count areas in Units 11 and 13, encompassing diverse habitat types, at roughly the same period. Yet, there is a very good inverse correlation between wolf abundance and observed calf:cow ratios. On the other hand, some observations indicate that calf:cow ratios may be low as early as June. It is difficult to visualize the impact of wolf predation being felt so quickly.

Recommendations

The seasons and bag limits in the Nabesna Road portions of Units 11 and 12 should be restricted and continue to correspond.

A bull only season of Aug. 20-Sept. 20 for all of Unit 11 would probably be safely conservative until intensive management programs are adopted. Such a season would correspond to the current season in Unit 13 and would reduce the tendency of hunters to concentrate in areas where seasons are unique and more liberal.

The intensive management programs proposed for Unit 13 should also be adopted in Unit 11. Investigative programs proposed for Unit 13 should also apply to Unit 11. A solution to the low natality or poor calf survival is urgently needed.

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SUBMITTED BY:

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Regional Management Coordinator

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 11

Year	Harvest				Hunters	Percentage Success
	Male	Female	Unid.	Total		
1963	86	37	0	123		
1964	89	38	0	127		
1965	116	70	2	188		
1966	89	69	5	163	263	62
1967	108	70	2	180	317	57
1968	99	34	8	141	293	48
1969	101	59	2	162	378	43
1970	126	115	1	242	562	43
1971	90	89	2	181	546	33
1972	86	55	5	146	525	28
1973	105	77	5	187	594	31

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APPENDIX II

A comparison of Moose Harvest Data for Unit 11.

	1969	1970	1971	1972	1973
Harvest from Nabesna Road Vicinity[a]:	93	161	105	82	46
Harvest from Ramainder of Unit 11[a]:	36	43	36	43	101
Ratio, Nabesna Road: Remainder of Unit 11 harvest[a]::	2.6:1	3.7:1	2.9:1	1.9:1	0.46:1
Transportation Means[b],					
Airplane:	19%	12%	22%	20%	46%
ORV + snow machine:	29%	52%	49%	64%	30%
Afoot + highway vehicle:	38%	25%	18%	13%	12%
Other:	14%	11%	11%	3%	9%
Sample Size:	159	238	175	141	195
Percentage of Harvest Taken during November season[c]:	28%	58%	65%	77%	43%
Residents,					
Successful:	103	165	137	117	142
Total Hunters:	268	417	467	449	512
Success:	38%	40%	29%	26%	28%
Nonresidents,					
Successful:	30	24	37	17	35
Total:	37	40	65	52	55
Success:	81%	60%	57%	33%	64%
Ratios[d],					
Resident:Nonresident Hunters::	7.2:1	10.4:1	7.2:1	8.6:1	9.3:1
Resident:Nonresident Harvest::	3.4:1	6.9:1	3.7:1	6.9:1	4.1:1
Resident:Nonresident Success::	0.47:1	0.67:1	0.51:1	0.79:1	0.44:1

a. Based only on hunters specifying a location of kill.

b. Based only on successful hunters specifying one or more transportation means; all transportation means included in combinations were tallied.

c. Based only on hunters specifying a date of kill.

d. Based only on hunters specifying whether residents or nonresidents.

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APPENDIX III

A Comparison of Moose Sex and Age Composition Data

Year	Large Males per 100 Females	Small Males per 100 Females	Calves per 100 Females	Moose per Hour	Sample Size
Mt. Drum Count Area					
1955*	116	29	36	75	300
1956*	130	15	30	54	55
1957*	64	7	39	92	92
1958*	128	12	34	94	291
1960*	64	16	36	48	110
1965*	55	25	19	81	269
1967	62	10	29	117	456
1969	54	11	28	85	299
1970*	46	15	14	59	199
1972	46	5	10	69	250
1973	66	6	12	25	97
Nabesna Road Count Area					
1965*	22	20	39	52	83
1968*	14	5	12	44	140
1971	11	0	24	20	50
1972	0	7	19	16	39
1973	--**	--**	--**	5	15
Chokosna River Count Area, Chitina Valley					
1973	42	7	1.4	46	107

* Area boundary change.
** Data of no value because of small sample size.

Prepared by: Carl McIlroy, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 12 - Upper Tanana River

Seasons and Bag Limits

Aug. 20 - Oct. 7 Nov. 1 - Nov. 30	One moose, provided that bull moose only may be taken from Aug. 20 - Sept. 30 and from Nov. 1 - Nov. 30 and only antlerless moose may be taken from Oct. 1 - Oct. 7.

Harvest and Hunting Pressure

The following table summarizes the annual Unit 12 moose harvest since harvest tickets were initiated in 1963:

Year	Male	Female	Unknown	Total
1963	138	22	1	161
1964	145	16	0	161
1965	151	33	6	190
1966	156	19	7	182
1967	136	42	4	182
1968	132	30	2	164
1969	125	29	4	158
1970	110	26	3	139
1971	107	45	0	152
1972	137	7	1	145
1973	131	56	6	193

Resident hunting success during the 1973 season was 22.5 percent, an increase from 1972's 14.9 percent, while nonresident success declined from 8.1 percent in 1972 to 6.3 percent in 1973. A total of 654 hunters reported hunting in Unit 12. The 1973 moose harvest was the largest recorded for Unit 12, representing a 13 percent increase over the 10-year average of 167 animals. Harvest data by drainage, sex, season and transportation mode of hunter are presented in Appendices I-IV.

The harvest of 56 antlerless moose, 29 percent of the total harvest, represents a 93 percent increase over the past 9-year average of 29 animals (excludes 1972 when female harvest statistics are suspect).

The November harvest of 36 animals accounted for 18.6 percent of the total, a slight increase over the past 4-year average of 18 percent, but less than 1972 when 33 percent of the harvest occurred during November.

The Tok River drainage (along the Tok-Slana Highway) produced 46 percent of the harvest, followed by the Nabesna River (Nabesna Road area) with 23 percent and the Tanana River (Alaska Highway area)

with 13 percent. The Chisana and White Rivers produced four and one percent, respectively, while the kill location of the remaining 13 percent was unreported. The Tok River drainage produced most of the antlerless harvest with 61 percent of the antlerless kill coming from there. The Nabesna drainage produced 21 percent of the antlerless harvest followed by the Tanana drainage with 7.3 percent.

In view of the overall increase in moose hunting effort observed in Unit 12 during 1973, it is surprising that the November harvest declined.

Composition and Productivity

Aerial composition counts conducted during late October in the Tok River drainage indicated a calf/cow ratio of only 15:100, the lowest that has been recorded for this area since annual surveys began in 1968. Total numbers of moose generally appeared moderate, except for areas adjacent to the road system, and the bull:cow ratio remained at 16:100, which should be adequate for reproduction.

The Little Tok drainage was surveyed during late October, the first survey conducted there since 1968. Except for a decline in the number of moose seen per hour of flying, the data gathered closely resembled those obtained in 1968. The discrepency in moose/hour figures is possibly due to the intense coverage given to areas close to the road system which contain few moose. This intense coverage was not given in 1968.

Survey data since 1968 for the Tok-Dry Tok Rivers are summarized below:

Year	Calves:100 Cows	Moose/Hour	Bulls:100 Cows	Sample Size
1968	39	52	26	154
1969	23	60	25	179
1970	31	126	6	175
1971	16	126	6	247
1972	19	114	16	227
1973	15	137	16	219

Survey data for the Little Tok River are summarized below:

Year	Calves:100 Cows	Moose/Hour	Bulls:100 Cows	Sample Size
1968	12	114	34	151
1973	11	41	27	154

Range and Habitat

Five snow measuring stations were established in 1971 along the Tok-Slana Highway in Unit 12 and snow depths were measured periodically at the stations throughout the winter. Though snow measurements from only one year may have little application, when compared over several years they show comparative differences which may partially indicate the severity of the winter so far as food-gathering conditions for moose are concerned.

Browse utilization plots were established along the same route as the snow depth measurement stations. Browse utilization was classified as light, moderate or heavy. Green leaf willow (*Salix pulchra*) and felt leaf willow (*Salix alaxensis*) are the primary indicator species. When snow depth along the highway exceeds two feet, moose are forced to the valley floor and if this movement takes place before mid-December, browse utilization is about 100 percent (all available twigs show use). Timing of the migration to winter range as well as moose population size appear to dictate winter range utilization.

During winter 1973-74 snowfall was light, measuring less than two feet along the valley floor throughout the winter. Most moose remained in the foothills through the winter. Browse utilization on critical winter range in the Tok River valley was considered to be moderate.

Population Trends

Moose populations in the Nabesna Road portion of Unit 12 are low and require increased protection. Composition counts in the Jack Creek drainage were attempted during November, but were unsuccessful because of the low number of moose sighted.

Low moose populations, or apparent low numbers of moose visible along road systems, continue to be a source of concern to some of the public. It would be desirable to provide a greater number of viewable moose for the public, and consideration should be given to the means available to attain this goal.

Aerial surveys were attempted during March in the Tok River valley, to obtain data for trend counts, but moose were distributed throughout heavy spruce timber and the surveys were unsuccessful.

Data gathered during fall sex and age composition surveys indicate that overall moose populations in the Alaska Range and along the Tok River have undergone little numerical change during the past five years. While total moose numbers do not appear to be declining, neither are they increasing. Moose populations are sparse along roadsides, however. This may be attributed to several factors, including marginal habitat and excessive hunting pressure.

Moose are more numerous in relatively inaccessible areas in the Alaska Range and along the Little Tok and Dry Tok Rivers. These populations are experiencing an increasingly larger annual harvest due to improved hunter transportation equipment and may be approaching the desired annual harvest level.

Management Summary and Recommendations

Low calf survival prevails throughout most of Unit 12. Larger harvests should not be allowed until calf survival improves. Areas which support most of the harvest do not appear to have higher calf

survival and conversely appear to have lower moose densities. It appears that fall calf:cow ratios in the range of 15-20:100 are about the maximum that can be expected in Unit 12 under present conditions. Causes of continued poor survival are unknown, but may relate to predation and unfavorable range conditions, among other things. There is some indication that the apparent stable moose harvest in Unit 12 is not a result of stable moose populations as had been formerly assumed, but rather of hunter egress into formerly unhunted or lightly hunted areas. Recent increased use of all-terrain vehicles has allowed access into regions formerly considered inaccessible. The Little Tok River is a good example of a formerly lightly hunted area absorbing an increasingly large share of the Unit 12 harvest, while sections closer to the road system appear to be experiencing a declining share of the harvest.

Because of the current low calf survival rate, it is doubtful that recruitment is sufficient to maintain the present population level in the areas supporting the majority of the Unit 12 harvest. Harvest levels should not be allowed to increase in the Tok River and Alaska Range portions of Unit 12.

To compensate for anticipated increases in hunting pressure, further season restrictions may be necessary in 1975. In addition, it may be desirable to more closely align Unit 12 seasons with those in Units 11 and 13 to avoid excessive hunting pressure during times when Units 12 and 20 are the only units open for moose hunting along the road system. The season restrictions recently imposed along the Nabesna Road should continue until moose populations have recovered.

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Appendix I. Annual harvest by drainage.

Drainage	YEAR 69	70	71	72	73
Tanana River	29	30	29	23	26
Tok River	48	24	40	38	88
Nabesna River	45	50	52	50	44
Chisana River	9	8	2	3	7
White River-Beaver Creek	6	4	7	4	3
Unknown	21	23	22	27	25
Total	158	139	152	145	193

Appendix II. Sex composition of harvest by drainage.

Drainage	Male	Female	Unknown	Total
Tanana River	22	4	0	26
Tok River	50	34	4	88
Nabesna River	31	12	1	44
Chisana River	6	1	0	7
White R.-Beaver Creek	3	0	0	3
Unknown	19	5	1	25
Total	131	56	6	193

Appendix III. Annual harvest by season.

Year	No. Hunters Reporting	Harvest 1st Season	Harvest Nov. Season	Total
1969	408	152	6	158
1970	368	117	22	139
1971	444	123	29	152
1972	554	98	47	145
1973	654	137	36	193

November harvest data are not available prior to 1969.

Appendix IV. Transportation mode utilized.

Transportation Mode	Number Reporting Mode*	Number Successful Hunters	Percent Success
Aircraft	52	40	77
Horse	11	7	63
Boat	18	8	44
ORV	95	41	43
Snow Machine	40	17	42
Highway Vehicle	238	49	21
Motorbike	2	0	0

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

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 13 - Nelchina, upper Susitna and western half of the upper Copper River Basin

Seasons and Bag Limits

Subunit 13A	Aug. 20 - Sept. 10	One bull
Subunit 13B	Aug. 20 - Sept. 10 Nov. 1 - Nov. 10*	One bull
Subunit 13C	No open season unless authorized by Commissioner's announcement.*	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.*
Subunit 13D & 13E	Aug. 20 - Sept. 10 Nov. 1 - Nov. 10*	One bull

* The late season was closed before the hunt by Commissioner's announcement. No hunt was authorized in subunit 13C.

From 1960 through 1966, the seasons for bull moose were Aug. 20 - Sept. 30 and Nov. 1 - 30. The late season was reduced to Nov. 1 - 20 during 1967 through 1972. However, the late season was closed on Nov. 4, 1972 by Commissioner's announcement. The early season did not change until 1970 when it became Aug. 20 - Sept. 20. There have been antlerless moose seasons in addition to bull moose seasons since 1962 except for bull moose only seasons during 1965 and 1969. A portion of Unit 13 comprising what is now the eastern half of Subunit 13A was closed to antlerless moose hunting during 1967 and 1968. Prior to 1970, antlerless moose seasons were 2 - 7 days in length. During 1970 and 1971, however, permits were issued to achieve designated harvest levels in Subunits 13B and 13C only. The antlerless moose season was closed before the hunt by Commissioner's announcement during 1972.

Harvests and Hunting Pressure

Harvest and hunting pressure information is summarized in Appendix I. Annual bull harvests have declined from 1,200 to 1,400 during the mid-1960's to substantially lower numbers in recent years. Much of the decreased bull harvest was due to reduced season lengths. However, declining early season harvests since the mid-1960's and declining hunter success suggest that there has been a reduced availability of moose to hunters during recent years.

A comparison of age data from annual harvests in Unit 13 is given in Appendix II. These data were selected, where possible, to apply to the same area. The mean age of bulls has been less than the mean age of cows, and fewer bulls were 6 years old and older in comparison to cows. During 1973 a high proportion of the bull harvest was composed of relatively young animals. No increasing or decreasing trends are clearly apparent.

The major means of transportation used by successful hunters in Unit 13 during 1973 were aircraft (used by 36 percent of the successful hunters that specified transporation means), off-road vehicles (32 percent), highway vehicles (20 percent) and boats (8 percent).

Composition and Productivity

Some moose population indices obtained during annual composition counts in Unit 13 are graphed in Figure 1. The number of moose seen per hour of survey is an index of moose density, although this index may be influenced by many factors (LeResche and Davis, 1971). There were large fluctuations in the number of moose seen per hour of survey prior to 1964. The reduced fluctuations since 1964 were probably due to the gradual development of count areas with fixed boundaries, the gradual increase in the number of count areas and a gradual increase in survey intensity. Moose density has apparently declined 4.7 percent per year since 1964. The large bull per 100 cow ratio is an index of hunting pressure when antlerless moose harvests have been nominal, and this has been the case in Unit 13. The large bull per 100 cow ratios have declined 3.8 percent per year since 1952. Calves born and surviving until the November composition counts have declined a minimum of 3.4 percent per year since 1952 (assuming a value of 55 calves per 100 cows in 1952). The small bull per 100 cow ratios when doubled may approximate the yearling increment added to the herd, although the loss of yearling bulls through harvesting has probably influenced this ratio. (Data in Appendix II show that the percentages of yearlings in the bull harvests over the past 10 years have ranged from 16.7 to 35.6 percent [mean of the percentages, 26.5 percent]). The yearling bull per 100 cow ratio has decreased an average of 3.2 percent per year since 1952, although this ratio has been relatively stable and low for the past 8 years.

A brief history of moose and a discussion of potentially limiting factors with their assessed probability of affecting moose in Unit 13 were presented in a previous report (McIlroy 1974). In addition to the factors mentioned in that report, another factor has been receiving increasing consideration as a population controlling mechanism in recent years. Chitty's hypothesized mechanism of genetic change has been recently redescribed with supporting data for voles (Myers and Krebs 1974) and has been suggested to play a part in mountain sheep population dynamics (Geist 1971). In this hypothesized mechanism, changing environmental conditions affect phenotype through changing genotype (or cause concurrent changes in both phenotype and genotype). Even if Chitty's mechanism has been operating on Unit 13 moose, the primary controlling factors should still be environmental conditions. However, one might expect a longer delay between a major environmental change and a major phenotypic (or population) response.

Management Summary and Conclusions

Moose seasons have generally become more restrictive as moose abundance and bull:cow ratios have declined in the Nelchina Basin. The declining moose seen per hour of survey supports the almost unanimous opinion of local guides and air taxi operators that there has been a major decrease in moose abundance in Unit 13. The use of aircraft, especially by guides and air taxi operators, became intense during the early 1960's and continues to be among the most effective transportation means. Increased aircraft usage plus the increasing prevalence of ORVs and snow machines since the mid-1960's have greatly increased access into previously lightly hunted areas. Harvests during the late 1960's were probably maintained by continual utilization of new hunting areas. Recent harvests have substantially declined with the elimination of the November season and antlerless moose hunts.

Moose composition data since the early 1950's show substantial reductions in calf survival and moose density. A combination of increasing total mortality and decreasing calf natality or survival has probably been responsible for the declining moose density. Because they are still pertinent, some of the conclusions reached in the previous progress report (McIlroy 1974) are given below.

"Moose apparently increased from low levels in the early 1900's until they reached peak abundance during the late 1950's and early 1960's. Whether reductions in wolf abundance that occurred during 1908 to 1925 and during 1948 to 1953 were major factors in this increase is conjectural. Frequent forest fires during 1900 to 1950 probably increased the distribution of moose into lowland areas by creating additional range. Moose may have exceeded sustained carrying capacity of the range while at peak abundance. Severe winters have probably caused substantial but periodic mortality while large bull harvests since the early 1960's coupled with increasing predation by grizzly bears and wolves have probably caused significant, sustained mortality. Calf survival may have been limited since the mid-1960's primarily by decreasing range quality and/or wolf predation although grizzly bear predation, low bull:cow ratios in localized areas and periodic deep snows probably contributed to low calf survival. Calf survival is now so low that Unit 13 moose populations may continue to decline in abundance even if unhunted." If wolf predation and inadequate nutrition can be excluded as the major limiting factors to moose in Unit 13, the possibility that these moose have undergone a genetic change will have to receive consideration.

Recent management actions have substantially reduced mortality by shortening the bull season and eliminating the antlerless moose season. Further reductions in harvesting may not be sufficiently beneficial to justify the loss of hunter opportunity. Decreasing the mortality caused by other factors (starvation during winters, predation) may be outside the range of management capability or authority.

Recommendations

Identify critical moose habitat, preserve these areas by land acquisition or interagency agreements and enhance the habitat as time and money allow.

Initiate the following investigations in Unit 13:

A radio-telemetry study of moose calves to identify the time and cause of calf mortality (this study is in lieu of a more direct wolf control study which may be unacceptable to a segment of the public).

A study to determine natality or late pregnancy rates.

A comprehensive range-weather-moose numbers study which may provide information about optimal moose numbers in specific drainages (this information is a prerequisite to assigning values for allowable harvests within each drainage).

A radio-telemetry study to determine seasonal use of habitat of major moose herds (ultimately, to know the home range patterns of moose within each major drainage).

A radio-telemetry study of wolves to determine their seasonal use of prey.

Subdivide Unit 13 into the smallest practical moose management units and make these units identical with composition count areas and harvest report units. Management of moose and hunting should be based on moose management units, individually or clustered, depending on the prevailing usage and differences between units.

Gather information annually to allow assignment of values within each moose management unit for total number present, composition, yearling increment, total mortality, optimal numbers and desired composition; allowable harvest of each sex can be calculated from these data. While values may have to be guessed at initially, continued research plus feedback from predictions based on previous guesses will allow improvement in the assigned values. An interim management policy of maximum sustained harvest should be continued until long range goals are formulated.

An early season of Aug. 20 - Sept. 20 for bulls only is recommended for all of Unit 13.

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MOOSE - GMU 13 - Nelchina Basin

APPENDIX I

A Comparison of Annual Moose Harvest and Hunting Pressure

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	27
1967	1st	1009	319				
	2nd	112	0				
	Total	1217*	319	16	1552	4027	39
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	3381	36
1970	1st	746	56	14			
	2nd	271	58	8			
	Total	1141*,***	158***	30*	1329	3585	37
1971	1st	703	333				
	2nd	205	338				
	Total	1126*	671****	18	1815	4881	36
1972	1st	559	5	7			
	2nd	39	2	1			
	Total	689*	7*	16*	712	3199	22
1973	Total	604	4	10	618	2513	25

* Moose whose data of kill is unknown are included in the total.
** 220 antlerless moose were known killed.
*** 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.

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APPENDIX II

A Comparison of Age Indices of Moose

from Annual Harvests in Unit 13

Males

Year	Area	Mean Age* (excluding Calves)	Percent older than 6 years	Percent Yearling	Sample Size
1964	Denali Check Sta.	2.7	5.8%	35.6%	104
1965	Denali Check Sta.	3.1	0.0%	18.0%	89
1966	Denali Check Sta.	4.0	16.7%	16.7%	126
1967	Denali Check Sta.	3.7	13.1%	26.8%	153
1968	Denali Check Sta.	3.9	19.2%	27.7%	130
1969	Denali Check Sta.	3.4	14.5%	35.5%	186
1970	13B	3.4	10.4%	22.6%	106
1971	13B	2.4	12.4%	30.7%	153
1972	Mainly Denali Highway	3.4	14.1%	16.9%	71
1973	Mainly Denali Highway	2.8	2.0%	34.7%	49

Females

Year	Area	Mean Age* (excluding Calves)	Percent older than 6 years	Percent Yearling	Sample Size
1964	Denali Check Sta.	6.0	39.7%	12.1%	58
1966	Denali Check Sta.	6.4	46.9%	6.3%	32
1967	Denali Check Sta.	4.3	17.8%	17.8%	45
1968	Denali Check Sta.	4.0	20.0%	15.0%	20
1970	13B	5.7	54.4%	5.9%	68
1971	13B	6.2	41.2%	12.9%	318

* All animals 10+ years old were given the value of 10 when calculating means.

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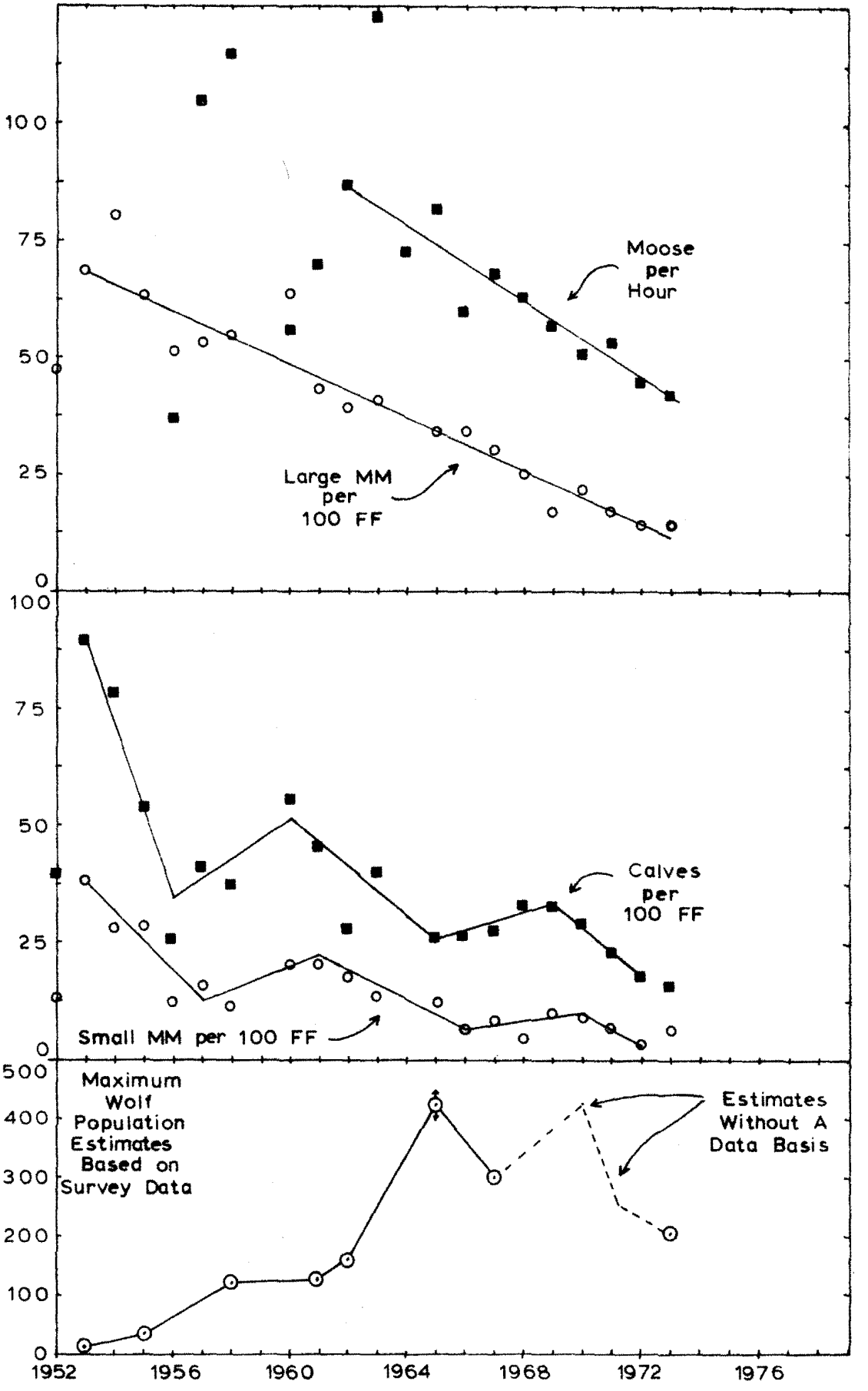
Figure 1. A comparison of Unit 13 moose population indices and estimates of wolf abundance for the period 1952 through 1973.



MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 14A - Palmer

Seasons and Bag Limits

Aug. 20 - Sept 10 Nov. 1 - Nov. 10	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.

Harvest and Hunting Pressure

The final IBM reported harvest for Subunit 14A totaled 346 animals; 337 males, 1 female, and 8 of unknown sex (Appendix I). No antlerless moose season was held in 14A during 1973 so the reported take of one cow moose may have been an error or an illegal kill.

The reported harvest of 337 bull moose represents an increase of 59 percent over the harvest of 212 bulls during the 1972 season, but a decrease of 12.5 percent from the 1969-72 average of 385.

The IBM data reveal that 167 bull moose were reported taken during the November season. This represents 55 percent of the 303 male moose taken for which the date of harvest is known. No date was given for an additional 34 male kills.

On-the-ground monitoring of hunting pressure during the first three days of the November 1-10 season revealed extensive utilization of snow machines on the Bald Mountain Ridge portion of Subunit 14A. During these three days a minimum of 21 bulls were harvested.

Due to report deadlines the data collected on moose mortality during the winter of 1973-74 in Subunit 14A, from causes other than hunting, are not complete at this writing. Appendix II discloses verified moose mortality from such causes during the period June 1, 1972 through May 31, 1973. Documented highway killed moose totaled 36; illegal kills, 49; and incidental kills 5, for a total of 90. In all categories except illegal kills, the verified mortality was below 1970-71 and 1971-72 levels. The verified illegal kill was comparable to levels of the two previous years. The verified non-hunting mortality figure of 90 represents 41 percent of the 1970-71 and 1971-72 average of 221.

Composition and Productivity

A sex and age composition sample of 1982 moose was tallied during the period December 21 through 22, 1973 in count areas 1 through 8

(Appendix III). The bull/cow ratio decreased from 8.6 bulls per 100 cows in 1972 to 5.9 bulls per 100 cows in 1973. This may partially be the result of the late date of the survey as some of the bulls had already shed their antlers. The calf/cow ratio increased from a low of 29.0 calves per 100 cows in 1972 to 42.2 calves per 100 cows in 1973. Mild weather during the winter of 1972-73 probably contributed to this increase. Similarly the incidence of twins increased from 2.1 twins per female with calf in 1972 to 6.1 twins per female with calf in 1973.

A series of four parturition counts was conducted between May 24 and June 8, 1973 (Appendix IV). The highest calf/cow ratio observed was on June 8 when 40.8 calves per 100 adult females were observed in a sample of 99 moose. This is below the December, 1973 level of 42.2 calves per 100 cows when yearling females were included with the cows. Had we been able to differentiate female yearlings in the June surveys and include them with the adult females, the result would have been an even lower calf/cow ratio in June. The observed incidence of twins fluctuated from 16.7 twins per female with calf on June 5 to 50.0 twins per female with calf on May 24. However, only 4 females with calf were observed on May 24 and all samples sizes were small.

The pregnancy status of a sample of 29 female moose killed illegally or by automobile during the winter of 1972-73 (Appendix V) revealed 82.8 percent of the moose were pregnant. In a sample of 20 females, from which the number of fetuses was ascertained, a ratio of 10.0 twin fetuses per 100 females with fetus was observed. Again, sample sizes were very small.

Forty-nine adult female moose incisors from train, automobile, incidental and illegally killed moose during the period June 1, 1972 through May 31, 1973 were collected, processed and read at the Palmer office of the Alaska Department of Fish and Game (Appendix VI). The mean age of these 49 adult moose was 6.2 years. This is a full year older than the average age of 5.2 from a sample of 90 adult female moose incisors collected during the September 1972 antlerless moose hunt. It is also a full year older than the average age of 5.2 from a sample of 68 adult female moose incisors collected during the June 1, 1971 through May 31, 1972 time period.

The average age of 41 male moose whose jaws were collected during the 1973 hunting season was 1.8 years (Appendix VII). This is comparable with the 1972 average age of 1.7 years which came from a very small sample.

Management Summary and Conclusions

The moose population in Game Management Subunit 14A appears to be rebounding after the difficult winters of 1970-71 and 1971-72. The mild winter of 1972-73 undoubtedly contributed to this population increase. Winter mortality except for illegal kills was low. Calf production and twinning rates, as indicated by fall sex and age composition counts, have improved considerably. Indices of calf production from pregnancy and parturition data are variable, perhaps due to small sample sizes.

The bull/cow ratio is very low although the late date during which the composition counts were conducted may have made it appear lower than it actually was.

The 1973 bull harvest was significantly greater than the 1972 harvest in spite of a 20-day reduction in the combined early and late seasons. This is probably the result of good calf survival during the winter of 1972-73 and an increase in hunting pressure during the shortened season. Snow machine hunters appear to have been particularly effective in the Bald Mt. Ridge area during the November season. Rising meat prices very likely contributed to the increased moose hunter effort.

Age data reveal that the average age of female moose that died from various non-hunting causes during the winter of 1972-73 was approximately one year older than those collected during the September 1972 hunting season or during the previous winter.

Average ages of bull moose in Subunit 14A remained below two years.

As has been reported in the past, moose winter range in Subunit 14A continues to decline in quantity and quality. The increased moose population cannot be sustained during more severe winters as was demonstrated during the winters of 1970-71 and 1971-72. No large fires occurred during the past year and the Legislature failed to appropriate money to conduct a browse rehabilitation program. Interest in establishing a large scale logging operation in Subunit 14A has been expressed by a logging firm. If this develops it may reverse the current trend of deteriorating winter habitat.

Recommendations

Eliminate the November bull moose season and add 10 days to the fall season. This would allow the same amount of hunting opportunity while eliminating harvests during the period when snow is on the ground and hunter access and effectiveness are increased.

The scheduled antlerless season should be held when the moose from more remote areas move into the accessible portions of Subunit 14A.

Efforts should be continued to inaugurate a program to rehabilitate moose browse.

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Appendix 1. Moose harvest and hunting pressure - Subunit 14(A)

Year	Date	Season	Bulls	Cows	Unid.	Total	Number of Hunters	Percent Success
1969	8/20-9/20	First	213	0	4	217		
	11/1-11/20	Second	84	1	2	87		
	1/28-2/5/70	Antlerless	28	93	3	124		
		Unk. Date	109	47	0	156		
		TOTAL	434	141	9	584	1169	50.4*
1970	8/20-9/20	First	182	0	1	183		
	11/1-11/20	Second	102	0	6	108		
	To be announced	Antlerless	Season Cancelled by Public Pressure					
		Unk. Date	79	2	4	85		
		TOTAL	363	2	11	376	897	41.9
1971	8/20-9/20	First	177	0	1	178		
	11/1-11/20	Second	225	0	0	225		
	9/1-9/20 Antlerless - 1st		0	101	0	101		
	11/1-11/14 Antlerless-2nd		0	233	0	233		
		Unk. Date	127	145	9	281		
		TOTAL	529	479	10	1018	2090	No Data
1972	8/20-9/20	First	83	1	1	85		
	11/1-11/20	Second	100	1	0	101		
	9/1-9/20 Antlerless -1st		0	75	0	75		
	To be announced Antlerless -2nd		Season Cancelled				No Data	No Data
		Unk. Date	29	17	2	48		
		TOTAL	212	94	3	309		
1973	8/20-9/10	First	136	0	2	138		
	11/1-11/10	Second	167	0	3	170		
	To be announced	Antlerless	Season Cancelled					
		Unk. Date	34	1	3	38**		
		TOTAL	337	1	8	346	No Data	No Data

* Using 589 successful (IBM) instead of the 584 taken from the chronology (IBM).

** This figure includes 4 male moose, 1 female, and 1 moose of unknown sex reportedly taken in October, December, January or February.

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Appendix II. Verified moose mortality (excluding hunting) in Alaska's Game Management Subunit 14A, June 1, 1970 - May 31, 1971, June 1, 1971 - May 31, 1972 and June 1, 1972 - May 31, 1973.

1970-71

	Road Kill						Train Kill						Incidental Kill						Illegal Kill						Winter Kill					
	*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.
	18	31	15	31	4	99	6	4	-	1	11	22	2	10	7	10	2	31	3	20	5	6	18	52	1	6	5	3	-	15
1971-72																														
	8	35	27	28	11	109	2	4	0	3	6	15	6	13	2	3	5	29	3	30	0	4	8	45	0	6	8	10	1	25
1972-73																														
	4	20	6	4	2	36	0	0	0	0	0	0	0	2	0	2	1	5	3	31	2	6	7	49	0	0	0	0	0	0

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

Non-hunting kill, 1970-71

Adult Male	=	30
Adult Female	=	71
Calf Male	=	32
Calf Female	=	51
? Sex & Age	=	35
Total		219

Non-hunting kill, 1971-72

Adult Male	=	19
Adult Female	=	88
Calf Male	=	37
Calf Female	=	48
? Sex & Age	=	31
Total		223

Non-hunting kill, 1972-73

Adult Male	=	7
Adult Female	=	53
Calf Male	=	8
Calf Female	=	12
? Sex & Age	=	10
Total		90

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Appendix III. Moose sex and age composition and ratios, Alaska's Game Management Subunit 14(A).

Year	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.)	Moose per Hour
1968 12/2-6, 14	138	98	236	793	603	42	1438	1674	9	696	8	2378	43.7	54
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.													
1970 11/24-27	83	60	143	957	543	48	1548	1694	13	652	19	2360	48.1	49
1971 11/23-24, 29	58	78	136	866	485	17	1368	1504	27	546	13	2063	59.2	34.8
1972 11/30-12/2	34	52	86	715	274	6	995	1081	3	289	25	1395	49.7	28.1
1973 12/21-22	32	46	78	811	489	32	1332	1410	9	562	10	1982	42.7	46.4

Year	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
1968	16.4	6.8	72.6	4.1	28.1	48.4	6.5	29.3	54	2378
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.									
1970	9.2	3.9	72.3	2.6	18.4	42.1	8.1	27.6	49	2360
1971	9.9	5.7	134.5	3.8	28.6	39.9	3.4	26.4	34.8	2063
1972	8.6	5.2	152.9	3.7	36.0	29.0	2.1	20.7	28.1	1395
1973	5.9	3.5	143.8	2.3	16.4	42.2	6.1	28.5	46.4	1982

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Appendix IV. Moose productivity in Alaska's Game Management Subunit 14A, 1973.

Date	Newborn Calves			Yearlings			Totals				Males	Calves per 100 FF	Calves per 100 FF & Yrlgs.	Yrlgs. per 100 FF	Twins per 100 FF w/Calf	Total Moose
	FF/0	FF/1	FF/2	WO/FF	FF/1	FF/2	Calves	Yrlgs.	FF	Unk.						
5/24	54	2	2	10	12	1	6	24	71	2	9	8.5	6.3	33.8	50.0	112
6/1	46	16	5	9	4	1	26	15	72	0	4	36.1	29.9	20.8	23.8	117
6/5	43	20	4	9	9	1	28	20	77	0	12	36.4	28.9	26.0	16.7	137
6/8	23	10	5	8	8	3	20	22	49	0	8	40.8	28.2	44.9	33.3	99

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Appendix V. Pregnancy status of female moose killed illegally or by automobile in Alaska's Game Management Subunit 14A during the period November 16, 1972 through May 31, 1973.

Cementum Age Class	Sample Size	Pregnant	Not Pregnant	One Fetus	Two Fetuses	Unknown No. of Fetuses	% Pregnant	Twins per* per 100 FF w/Fetus
1+	0	-	-	-	-	-		
2+	4	3	1	3	0	0		
3+	6	5	1	5	0	0		
4+	4	3	1	1	0	2		
5+	2	2	0	1	0	1		
6+	1	1	0	1	0	0		
7+	2	1	1	0	1	0		
8+	2	2	0	2	0	0		
9+	0	-	-	-	-	-		
10+	2	2	0	2	0	0		
11+	1	1	0	1	0	0		
12+	0	-	-	-	-	-		
13+	0	-	-	-	-	-		
14+	2	2	0	1	1	0		
?	3	2	1	1	0	1		
Total	29	24	5	18	2	4	82.8%	10.0

* From sample of 20 where number of fetuses present was determined.

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Appendix VI. Age composition of female moose taken by hunters during antlerless moose seasons, 1969-70 through 1972-73; and train, automobile, illegal and incidental kills during the periods June 1 through May 31, 1970-71 through 1972-73 in Alaska's Game Management Subunit 14A.

	Miscellaneous [1] Kills 6/1-5/31	Hunter Kills During Antlerless Moose Seasons [2]
	Mean Age [3]	Mean Age
1969-70	-	6.67 (126)
1970-71	5.93 (44)	-
1971-72	5.22 (68)	5.15 (476)
1972-73	6.16 (49)	5.19 (90)

1. Miscellaneous kills include train, automobile, illegal and incidental kills.

2. 1969-70 season: 1/28-2/5/1970
   1970-71 season: No antlerless season
   1971-72 season: 9/1-20/1971, 11/1-14/1971
   1972-73 season: 9/1-20/1972

3. Sample size in parentheses (excludes calves).

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Appendix VII. Age composition of male moose taken by hunters during moose seasons, 1964 through 1973; and train, automobile, illegal and incidental kills during the periods June 1 through May 31, 1970-71 through 1973-74 in Alaska's Game Management Subunit 14A.

	Miscellaneous [1] Kills 6/1-5/31	Hunter Kills During Moose Seasons
	Mean Age [2]	Mean Age [2]
1964-65	-	2.14 (14)
1965-66	-	2.50 (26)
1966-67	-	1.89 (37)
1967-68	-	2.09 (23)
1968-69	-	2.78 (64)
1969-70 [3]	-	4.41 (27)
1970-71	4.57 (14)	-
1971-72	4.75 (16)	2.17 (29)
1972-73	2.00 (7)	1.70 (10)
1973-74	Not yet available	1.78 (41)

1. Miscellaneous kills include train, automobile, illegal and incidental kills.
2. Sample size in parentheses (excludes calves).
3. All moose taken during January 28 through February 5, 1970 antlerless hunt.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 14B - Willow to Talkeetna

Seasons and Bag Limits

Aug. 20 - Sept. 20 Nov. 1 Nov. 20	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.

Harvest and Hunting Pressure

The final IBM reported harvest in Subunit 14B totaled 96 moose, of which 94 were bulls and 2 were of unknown sex. A reduction of 10 days from the 1972 early bull season did not reduce the bull harvest. Appendix I presents IBM reported harvest data from 1969 through 1973.

An antlerless hunt scheduled for Subunit 14B was not held because herd recovery from the previous two winters was needed. Also, the public was not receptive to a hunt at a time when nearly all other Game Management Units had restricted season lengths.

Appendix II presents verified moose mortality from causes other than hunting for Subunit 14B during the period June 1, 1972 through May 31, 1973. Documented highway kills (auto-moose collisions) totaled 3, train kills 10, illegal kills 1 and winter kills 1. It should be noted that last year's S & I Report revealed 115 moose were killed by trains. Two circumstances caused the large reduction; the winter was not severe, resulting in fewer moose wintering in the railbelt area and secondly, moose that wintered along the railbelt failed to concentrate on the railroad tracks because it did not provide easier walking than surrounding areas.

Composition and Productivity

One thousand and seventy-five moose were tallied during sex and age composition counts in Subunit 14B on November 28 and December 3, 1973 (Appendix III). The bull/cow ratio decreased from 22.1 bulls/100 cows in 1972 to 10.6 in 1973. The calf/cow ratio increased from 28.2 calves/100 cows in 1972 to 36.5 calves/100 cows in 1973. The calf percentage in the herd increased to 24.8 percent, the highest it has been since 1967 when it was 30 percent. The response in the calf segment of the herd may be due in part to reasonably good weather during the winter of 1972-73.

The bull/cow ratio in the area between Willow Creek and Little Willow Creek decreased again, from 4.9 bulls/100 cows in 1972 to 2.2 bulls/100 cows in 1973. Recent Alaska Board of Fish and Game action eliminated the November bull season in this area.

Although moose jaws were collected in Subunit 14B throughout the hunting season, and at other times, the data are not presented because sample sizes are insufficient.

Management Summary and Conclusions

Although the first bull season was reduced 10 days and no antlerless season was held, the 1973 moose harvest increased in Subunit 14B. In 1972, 35 bulls and 13 cows totaling 48 moose were harvested. In 1973, 94 bulls and 2 moose of unknown sex for a total of 96 moose were taken. The 1973 harvest represents an increase of 100 percent over 1972.

Non-hunting mortality was reduced drastically in 1973 in Subunit 14B. The incidence of moose-train collisions, which occur when winter snows become deep in Subunit 14B, was significantly reduced due to reduced snow accumulation.

Sex and age composition counts revealed that approximately the same number of moose per hour were seen in 1973 as were seen in 1972. The incidence of twins more than doubled, from 2.4 in 1972 to 5.7 in 1973. The total number in the sample size has declined from 1922 moose in 1970 to 1810 in 1971, 1142 in 1972 and 1075 in 1973. This downward trend is probably not due to hunting pressure (except for the Willow to Little Willow area), but is a reflection of severe winters. Poor access is the prominent reason for low hunter success. Winter browse availability and weather are felt to be the limiting factors on this moose herd.

Recommendations

Reduce the 1974 bull season.

A browse rehabilitation program should be initiated in Subunit 14B as soon as possible.

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John S. Vania
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Appendix I. Moose harvest and hunting pressure - Subunit 14B

Year	Date	Season	Bulls	Cows	Unid.	Total	Number of Hunters	Percent Success
1968	8/20-9/30	First	67	0	0	67		
	11/1-11/20	Second	67	0	0	67		
	To be announced	Antlerless	Season canceled by public pressure					
		Unk. Date	9	0	0	9		
		Total	143	0	0	143	473	30.2
1969	8/20-9/30	First	37	0	0	37		
	11/1-11/20	Second	25	0	0	25		
	1/28-2/5/70	Antlerless	29	30	0	59		
		Unk. Date	30	16	0	46		
		Total	121	46	0	167	310	53.9
1970	8/20-9/30	First	34	0	0	34		
	11/1-11/20	Second	21	0	1	22		
	To be announced	Antlerless	Season canceled by public pressure					
		Unk. Date	26	0	0	26		
		Total	81	0	1	82	264	31.1
1971	8/20-9/30	First	36	0	4	40		
	11/1-11/20	Second	48	0	1	49		
	9/1-9/30	Antlerless 1st	0	39	0	39		
	11/1-12/15	Antlerless 2nd	0	101	0	101		
		Unk. Date	40	43	0	83		
		Total	124	183	5	312	890	35.1
1972	8/20-9/30	First	13	0	0	13		
	11/1-11/30	Second	12	0	0	12		
	9/1-9/30	Antlerless	0	13	0	13		
		Unk. Date	10	0	0	10		
		Total	35	13	0	48	286	16.8
1973	8/20-9/20	First	28	0	1	29		
	11/1-11/20	Second	59	0	1	60		
	To be announced	Antlerless	Not held					
		Unk. Date	6	0	1	7		
		Total	93	0	3	96	395	24.3

PREPARED BY:

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Appendix II. Verified moose mortality (excluding hunting) in Alaska's Game Management Subunit 14B, June 1, 1970 through May 31, 1971; June 1, 1971 through May 31, 1972 and June 1, 1972 through May 31, 1973.

1970-71

	Road Kill						Train Kill						Incidental Kill						Illegal Kill						Winter Kill					
	*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.
	0	7	0	0	3	10	16	43	7	9	40	115	0	0	0	0	0	0	1	0	0	1	0	2	24	9	19	24	5	81

1971-72

	2	1	2	1	1	7	13	18	7	7	30	75	3	0	0	0	0	3	3	3	0	0	0	6	3	4	8	4	0	19

1972-73

	1	0	0	0	2	3	0	4	2	1	3	10	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1

Non-hunting kill, 1970-71

Adult Male	= 41
Adult Female	= 59
Calf Male	= 26
Calf Female	= 34
? Sex & Age	= 48
	208

Non-hunting kill, 1971-72

Adult Male	= 24
Adult Female	= 26
Calf Male	= 17
Calf Female	= 12
? Sex & Age	= 31
	110

Non-hunting kill, 1972-73

Adult Male	= 1
Adult Female	= 4
Calf Male	= 2
Calf Female	= 2
? Sex & Age	= 6
	15

*Ad. M = Adult Male; Ad. F = Adult Female; 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.

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)	Moose per Hour
1968 11/26-27	190	85	275	498	262	31	791	1066	4	328	0	1394	24.9	56
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.													
1970 11/23,26	214	104	318	671	390	28	1089	1407	5	451	64	1922	----	---
1971 10/29 11/1	197	98	295	838	317	12	1167	1462	3	344	4	1810	34.6	52.2
1972 12/5-15	148	19	167	550	201	5	756	923	2	213	6	1142	36.0	31.7
1973 11/28,12/3	56	21	77	479	233	14	726	803	4	265	7	1075	32.7	32.9

Year	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
1968	34.8	10.7	44.7	6.1	51.8	41.5	10.6	23.5	56	1394
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.									
1970	29.2	9.5	48.5	5.6	46.1	41.4	6.7	24.3	--	1922
1971	25.3	8.4	49.7	5.4	57.0	29.5	3.6	19.0	52.2	1810
1972	22.1	2.5	12.8	1.7	17.8	28.2	2.4	18.7	31.7	1142
1973	10.6	2.9	37.5	2.0	15.8	36.5	5.7	24.8	32.9	1075

PREPARED BY: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 14C - Anchorage

This report is the first occasion that management considerations in game management subunit 14C have been discussed by specific aerial survey count areas; they will be referred to as management areas. This is the format that will be used in forthcoming reports for this subunit.

Seasons and Bag Limits

Unit 14(C)	Sept. 4 - Sept. 30 Nov. 1 - Nov. 20	One moose; antlerless moose may be taken by permit only

Harvest and Hunting Pressure

Appendix I presents the 1973 IBM Harvest data for Game Management Subunit 14C. One hundred and thirty-seven moose including 93 males, 41 females and three sex unknown were harvested. This includes 37 females and 13 males taken during the Fort Richardson antlerless hunt. Two males and three females were taken by bow and arrow during a November 1 through March 31, 1974 special archery season on the Anchorage International Airport, during which 661 archers hunted 2,379 hours and took 68 shots.

The harvest of 93 bulls from Subunit 14C is above the previous five-year average of 80. Similarly, the total harvest of 137 is above the previous five-year average of 109. This increase is mainly due to the harvests on Anchorage International Airport and Fort Richardson Military Reservation.

The annual harvest in Subunit 14C for the last five years clearly illustrates the effects that motorized vehicle restrictions, closed areas, and reduced hunting seasons have had on total harvest, especially when the 1965 and 1966 harvests of 497 and 215 moose, respectively, are considered.

Verified moose mortality, excluding sport hunting, in Subunit 14C for the period June 1, 1972 through May 31, 1973 totaled 69 moose (Appendix II). The majority (60) were attributed to moose/auto collisions.

A considerable amount of non-sport hunting moose mortality exists in 14C. Of the five categories (See Appendix II) involved only two of those can be realistically manipulated by management; these are automobile/moose collisions and illegal activities. These two categories have accounted for 77.9 percent and 88.3 percent of the non-sport hunting mortality in 1971 and 1972, respectively. This mortality also accounted for 43.3 percent and 44.2 percent of the total moose harvest (non-sport and sport) in 1971 and 1972, respectively.

In 1973, road kills and illegal activities accounted for 94.2 percent of the non-sport mortality and 31.6 percent of the total known moose mortality in 14C.

The November moose season was eliminated in 14C for 1974. This was done because the anticipated increase in hunting effort was expected to change in an adverse manner the already sensitive conditions existing in many isolated moose populations within this subunit. This closure should improve the declining bull/cow ratio; if not, a closer look at management alternatives will be in order in 1975.

14C Management Areas

I. Hunter Creek - Until 1972 Hunter Creek was an area generally inaccessible to the public. Now a paved highway connects the creek with the old Palmer Highway. IBM harvest data for 1973 indicate a minimum of nine moose harvested.

II. Eklutna Basin - Even though this area was closed to hunting the 1973 IBM harvest data indicated a minimum harvest of three moose.

III. Peters Creek - IBM harvest data indicate a minimum of eight moose harvested.

IV. Eagle River - IBM harvest data indicate a minimum of 12 moose harvested.

V. Fort Richardson/Ship Creek - During the 1973-74 moose season 63 moose were legally sport harvested from the entire Fort Richardson/Ship Creek area. Fifty of these moose (13 males and 37 females) were taken on Fort Richardson during the February 4-8, 1974 special antlerless moose hunt.

Moose hunting on Fort Richardson has been allowed by permit only; the hunt was established by the Board of Fish and Game in cooperation with the U. S. Army at Fort Richardson. Three of the five antlerless moose hunts conducted on Fort Richardson were held after January 20, one was held on December 20 and one was held on November 27. The dates for the Fort Richardson antlerless hunts have been scheduled primarily to facilitate a rapid harvest of the Fish and Game Board allottment of 50 moose.

Access limitations have made the Ship Creek drainage a difficult area in which to hunt moose. Also, because of the Chugach State Park existence and the Division of Parks' policy regarding non-consumptive use, the Alaska Board of Fish and Game has established a September 3 moose season opening date for the 1974 hunting season, whereas most of Southcentral Alaska opens August 20.

Regardless of the problems encountered, hunters are learning how to handle the difficulty in hunting Ship Creek and adjacent areas. Horses have been the most effective hunting means along with foot hunting where groups of people, assist a single hunter pack meat out. Horses, pack dogs and dog sleds were also methods used successfully in hunting and packing moose.

In 1973 there were a total of 43 moose killed by automobiles on the Glenn and Davis highways alone. Department road kill records for the past eight years indicate that an average of 51.8 percent of this type of mortality occurs between August 1 and December 31 of each year. A minimum of five illegally killed moose were also discovered on military reservation property.

Composition and Productivity

Sex and age composition count data for all areas in Subunit 14C in 1973 are presented in Appendix III.

The bull/cow ratio is down 27 percent from the previous three year average of 21.6. Calves/100 cows are up 1.4 percent from the previous three-year survey average of 34.4. Calf percent in the herd increased 9.5 percent from the previous three-year survey average of 21.2.

The total sample size is down 10.7 percent from the previous three-year survey average of 776.

The above figures generally reflect less than satisfactory conditions in all categories except calf production.

However, when the count areas are considered on an individual basis the results show that some areas are in worse shape than others. The sex and age composition data for these count areas are presented in Appendix IV.

14C Management Areas

I. Hunter Creek - The sample size of 52 has dropped 40 percent below the previous three-year survey average of 87. Production is poor at 10.0 calves/100 cows and 7.7 percent calves in herd.

II. Eklutna Basin - The sample size of 114 has increased 15 percent over the previous three-year survey average of 99. Total bulls/100 cows, calves/100 cows and calf percent in herd are up 10.0 percent, 38.6 percent, and 64.0 percent, respectively, from the previous three-year survey average of 18.6 percent 26.7 and 17.1.

III. Peters Creek - The 1973 composition figures indicate that the sample size is up three percent over the previous three-year survey average of 60. Calves/100 cows and calf percent in herd are up 14.7 percent and 19.7 percent, respectively, over the previous three-year survey average of 25.2 and 17.8. There were no large bulls observed during the aerial survey.

IV. Eagle River - Composition figures indicate that the sample size is down 11.5 percent from the previous three-year survey average of 104. Calves/100 cows and calf percent in herd are down 28.2 percent and 20.0 percent, respectively, from the previous three-year survey average of 47.1 and 28.2. Bulls/100 cows is presently at 7.7, down 58.4 percent from the previous three-year survey average of 18.5. There were no yearling bulls sighted on the survey.

V. Fort Richardson*/Ship Creek - Composition figures indicate that the sample size is only 1.5 percent down from the previous three-year survey average of 380. Calf percent in herd is similar to the previous three-year survey average of 23.8. Calves per 100 cows are still in good shape, but down 7.7 percent from the previous three-year survey average of 40.2. Bulls/100 cows are down 24.4 percent from the previous three-year survey average of 23.4.

* Fort Richardson is downstream and separated from the Ship Creek count area by an imaginary reservation boundary line. For management consideration purposes the individual composition figures have and will in forthcoming reports be combined.

Age data from the Fort Richardson antlerless hunt (Appendix V) reveal that 21.6 percent of the female harvest was over six years of age. The average age of 36 adult females taken was 5.2 years. The age of the male portion of the Fort Richardson antlerless moose harvest does not reflect the actual age structure of the male segment of this moose population, because males are avoided during the hunt.

Management Summary and Conclusions

The past decreased hunter harvest of moose in Subunit 14C reflects the effects of the following restrictions placed on hunters: 1) the establishment of the West Chugach Management Area where the use of motorized vehicles for the purpose of big game hunting previous to its establishment was allowed but now is prohibited; 2) the creation of the Chugach State Park overlapping the West Chugach Management Area in conjunction with the parks random approach to closures of areas to the discharge of firearms; 3) the closure of the Eklutna Basin to all big game hunting; 4) the absence of a subunit-wide antlerless moose season and 5) the elimination of the November moose season.

The information presented in section V. of Harvest and Hunting Pressure indicates that the antlerless hunts are not scheduled at the proper time to effectively reduce road kills and moose auto accidents. It also indicates that the Fort Richardson harvest quota could be significantly increased.

Moose winter range extends throughout the Anchorage bowl area with a substantial amount of critical winter habitat existing on the Fort Richardson military reservation. Through cooperation with the military a manageable situation exists on Fort Richardson in protecting this habitat. Moose summer range in 14C is protected from development by being located within the Chugach State Park. The widespread winter habitat which exists throughout the Anchorage bowl occurs on privately owned property. This land is valuable in dollars and is being developed rapidly. The department has no money available for land acquisition, so the loss of this winter habitat seems inevitable.

Summary and Conclusions for 14C Management Areas

I. Hunter Creek - The sex and age composition data for the past four years indicate a steady decline in the bull/cow ratio as can be expected when, historically, hunting has been restricted to bulls only. Calf production is marginal, with only four calves observed in the 1973 aerial survey. If there are mortality factors other than hunting in this area, downward trends can be expected to continue in all sex and age categories.

II. Eklutna Basin - This area will be under native ownership (Native Land Claims Settlement Act); it was also closed to all hunting in 1972.

This population seems to have good representation in all sex and age composition categories. With one exception, changes in management direction at this time are probably dependant on the direction and objectives of the new land owners, the Eklutna Native Corporation. If hunting is again desired in this drainage a limited permit system would be recommended for consideration.

III. Peters Creek - There are two good jeep trails leading to several homesteads and recreation cabins situated along upper Peters Creek.

Of the 63 moose observed in the 1973 aerial composition survey there were only 13 calves and three yearling bulls; no large bulls were observed.

IV. Eagle River - This drainage is rapidly being developed for human use resulting in a tremendous loss of critical moose winter habitat. The loss of habitat and increased human population seem to be the major problems contributing to the decline of this population. Unless land is specifically set aside in Eagle River valley for moose winter habitat the long range outlook for maintaining a harvestable population is poor.

The large influx of people has also increased the unmonitorable illegal game killing activities. As a result there presently exists a long standing request from many of the local residents to close the valley to big game hunting.

V. Fort Richardson/Ship Creek - The Fort Richardson/Ship Creek area contains critical winter habitat that supports, at one time or another, moose comprising over 40 percent of the subunit's total population. Within this population exists a substantial crop of large-antlered bulls. A good representation of other sex and age classes also exists.

The department has recognized that the abundance of large-antlered bull moose on Fort Richardson and Ship Creek provides consumptive and non-consumptive users the opportunity to observe, photograph and harvest trophy-sized bull moose. This situation has evolved into the following tentative management goal for the Fort Richardson/Ship Creek area: provide both consumptive and non-consumptive users the opportunity to observe and/or photograph various sex and age classes of moose and to harvest trophy-sized bulls.

As indicated by Department B. G. D. I. F. records, 51.8 percent of the road-killed moose occur between August 1 and December 31 of each year. The records also indicate that three of the five antlerless hunts conducted on Fort Richardson were held after January 20, one was held on December 20 and one was held on November 27.

Recommendations

14C Management Areas

I. Hunter Creek

Restrictive measures should be incorporated into the management of this area to insure that the bull/cow ratio doesn't drop below 15 males/100 cows. If necessary, moose hunting could be handled on a permit system, allowing a certain number of cows as well as a limited number of bulls to be harvested. If production does not improve in 1974 a total closure on hunting might be warranted until the situation is remedied.

II. Eklutna Basin

Contact should be made with the Ekultna Native Corporation to identify their land management intentions. No hunting regulation changes are recommended at this time.

III. Peters Creek

The existence of jeep trails in this area offer temptation for violation of the restrictions on motorized vehicular use as prohibited within the West Chugach Management area. The Protection Division should be requested to examine this situation. No management recommendations are offered at this time. However, if the 1974 aerial composition surveys indicate continued declines in the bull/cow ratio and also in calf production a shift in specific sex harvest emphasis as well as a limited permit system will be considered for recommendation in 1975.

IV. Eagle River

Contact should be made with the Eagle River Sportsman Game Preservation Association and suggest they consider identifying possible permanent locations for critical moose winter habitat.

No management recommendations are offered at this time. However, if the 1974 aerial composition surveys indicate continued declines in the survival of yearlings as well as calf production a total hunting season closure above the military reservation will be considered for 1975.

V. Fort Richardson/Ship Creek

The loss of moose habitat is the most important problem facing moose in Subunit 14C today. Critical habitat areas need to be identified and classified in a manner guaranteeing long term moose winter use benefits. Because of the large number of moose depending on Fort Richardson's winter habitat it should be considered as the number one priority area in 14C for habitat protection.

Sport and non-sport moose mortality has reduced the bull/cow ratio below the recommended minimum level of 25 males/100 cows. This sex ratio can be achieved again by the selective harvest of females and males at pre-established specified levels. Also, the November season closure is recommended to continue.

A maximum harvest level for bulls should be calculated with the authorization of their harvest allowed by permit only. Application of this management technique should be considered for initiation by 1976.

A management plan incorporating the above recommendations should be drafted, with the final plan coordinated and supported by the U. S. Army Alaska at Fort Richardson and the Director of the Chugach State Park.

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Appendix I. Moose Harvest and Hunting Pressure, Alaska's Game Management Subunit 14C, 1972.

Year	Date	Season	Bulls	Cows	Unid.	Total	No. of Hunters	Percent Success
1968	8/20-9/30	First	60	0	0	60		
	11/1-11/20	Second	14	0	0	14		
	2/20-22/69**	Antlerless	14	37	0	51		
		Unk. Date	2	1	0	3		
		TOTAL	90	38	0	128	368	34.7
1969	8/20-9/30	First	49	0	1	50		
	11/1-11/20	Second	20	0	1	21		
		Antlerless	0	10*	0	10		
		Unk. Date	23	4	0	27		
		TOTAL	92	14	2	108	227	47.6
1970	8/20-9/30	First	39	0	3	42		
	11/1-11/20	Second	14	0	0	14		
		Antlerless	0	5*	0	5		
		Unk. Date	12	0	3	15		
		TOTAL	65	5	6	76	192	39.6
1971	8/20-9/30	First	50	0	1	51		
	11/1-11/20	Second	16	0	0	16		
	12/21-12/23**	Antlerless	5	31	0	36		
		Unk. Date	27	7	0	34		
		TOTAL	98	38	1	137	263	52.1
1972	8/20-9/30	First	29	0	0	29		
	11/1-11/20	Second	9	0	0	9		
	2/22-26/73**	Antlerless	14	36	0	50		
	12/1-3/31/73		0	3*	0	3		
		Unk. Date	3	0	3	6		
		TOTAL	55	39	3	97	193	50.2
1973	9/4-9/30	First	54	0	2	56		
	11/1-11/20	Second	17	0	1	18		
	2/4-8/74**	Antlerless	13	37	0	50		
	11/1-3/31/74*		2	4	0	6		
		Unk. Date	7	0	0	7		
		TOTAL	93	41	3	137	447	30.7

* Airport Archery
** Fort Richardson

PREPARED BY: Dimitri Bader, Game Biologist II

Appendix II. Verified Moose Mortality (excluding hunting), Alaska's Game Management Subunit 14C, June 1, 1972 through May 31, 1973.

	Adult Male	Adult Female	Calf Male	Calf Female	Unknown Sex or Age	Total
Road Kill	3	27	8	21	1	60
Train Kill	None reported				0	0
Incidental Kill	2	1	0	0	0	3
Illegal Kill	3	2	0	0	0	5
Winter Kill	0	0	0	1	0	1
Total	8	30	8	22	1	69

PREPARED BY: Dimitri Bader, Game Biologist II

Appendix III. Moose Sex and Age Composition and Ratios, Alaska's Game Management Subunit 14C,1967-1973.

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)	Moose per Hour
1967[1]	5	10	15	36	31	1	68	83	2	35	10	128	5.2	24.6
1968[2]	36	21	57	188	54	7	249	306	1	69	1	376	5.1	73.7
1970[3]	60	40	100	235	175	12	422	522	1	200	35	757	16.6	45.6
1971[4]	58	65	123	434	140	4	578	701	2	150	19	870	14.3	60.8
1972[5]	68	27	95	342	117	9	468	563	5	140	0	703	20.4	34.5
1973[6]	44	28	72	311	135	9	455	527	6	159	8	694	19.0	36.5

1. Eagle River
2. Fort Richardson
3. Fort Richardson, Eagle River, Ship Creek, Eklutna, Peters Creek, Hunter Creek
4. Fort Richardson, Ship Creek, Eagle River, Eklutna, Hunter Creek
5. Fort Richardson, Ship Creek, Eagle River, Peters Creek, Eklutna, Hunter Creek, Indian Creek, Bird Creek
6. Fort Richarson, Ship Creek, Eagle River, Peters Creek, Eklutna, Hunter Creek

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
1967	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	24	128
1968	22.9	8.4	58.3	5.5	61.8	27.7	11.5	18.3	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	20.3	5.8	39.7	3.8	38.6	29.9	7.1	19.9	35	703
1973	15.8	6.2	63.6	4.1	35.2	34.9	6.3	23.2	36.5	694

PREPARED BY: Dimitri Bader, Game Biologist II

Appendix IV. Moose Sex and Age Composition and Ratios for 5 Management Areas in Game Management Subunit 14C

Date	large ♂	small ♂	total ♂	♀ w/0	♀ w/1	♀ w/2	total ♀	total adults	lone calves	total calves	unid. sex & age	total sample	count time (hrs)
Sex and Age Composition													
I. Hunter Creek													
11/18/70	13	8	21	45	14	--	59	80	--	14	--	94	2.1
11/4/71	7	15	22	49	14	1	64	86	--	16	--	102	1.5
12/5/72	14	0	14	46	2	0	48	62	0	2	0	64	0.9
11/26/73	5	3	8	36	4	0	40	48	0	4	0	52	1.5
II. Eklutna River													
11/18/70	9	4	13	33	18	0	51	64	--	18	4	86	3.9
11/4/71	7	13	20	64	34	-	98	118	--	34	1	153	2.9
12/5/72	3	2	5	45	5	0	50	55	0	5	0	60	2.9
11/26/73	8	6	14	39	26	3	68	82	0	32	0	114	3.6
III. Peters Creek													
10/29/68	1	4	5	40	9	1	50	55	0	11	0	66	N/A
11/18/70	4	1	5	36	5	--	41	46	--	5	1	52	1.5
12/5/72	3	2	5	26	13	2	41	46	0	17	0	63	1.8
11/26/73	0	3	3	33	12	0	45	48	1	13	1	62	2.0
IV. Eagle River													
2/11/67	2	--	--	--	25	1	--	28	2	29	51	108	1.3
12/20/-21/67	5	10	15	36	31	1	68	83	2	35	10	128	5.2
10/27/70	3	10	13	40	44	3	87	100	1	51	--	151	3.8
11/4/71	3	9	12	45	19	1	65	77	2	23	--	100	3.3
12/5/72	8	0	8	19	17	0	36	44	0	17	0	61	2.9
12/21-22/73	5	0	5	46	18	1	65	70	2	22	0	92	2.35
V. Fort Richardson													
11/66	15	19	34	117	59	3	179	213	1	66	2	281	6.6
11/19/70	31	17	48	81	94	9	184	232	0	112	30	374	5.3
11/3/71 12/1/71	41	28	69	276	73	2	351	420	0	77	18	515	6.6
12/5-6/72	38	21	59	160	75	6	241	300	4	91	0	391	9.3
12/21/73-1/7/74	26	16	42	157	75	5	237	279	3	88	7	374	9.7

Appendix IV. (Continued) Sex and Age Ratios

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
I. Hunter Creek										
11/18/70	35.6	13.6	61.5	8.5	114.3	23.7	--	14.9	45	94
11/4/71	34.4	23.4	214.3	14.7	187.5	25.0	6.7	15.7	67	102
12/5/72	29.2	0	0	0	0	4.2	0	3.1	71	64
11/26/73	20.0	7.5	60.0	5.8	150.0	10.0	0.0	7.7	34.7	52
II. Eklutna River										
11/18/70	25.5	7.8	44.4	4.7	44.4	35.3	--	20.9	22	86
11/4/71	20.4	13.3	185.7	8.5	76.5	34.7	--	22.2	53	153
12/5/72	10.0	4.0	66.7	3.3	80.0	10.0	0	8.3	21	60
11/26/73	20.6	8.8	75.0	5.3	37.5	47.1	10.3	28.1	31.7	114
III. Peters Creek										
10/29/68	10.0	8.0	400.0	6.1	72.7	22.0	10.0	16.7	N/A	66
11/18/70	12.2	2.4	25.0	1.9	40.0	12.2	--	9.6	35	52
12/5/72	12.2	4.9	66.7	3.2	23.5	41.5	13.3	27.0	35	63
11/26/73	6.7	6.7	0	4.9	46.2	28.9	0	21.3	31	62
IV. Eagle River										
2/11/67*	--	--	--	--	--	--	3.8	26.9	83	108
12/20-21/67	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	24	128
10/27/70	14.9	11.5	333.3	6.6	39.2	58.6	6.4	33.8	40	151
11/4/71	18.5	13.8	300.0	9.0	78.3	35.4	5.0	23.0	30	100
12/5/72	22.2	0	0	0	0	47.2	0	27.9	21	61
12/21-27/73	7.7	0	0	0	0	33.8	5.3	23.9	39.1	92
V. Fort Richardson										
11/66	19.0	10.6	55.9	6.8	57.6	36.9	4.8	23.7	42.6	281
11/19/70	26.1	9.2	54.8	4.9	30.4	60.9	8.7	32.6	71	374
11/3-12/1	19.7	8.0	68.3	5.6	74.7	21.9	2.7	15.5	70.6	374
12/5-6	24.5	8.7	55.3	5.4	46.2	37.8	7.4	23.3	42.0	391
12/21-1/7/74	17.7	6.8	61.5	4.4	36.4	37.1	6.3	24.0	38.6	374

MOOSE - GMU 14C - Anchorage

Appendix V. Ages of Moose Taken by Hunters During the February 4 through 8, 1973 Antlerless Moose Season, Alaska's Fort Richardson, Game Management Subunit 14C.

Age	No. of Females	No. of Males
Calf	1	4
1+	1	0
2+	5	4
3+	4	1
4+	8	2
5+	7	1
6+	2	0
7+	1	0
8+	2	0
9+	1	1
10+	0	0
11+	0	0
12+	2	0
13+	0	0
14+	2	0
15+	0	0
16+	0	0
17+	0	0
18+	0	0
TOTAL	37 (36 Adults)	13 (9 Adults)
Sample size =	37	13
Mean age excluding calves	5.17	3.66
% over 6 years*	21.6%	7.7%

* This figure is presented only to illustrate how many animals older than 6 years of age occurred in the harvest.

PREPARED BY: Dimitri Bader, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 15A - Kenai

Seasons and Bag Limits

Unit 15A East, that portion of Subunit 15A lying north of the Homer Electric power line; east of the Moose River and a line from the headwaters of the Moose River to the outlet of Moose Lake, and from there downstream to the Chickaloon River to Turnagain Arm	Aug. 20-Sept. 20 Nov. 1 - Nov. 20	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.
Unit 15A West, that portion of Subunit 15A lying west and north of the Moose River and Chickaloon River	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Comsioner's announcement.
Unit 15A South, the remainder of Subunit 15A	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.

Harvest and Hunting Pressure

Harvest reports indicate that hunters took 270 moose during the 1973-74 season; 259 bulls, 7 cows and 4 sex unknown (Appendix 1). The 1973-74 bull harvest was up 34.2 percent from 1972-73 when 193 bulls were taken. The total harvest for 1973-74 was down 20.4 percent from 1972-73 when a total of 339 moose were taken. This decline in total harvest was due to the absence of an antlerless season.

Sixty percent (156/259) of the bull harvest occurred during the early season, Aug. 20 - Sept 20, and 32 percent (82/259) occurred during the late season, Nov. 1-20. Eight percent (21/259) of the reported harvest was incorrectly dated or had no date of kill given.

Composition and Productivity

Sex and age composition counts conducted in 1973 with the assistance of the USF&WS showed 9.3 bulls per 100 cows and 37.2 calves per 100 cows (Appendices II and III). The bull/cow ratio dropped 40.4 percent between

1972 and 1973 and is down 56.5 percent from 1971. Calf production is down slightly from 1972 when there were 41.2 calves per 100 cows. The change is not significiant. Calf production has remained good in this unit, averaging 37 calves/100 cows over the past 5 years.

Small bulls/100 cows, small bulls/100 large bulls and small bull percent of herd declined from 1971 to 1972 and again sharply between 1972 and 1973 (Appendix III).

Spring survival surveys have been flown annually in early May since 1971 (Appendix IV). These surveys, designed to determine calf survival through the winter, were initiated to determine if it is feasible to measure survival. A good correlation has been found between survival, as indicated by these surveys, and the following season's bull harvest. Small bull ratios in the fall have declined following springs when calf survival, as indicated by spring survival surveys, was low; further lending support to the validity of spring survival surveys (Appendix III and IV). Spring survival survey data may not reflect true ratios in the population, but simply an index of survival. More study is necessary to determine the validity of these data and how they may best be used for management purposes.

Based on low survival of calves to yearlings, as indicated by 1973 spring survival surveys, the antlerless season was postponed until after fall sex and age composition counts. Drastic declines in small bull ratios observed on sex and age composition surveys (Appendix III) confirmed low survival and the antlerless season was canceled.

Spring survival counts conducted in May 1974 indicate that survival of calves through the winter was again very poor (Appendix IV). The winter of 1973-74 was one of the more mild and open winters experienced in this area in the past five years. Calves appeared to be doing well until February. First reports of dead and morbid calves were received in March and continued through most of April, even though the snow was virtually gone by mid-April.

No evidence of adult mortality was noted when flying survival surveys, although numerous adults were noted to be in extremely poor condition. The high loss of calves due to malnutrition and poor condition of adults following a relatively mild winter with below average snowfall can only indicate severe range problems.

A census of moose in Subunits 15A and 15B combined was conducted by the Random Statified Sampling Technique. These counts, conducted by the U. S. Fish and Wildlife Service with assistance from the Department, have shown a decline in numbers between 1971 and 1974 of 26 percent (Appendix V). Since calf survival and small bull ratios observed in Unit 15B for the past 2 years have indicated herd growth, it is evident that most of the decline has taken place in Subunit 15A.

Management Summary and Conclusions

Although the reported 1973 harvest of 259 bulls was fair it was obtained at the expense of reducing the bull/cow ratio by over 40 percent

thus indicating that the bull harvest was well in excess of the number of bulls produced the preceding year.

Spring survival counts have been found to be of value at least as an indicator of calf survival through the winter. Indications of low survival have been substantiated later by changes in small bull ratios in the fall and by the harvest.

For the third year in succession overwinter calf survival has been very poor and numerous adults were noted to be in very poor condition. This condition, existing after a mild winter with below average snowfall, and with the population down 26 percent from 1971, can only indicate a severe range problem. It appears that the value of the 1947 burn as productive moose range has decreased considerably.

With calf survival very poor through the winter of 1973-74, and an already very low bull/cow ratio of 9.3 bulls per 100 cows, the outlook for bull hunting in the fall of 1974 is poor. With the current level of production it is doubtful that recruitment is sufficient to cover losses to road kills, poaching and wolf predation, much less sustain an antlerless harvest.

Recommendations

The 1974 season should be shortened to reduce the bull harvest and improve or at least maintain the bull/cow ratio. No antlerless season should be held until such time as an upward population trend is noted.

PREPARED BY:

Paul A. LeRoux
Game Biologist III

SUBMITTED BY:

John S. Vania
Regional Management Coordinator

MOOSE - GMU 15 (A) - Kenai

APPENDIX I

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

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	0	0	*		
	2nd	*	299	0	*		
	Combined	365	299	0	664	*	*
1966	1st	211	185	0	396		
	2nd	137	0	0	137		
	Combined	382[1]	185	0	567	*	*
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	0	0	91		
	Combined	268	1	0	269	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	209	*	*
	Combined	291[2]	191	11	493	918	54
1971	1st	153	223[2]	1	376		
	2nd	141	261[2]	0	402		
	Antlerless						
	Combined	369[1]	484[2]	4	853	1637	52
1972	1st	106	145[2]	1	236		
	2nd	54	0[2]	0	54		
	Combined	193[2]	145[2]	1	339	1518	22
1973	1st	156	4	2	162	1427	19
	2nd	82	2	1	85		
	Combined	259[1]	7[1]	4[1]	270		

* 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.

PREPARED BY: Paul A. LeRoux, Game Biologist III

APPENDIX II

Moose Sex and Age Composition - Subunit 15 (A)

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample
12/3-21/62	85	76	161	597	317	52	966	1127	2	423	18	1568
1/1964	-	-	-	-	284	19	-	1660	-	511	-	2171
12/1-12/64	145	66	211	1254	470	25	1740	1951	-	520	-	2471
6/1965*	-	-	298	475	188	17	680	978	-	222	-	1200
6/1966*	-	-	230	345	104	4	453	683	-	112	-	795
10/3-16/67*	29	17	46	280	96	18	394	440	-	135	-	575
12/1968*	148	125	273	945	598	32	1575	1848	14	676	137	2661
11/18-20/69	40	17	57	243	181	14	438	495	1	210	-	705
11/30-12/2/70	98	58	156	756	305	19	1080	1236	4	343	6	1586
11/8-16/71	185	98	283	940	367	17	1324	1607	14	415	5	2027
11/27-12/5/72	136	35	171	678	399	19	1096	1267	14	451	5	1723
11/21-27/73	89	17	106	752	367	21	1140	1246	15	424	7	1677

* Lowlands only

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX III

Moose Sex and Age Ratios - Subunit 15 (A)

Year	Total MM Per 100FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF W/calf	Calf % in Herd	Animals per Hour	Total Sample
1962*	16.7	7.9	89.4	4.8	35.8	43.8	14.9	27.0	--	1568
1963*	-	-	-	-	-	-	6.3	23.6	--	2171
1964*	12.0	3.8	46.0	2.7	25.4	29.9	5.1	21.0	--	2471
1965**	43.8	-	-	-	-	32.6	8.3	18.5	--	1200
1966**	50.8	-	-	-	-	24.7	3.7	14.1	--	795
1967**	11.7	4.3	58.6	3.3	25.0	34.3	15.8	23.5	--	575
1968	20.0	9.0	82.8	5.1	38.6	46.9	5.1	26.7	--	2661
1969***	17.4	-	-	-	-	42.8	-	29.7	--	705
1970	14.1	5.4	59.2	3.6	32.9	32.1	5.9	21.9	58	1586
1971	21.4	7.4	53.0	4.8	47.0	31.5	4.4	20.6	49.7	2027
1972	15.6	3.2	25.7	2.0	15.5	41.2	4.5	26.3	39.2	1723
1973	9.3	1.5	19.1	1.0	8.0	37.2	5.4	25.4	45.4	1677

* Varied count areas
** Lowlands only
*** Count areas 9A, 11, 12A, 12B, 18A, 18B

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX IV

Productivity (Spring Fall survival) Ratios and Percents

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]	21.4	24.6	42.8	16.4	29.7	44.8	744[2]
(5/14/71)[3]	15.8	14.0	32.1	10.9	21.9	50.2	239
(5/15/72)[4]	16.5	4.8	31.5	4.0	20.6	80.6	302
(5/10/73)	-	-	41.2	6.5	26.3	75.3	142
(5/7/74)[5]	-	-	37.2	6.5	25.4	74.4	277

* Use only if survey is conducted late enough to distinguish bulls, if not, work with calf % in herd.
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 Loop, Sterling Highway.
5 Area surveyed Beaver Creek, Swanson River, Moose River Flats and area between Skilak Loop Road and Kenai River.

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX V

Moose Population levels of Subunits 15 (A) and 15 (B) combined as determined by the random stratified sampling technique.

Year	Population Estimate	Confidence Limit
1964	8279 ± 1556	90%
1965	7432 ± 1561	90%
1966	7152 ± 1262	90%
1967	6732 ± 1413	90%
1971	7904 ± 1461	90%
1973	5692 ± 1348	90%
1974	4850 ± 1045	90%

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 15B - Soldotna

Seasons and Bag Limits

Unit 15B East, that portion of Subunit 15B east of the Funny River and a line from the headwaters of the west fork of the Funny River to the mouth of the Skantatalik Creek on the Kenai National Moose Range	Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose; provided that bull moose may be taken only from Aug. 20 - Sept. 30.
Unit 15B West, the remainder of Subunit 15B	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; antlerless moose may be taken by permit only.

Harvest and Hunting Pressure

Harvest reports indicate that hunters took 267 moose in Subunit 15B during the 1973-74 season (Appendix I). The reported harvest was composed of 145 bulls, 116 cows and 6 sex unknown. Sixty-two bulls were reported taken in 15 (B) east and 46 in 15 (B) west. Thirty-seven bulls were reported taken in 15 (B) with no subunit breakdown given. Distribution of these 37 bulls to 15 (B) east and 15 (B) west proportionately would give a harvest of 82 bulls in 15 (B) east and 63 in 15 (B) west. The entire cow harvest was from 15 (B) east.

Distribution of the harvest in 15 (B) east was poor. Over 50 percent of the antlerless kill came from the lowland area east of Funny River to Skilak Lake. In this area 53 cows and 14 bulls were reported taken. Thirty-seven percent of the bull harvest was from the upper Funny River Horse Trail area, while only three bulls were taken in the highland areas east of Funny River.

Sixty-five percent (174/267) of the total harvest was taken during the early season, and 27 percent (72/267) during the second season. Eight percent (21/267) of the harvest was either without a date of kill or taken during the closed season. Sixty percent (70/116) of the cow harvest was taken during the early season; 33 percent (38/116) during the second season and 7 percent (8/116) had no date of kill or was during the closed season.

Composition and Productivity

Sex and age composition surveys conducted in 1973 with the assistance of the USF&WS showed 35.5 bulls and 30.2 calves per 100 cows (Appendices II & III). The bull/cow ratio was up 14.9 percent from the 1972 level of 30.9 bulls per 100 cows. The bull/cow ratio does not appear to be

following a trend. Calf ratios were up 12.7 percent from 26.8 in 1972. Calf production appears to be on an upward trend having increased from 14.5 calves per 100 cows in 1970 to 30.2 in 1973.

Small bull ratios increased substantially from 1972 levels which were low because of poor calf survival through the winter of 1971-72. Small bulls per 100 females increased from 2.0 in 1972 to 4.6 in 1973; small bulls per 100 large bulls increased from 7.0 to 14.9 and small bull percent of herd from 1.3 to 2.8.

Spring survival surveys were initiated in Subunit 15 (B) in 1973 (Appendices IV & V). The 1973 surveys showed very high calf survival through the previous winter with yearlings comprising 16.3 percent of the herd. High small bull ratios in the fall of 1973 confirm that survival was good. The 1973 spring survival surveys again indicate good calf survival with yearlings comprising 15.0 percent of the herd. Although one year's data appears to indicate that spring survival surveys give a good indication of survival, these data should be used with caution. More study will be necessary to determine the accuracy of these surveys and their application for management purposes.

Management Summary and Conclusions

Harvest reports indicate a harvest of 145 bulls, 116 cows and 6 sex unknown moose during the 1973-74 season. The entire harvest of 116 cows came from Subunit (B) east. Sixty-five percent of the total harvest and 60 percent of the cow harvest was reported from the early season. The antlerless harvest was probably excessive in the lowlands east of Funny River to Skilak Lake.

The bull/cow ratio remains fairly high at 35.5 bulls per 100 cows. Calf production is good at 30.2 calves per 100 cows and appears to be on an ascending trend.

Distribution of the harvest, particularly of cows, is a concern. Too many cows were harvested in the lowland area near access points and too few in the inaccessable highland areas. The harvest of bulls in the upper Funny River Horsetrail areas was in excess if a trophy herd is to be maintained.

Spring survival surveys indicate good calf survival through the winter of 1973-74.

Recommendations

Management plans, scheduled for implementation in 1975, should better distribute the harvest of both bulls and cows; therefore, the harvesting of cows should be suspended during 1974. Elimination of the either-sex season should reduce the attractiveness of the area and reduce the bull kill in the upper Funny River Horsetrail area.

PREPARED BY:

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Game Biologist III

SUBMITTED BY:

John S. Vania
Regional Management Coordinator

MOOSE - GMU 15 (B) - SOLDOTNA

Appendix I

Moose Harvest and Hunting Pressure - Subunit 15 (B) - Soldotna

Year	Bulls	Cows	Unk. Sex	Totals	No. Hunters	Percent Success
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.]	55[3.]	2[1.]	176		
1970	69[1.]	75[1.] *(15BE=50, 15BW=18) (Unk.=7)	2[1.]	146		
1971	128[1.]	79[2.](15BE)	5[1.]	212		
1972	73[1]	11[2] (15BE)	1[1]	85		
1973	145[1] 15BE=82 15BW=63	116[1] (15BE)	6[1]	267	877	30.4

[1] Data derived from harvest reports.
[2] Data derived from registration permit returns.
[3] Data derived from field observations.

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (B) - SOLDOTNA

APPENDIX II

Moose Sex and Age Composition - Subunit 15 (B)

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose Per Hour
12/3-21/62	377	61	438	673	317	28	1018	1456	2	375	1	1832	-	-
1963	NO COUNTS MADE													
12/64	337	46	383	690	166	10	866	1249	1	187	0	1437	22	65
1965	NO COUNTS MADE													
1966	NO COUNTS MADE													
1967	NOT AVAILABLE													
1968	NO COUNTS MADE													
1969	NO COUNTS MADE													
12/2-4/70& 12/12/70	184	17	201	455	75	2	531	732	0	77	5	817	10.4	78.6
1971	NO COUNTS MADE													
12/1-2/72	200	14	214	515	174	4	693	907	4	186	0	1093	17.79	61.4
11/19-21/73	188	28	216	436	166	7	609	825	4	184	1	1010	23.4	43.2

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (B) - SOLDOTNA

APPENDIX III

Moose Sex and Age Ratios - Subunit 15 (B)

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Animals per Hour	Total Sample
1962	43.2	6.0	16.2	3.3	32.5	36.9	8.1	20.4	-	1832
1963	NO COUNTS MADE									
1964	44.2	5.3	13.7	3.2	52.0	21.6	5.7	13.0	65	1437
1965	NO COUNTS MADE									
1966	NO COUNTS MADE									
1967	28.8	3.5	13.8	2.4	44.0	15.8	2.0	10.9	-	457
1968	NO COUNTS MADE									
1969	NO COUNTS MADE									
1970	37.8	3.2	9.2	2.1	47.2	14.5	2.6	9.4	78.6	817
1971	NO COUNTS MADE									
1972	30.9	2.0	7.0	1.3	15.1	26.8	2.3	17.0	61.4	1093
1973	35.5	4.6	14.9	2.8	30.4	30.2	4.0	18.2	43.2	1010

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (B) - SOLDOTNA

APPENDIX IV

Moose Productivity (spring-fall survival) Composition

Date	Cows w/1 Ylgs.	Cows w/2 Ylgs.	Total Cows	Unid. Adults	Total Adults	Lone Ylgs.	Total Ylgs.	Unid. Sex & Age	Total Sample
5/11/73	10	0	10	67	77	5	15	0	92
5/08/74	16	0	16	92	108*	3	19	0	127

* Includes 9 bulls

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (B) - SOLDOTNA

APPENDIX V

Moose (spring-fall survival) ratios and percents

Date	Calves/ 100 cows in fall	Yrlg. % of herd	Calf % of fall herd	% Calf winter mortality	Total Sample
5/11/73	26.8	16.3	17.0	4.1	92
5/08/74	30.2	15.0	18.2	21.3	127

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 15C - Homer

Seasons and Bag Limits

August 20 - Sept. 10	One moose; antlerless moose **may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement.**

Harvest and Hunting Pressure

Harvest report returns indicate a harvest of 152 bulls in Subunit 15C during the 1973 season (Appendix I). The bull harvest was down 10.6 percent from 1972 and was 51.8 percent below the average for the preceding five years. The decline in the bull harvest is attributed to a 30 day shorter season in 1973.

A permit registration antlerless hunt was held September 1-23, 1973; 500 permits were issued and 143 antlerless moose were reported harvested. The season was closed by emergency order on September 23 even though the desired harvest had not been reported. The closure was prompted by numerous complaints from successful permittees who knew of persons who had killed an antlerless moose but were not reporting because they hoped to get another. This, along with other evidence of widespread poaching, prompted closure before the quota of 250 had been reported. A harvest of 143 female moose was reported by permit returns. The female harvest reported by harvest reports was 122, for a difference of 14.6 percent. In 1972 the difference was 5 percent.

Composition and Productivity

Sex and age composition counts were conducted in all count areas of Subunit 15C except a part of count area H - Fox River (Appendices II and III). The bull/cow ratio increased from 9.8 bulls per 100 cows in 1972 to 18.8 bulls per 100 cows in 1973. Small bull ratios increased substantially indicating good survival of calves to yearlings, although these figures are probably partly inflated by the reduced harvest of bulls.

Calf production increased from 25.4 calves per 100 cows in 1972 to 27.9 in 1973. The increase was most likely higher than indicated as the figure is biased by the high proportion of non-breeding yearling cows.

Spring survival surveys (Appendix IV) have been conducted in May since 1972. Although the samples are small, the data obtained appear to

be usable at least as a gross indicator of survival. Low survival, as indicated by 1972 spring survival surveys, was confirmed by: 1) the low yearling bull ratios observed in the fall of 1972; 2) the substantial decline in the 1972 total bull/cow ratio and 3) the low harvest of bulls in 1972. The low percentage (7.5 %) of yearlings in the 1972 antlerless harvest further substantiates low survival of calves through the winter of 1971-72.

Conversely, spring survival counts conducted in the spring of 1973 indicated very good yearling survival. In addition fall composition counts showed substantial increases in yearling bull ratios. The bull/cow ratio almost doubled with the harvest being only slightly lower than in 1972. Also lending support to the increase was the harvest of 152 bulls in 20 days of hunting compared to the 1972 harvest of 170 bulls in 50 days.

The 1974 spring survival surveys also indicated very good survival of calves through the winter, however, the sample size was very small. Error in this survey is obvious since the spring surveys show a higher percent of yearlings in the herd than there were calves in the fall. Caution should be excercised in the use of spring survival data. Although there appears to be a good correlation between survival, as indicated by these surveys, and survival as indicated by fall surveys, the ratios observed may not be representative of the true ratios in the population. More study will be necessary to determine the value of these surveys for management purposes.

One hundred and fourteen cows older than calves from the 1973 antlerless harvest were aged by the cementum annuli method (Appendix V). Comparison of these data with other female age data back to 1969 suggests little change in the age structure of the harvest. The high survival of calves over the previous winter is further confirmed by the magnitude (22 percent) of the yearling age class in the cow harvest.

Management Summary and Conclusions

The 1973 harvest of 152 bulls was the lowest ever recorded and was a result of reducing the season by 30 days. Because of the lowered harvest and high survival of calves from the previous year the bull/cow ratios increased from 9.8 to 18.8 and yearling bull ratios (Appendix II) improved substantially. Calf production appears to be on the upward trend, increasing from a low of 18.7 calves per 100 cows in 1971 to 27.9 in 1973. Survival of calves through the winter of 1973-74 appears to have been very good as indicated by limited spring survival surveys.

The reported antlerless kill of 143 was only slightly lower than the bull harvest of 152. Indications are that because of poaching and failures to report antlerless kills the actual harvest may have been substantially higher. There was no way of estimating the unreported kill. Poaching and reports of violations of the reporting conditions of

the antlerless permits caused the closing of the antlerless season before the quota of 250 had been reached.

Comparison of mean ages of the antlerless harvest from 1969-73 does not show a trend. The magnitude of the antlerless harvest through these years has not been sufficient to significantly change the age structure of the population.

Recommendations

Since the bull/cow ratio has improved to an acceptable level (18.8 bulls per 100 cows) it is recommended that the bull season be liberalized to allow the harvest of most of the annual increment of bulls. The harvesting of antlerless moose should take place during the closed season for bulls to allow concentration of the enforcement effort and closer monitoring of the hunt. The impact of the rapidly expanding wolf population must be considered when the antlerless harvest quota is established.

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SUBMITTED BY:

John S. Vania
Regional Management Coordinator

MOOSE - GMU 15 (C) - HOMER

Appendix I

Moose Harvest and Hunting Pressure - Subunit 15 (C) - Homer

Year	Bulls	Cows	Unk. Sex	Total	Hunters	Percent Success
1961	-	106[2]	-	-	-	-
1962	-	100[2]	-	-	-	-
1963	349[1]	147[1]	-	496	-	-
1964	470[1]	337[1]	-	807	-	-
1965	263[1]	229[1]	-	492	-	-
1966	278[1]	72[1]	-	350	-	-
1967	294[1]	-	-[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

[1] Data derived from harvest ticket reports.
[2] Data derived from permit hunt reports.
[3] Data derived from field observations.

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (C) - Homer

APPENDIX II

Moose Sex and Age Ratios - Subunit 15 (C)

Year	Total 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	Twins Per 100 FF w/calf	Calf % in Herd	Animals Per Hour	Total Sample
1964	22.4	7.8	53.6	2.8	5.6	24.3	2.1	19.5	52.0	1848
1965	32.6	9.7	42.3	5.9	62.5	31.2	6.0	19.0	57.0	1889
1966	16.9	6.3	59.6	4.3	41.0	30.7	4.5	20.8	61.0	794
1967	21.0	6.6	46.0	4.2	34.0	40.0	14.0	25.6	150.0	3038
1968	20.5	6.1	41.8	3.8	30.2	40.1	6.9	25.0	60.5	1883
1969	13.9	6.5	88.0	4.5	46.5	27.9	5.8	19.1	53.6	1636
1970	20.4	3.3	25.1	2.3	27.1	24.3	4.1	16.8	150.0	1992
1971	26.0	7.7	42.2	5.3	82.6	18.7	7.7	12.8	48.4	1436
1972	9.8	0.8	8.7	0.6	6.2	25.4	2.1	18.8	72.5	2073
1973	18.8	7.1	60.3	4.8	50.6	27.9	3.9	19.0	62.9	1833

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (C) - Homer

APPENDIX III

Moose Sex and Age Composition - Subunit 15 (C)

Year	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose Per Hour
12/8-17/64	97	52	149	323	336	7	665	1487	-	361	673	1848	-	52
11/30/65 12/17/65	265	112	377	824	313	20	1158	1538	12	361	3	1899	33.08	57
12/20-29/66	57	34	91	384	147	7	538	629	4	165	13	794	13.0	64
10/24-28/67	277	127	404	1196	641	50	1887	2291	6	747	0	3038	19.0	160
11/68	170	71	241	738	404	30	1172	1413	6	470	0	1883	31.0	60
12/11-12/69	83	73	156	826	278	17	1121	1277	1	313	46	1636	30.3	53
11/1-3/70	235	45	280	1051	306	13	1370	1650	1	333	9	1992	13.2	150
11/22-24/71	180	76	256	814	156	13	983	1239	2	184	13	1436	29.67	48
11/28-12/2/72	138	12	150	1149	368	8	1525	1675	3	387	11	2073	28.6	72
11/19-12/1-73	146	88	234	914	320	13	1247	1481	2	348	4	1833	29.3	63

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (C) - Homer

Appendix IV

Productivity (spring fall survival) Ratios and Percents

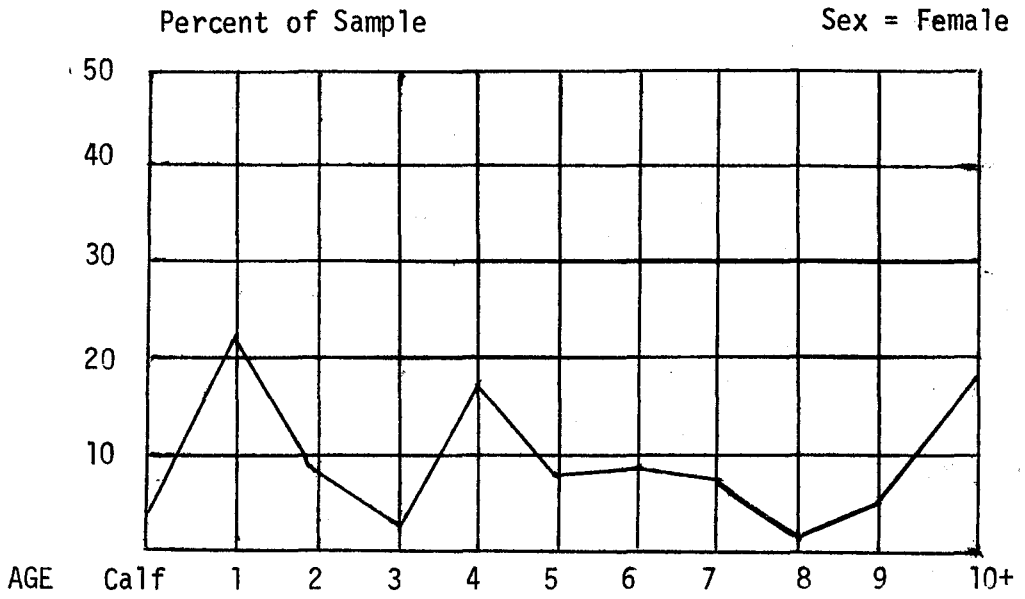
Date	Bulls/ 100 Cows	Yearlings/ 100 Cows	Calves/ 100 Cows in Fall	Yrlg. % of Herd	Calf % of Fall Herd	% Calf Winter Mortality	Total Sample
5/8/72	-	-	18.7	1.0	12.8	92.1	102
5/11/73	-	-	25.4	16.1	18.8	14.4	149
5/8/74	-	-	27.9	20.3	19.0	-	64

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (C) - Homer

Appendix V

Age Structure of Antlerless Moose Harvest 1973



Sample Size = 118
Mean Age = 5.57
(exclude calves)
% Over 6 Years = 32.2

AGE	#	%	AGE	#	%
Calf	4	3.4			
1 -	26	22.0	11 -	4	3.4
2 -	8	6.8	12 -	5	4.2
3 -	3	2.5	13 -	4	3.4
4 -	20	16.9	14 -	2	1.7
5 -	8	6.8	15 -	1	0.8
6 -	11	9.3	16 -	1	0.8
7 -	8	6.8	17 -	0	0
8 -	2	1.7	18 -	1	0.8
9 -	7	5.2	19 -	0	0
10 -	3	2.5	20 -	0	0
			Total	118	99.7

Season ran Sept. 1-23, 1973

PREPARED BY: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 16 - West Side of Cook Inlet

Seasons and Bag Limits

Subunit 16A	Aug. 20 - Sept. 20 Nov. 1 - Nov. 10	One moose; antlerless moose may be taken by permit only; dates and conditions of hunt will be described by Commissioner's announcement.
That portion of Subunit 16B from the junction of the Yentna and Skwentna Rivers, thence along the Skwentna River to Portage Creek to its headwaters at Stony Glacier, thence north along the Unit 16 boundary to the west side of Yentna Glacier, thence down the Yentna River to its junction with the Skwentna River. Boundaries will be the outermost bank of the boundary rivers and creek.	Aug. 20 - Nov. 30	One moose.
Remainder of Subunit 16B	Aug. 20 - Sept. 30 Nov. 1 - Nov. 30	One moose.

An emergency order issued by the Alaska Department of Fish and Game closed Subunit 16B to moose hunting effective at midnight, November 20, 1973.

Harvest and Hunting Pressure

The final IBM reported harvest for Unit 16 totaled 925 moose of which 609 were males, 297 were females and 19 were of unknown sex (Appendix I). A total of 83 moose including 78 males and 5 females were reported taken from Subunit 16A (Appendix II), and 842 animals including 531 males, 292 females and 19 moose of unknown sex came from Subunit 16B (Appendix III). No breakdown is available to determine which animals were taken in the portion of Subunit 16B between the Yentna and Skwentna Rivers.

The reported harvest of 925 moose from all of Unit 16 is the largest take ever recorded from the unit. It is 52 percent greater than

the 1972 harvest and 30 percent greater than the 1968 through 1972 average of 709 per year. The harvest of 83 moose from Subunit 16A is less than the 1972 reported harvest of 101 moose from that area. No antlerless season was held in Subunit 16A during 1973.

A total of 441 moose (303 males, 128 females and 10 unidentified) were reported taken from Unit 16 during the August - September moose season and 413 (265 males, 143 females and 5 unidentified) were taken during the November season. Nine bulls and eight cows were reported taken in October in the Yentna-Skwentna triangle portion of Subunit 16B.

In Subunit 16A more than twice as many bull moose were taken during the second season (49) as were taken during the first season (22). In subunit 16B more bulls were taken during the first season (281) than during the second season (216).

Means of transport data indicate that 80.6 percent of the successful moose hunters in Unit 16 utilized aircraft during their hunt (Appendix IV). Other methods of transport were utilized by very few successful hunters.

Monitoring the November moose season by aircraft in Unit 16 revealed heavy aerial hunting pressure on accessible groups of moose in some areas such as Sunflower Basin, Tyonek Ridge, Yenlo Hills and Fairview Mountain. This heavy pressure by hunters utilizing aircraft, coupled with the regulation which left the season open 10 days longer in Subunit 16B than in surrounding areas, prompted the Commissioner to close the season in 16B effective at midnight, November 20.

Composition and Productivity

Aerial sex and age composition counts were conducted in portions of Unit 16 during 1973. The Peters Hills count area was flown for the sixth consecutive year and a sample size of 856 moose was obtained (Appendix V). The bull/cow ratio of 20.7 bulls per 100 cows was above last year's level of 18.8, but still below the 1967-72 average of 26.0 bulls per 100 females. The calf/cow ratio of 45.2 calves per 100 cows was above the level of the past two years as was the incidence of twins which stood at 11.3 twins per 100 females with calf.

An additional count area was flown in Sunflower Basin adjacent to the Peters Hills count area (Appendix VI). In a sample of 494 moose, the bull/cow ratio of 29.5 was above that of the Peters Hills. A calf/cow ratio of 34.1 calves per 100 cows and twinning rate of 7.3 per 100 females with calf were below those of Peters Hills.

The Mt. Susitna - Mt. Beluga count area was flown for the fifth time since 1968 (Appendix VII) and a bull/cow ratio of 34.1 bulls per 100 cows was determined. This is above the 1972 level, but below the

1968-1972 average of 45.6 bulls per 100 females. The calf/cow ratio of 44.1 calves per 100 females was the highest on record and the twinning rate of 11.3 calves per 100 females with calf was at the highest level since 1970. However, the sample size of 324 was smaller than normal. It appeared that many of the moose from this count area had moved down onto their winter range prior to the aerial survey. This prompted a survey of Alexander Creek on December 3, 1973 (Appendix VIII). Here a sample of 116 moose was obtained in 15 minutes for a rate of 464 moose per hour. In this group the incidence of bulls and calves was lower. The bulls per 100 cows ratio was 10.7 while the calf/cow ratio stood at 27.4. Similarly the incidence of twins was low.

The Redoubt Bay count area was flown for the second year in a row and the bull/cow ratio rose from 10.8 bulls per 100 cows in 1972 to 21.8 in 1973 (Appendix IX). Most of the gain was observed in the small bulls category. The calves per 100 females ratio increased from 26.1 in 1972 to 41.5 in 1973. The incidence of twins similarly increased from 6.9 twins per 100 females with calf in 1972 to 17.2 in 1973.

Management Summary and Conclusions

The reported harvest of 925 moose from Unit 16 is the largest on record. Over 80 percent of these moose were taken with the use of aircraft.

Although the total Unit 16 moose harvest has increased, the harvest in Subunit 16A has declined. This was due in part to the fact that no antlerless season was held in 16A during 1973.

Over the entire unit slightly more than half the moose were taken during the August - September season. Females made up a greater percentage of the harvest during the November season.

In Subunit 16A more than twice as many bull moose were taken during the November season than during the early fall season. In Subunit 16B slightly more bulls were taken during the first season than during the second.

Nine bulls and eight cows were the only moose reported taken during the month of October between the Yentna and Skwentna Rivers.

Hunters utilizing aircraft were particularly efficient during November in some above-timberline areas where moose concentrate. This prompted the closure of Subunit 16B ten days earlier than the scheduled November 30 closure.

Moose sex and age composition surveys throughout Unit 16 suggest the population in this area is recovering from losses sustained during the very severe winters of 1970-71 and 1971-72. Calf production and

bull/cow ratios are at higher levels than during past years. A decline in sample size in the Mt. Susitna-Mt. Beluga count area may be the result of migration from the area. The high density of moose along Alexander Creek lends credence to this supposition.

Recommendations

The proximity of Unit 16 to Alaska's largest population center, coupled with the increase in domestic meat prices, suggest that harvests in this area should be closely monitored. Moose seasons in Subunit 16A should not be longer than in surrounding units accessible by road. Moose seasons in Subunit 16B should be reduced in length during the November season when large numbers of moose are vulnerable to ski equipped aircraft. However, this latter problem may be solved by a recent Board of Fish and Game action adding moose to the list of species that may not be hunted the same day the hunter is airborne.

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Game Biologist III and Game Biologist II

SUBMITTED BY:

John S. Vania
Regional Management Coordinator

Appendix I. Moose harvest and hunting pressure in Alaska's Game Management Unit 16, West Side of Cook Inlet.

Year	Season	Bulls	Cows	Unid.	Total		Hunters	Percent Success
1968	First	227	0	0	227			
	Second	183	0	0	183			
	Antlerless	0	39	0	39			
	Unk. Date	22	7	9	38			
TOTAL		432	46	9	487		860	56.6
1969	First	252	0	5	257	*	The antlerless season bull harvest unobtainable from present program.	
	Second	183	0	1	184			
	Antlerless	0*	123	0	123			
	Unk. Date	180	44	1	225			
TOTAL		615	167	7	789		1366	57.8
1970	First	238	0	3	241			
	Second	228	152	5	385			
	Antlerless	0	0	0	0			
	Unk. Date	132	60	7	199			
TOTAL		598	212	15	825		1442	57.2
1971	First	174	0	0	174	**	All female harvest incorporated into antlerless season.	
	Yentna Area (Oct.)	9	**	1	10			
	Second	249	**	4	253			
	Antlerless	0	174	2	176			
	Unk. Date	153	61	8	222			
TOTAL		585	235	16	836		1648	50.7
1972	First	142	0	1	143	**	All female harvest incorporated into antlerless season.	
	Yentna Area (Oct)	11	**	0	11			
	Second	236	**	0	236			
	Antlerless	0	119	0	119			
	Unk. Date	69	25	4	98			
TOTAL		458	144	5	607		1413	42.9
1973	First	303	128	10	441	***	Includes moose reported taken from Subunit 16A in October, and 16A and B in December, January and February.	
	Yentna Area (Oct)	9	8	0				
	Second	265	143	5	413			
	Antlerless	0	0	0	17			
	Unk. Date ***	32	18	4	54			
TOTAL		609	297	19	925		1995	46.4

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix II. Chronology of moose harvest from harvest reports in Alaska's Game Management Subunit 16A, 1973.

	August	September				October	November	
	20-31	1-7	8-15	16-23	24-30	1-31	1-7	8-15
Male	11	6	2	2	1	2	35	12
Female	0	0	0	0	0	0	2	1
Unknown	0	0	0	0	0	0	0	0
Total	11	6	2	2	1	2	37	13

	November		December					
	16-23	24-30	1-7	8-15	16-23	24-31	Jan.-Feb.	No Date
Male	2	0	0	0	0	0	0	5
Female	1	0	0	0	0	0	1	0
Unknown	0	0	0	0	0	0	0	0
Total	3	0	0	0	0	0	1	5

Remarks: Season: Aug. 20 - Sept. 20
Nov. 1 - Nov. 10

Total males	78
Total Females	5
Total Unknown	0
Total	83

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix III. Chronology of moose harvest from harvest reports in Alaska's Game Management Subunit 16B, 1973.

	August	September				October	November	
	20-31	1-7	8-15	16-23	24-30	1-31	1-7	8-15
Male	70	49	65	53	44	9	86	70
Female	37	17	29	22	23	8	39	48
Unknown	5	2	1	2	0	0	1	1
Total	112	68	95	77	67	17	126	119

	November		December					
	16-23	24-30	1-7	8-15	16-23	24-31	Jan.-Feb.	No Date
Male	59	1	0	0	0	0	0	25
Female	51	1	1	0	1	0	0	15
Unknown	3	0	0	0	0	0	0	4
Total	113	2	1	0	1	0	0	44

Remarks: Season: Aug. 20 - Sept. 30
Nov. 1 - Nov. 20

Portion between Yentna and Skwentna Rivers Aug. 20 - Nov. 30*

Total males	531
Total females	292
Total Unknown	19
Total	842

* Closed by Commissioner's announcement on Nov. 20.

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix IV. Hunter success vs. transport means from harvest reports data in Alaska's Game Management Unit 16, 1973

*Transport Means	**Successful Means of Transport Res.	NR	Unk.	Total	Percent of Success. Hunters Utilizing Transport Means	***Unsuccessful Means of Transport Res.	NR	Unk.	Total	Total of Success. & Unsuccess. Methods of Transport Reported
1. Aircraft	658	92	29	779	80.6%	450	27	14	491	1270
2. Horse	0	0	0	0	0.0%	9	0	0	9	9
3. Boat	52	3	2	57	5.9%	84	4	2	90	147
4. Motorbike	1	0	0	1	0.1%	9	0	0	9	10
5. Snow machine	35	1	3	39	4.0%	109	3	6	118	157
6. Offroad vehicle	20	0	0	20	2.1%	95	4	1	100	120
7. Highway vehicle ("afoot")	37	8	2	42	4.3%	335	5	13	353	395
8. 1/ Afoot	-	-	-	-	-	-	-	-	-	-
No means reported	26	1	1	28	2.9%	92	2	2	96	124

* Method of transport means will be counted more than once when listed in combinations.

** Many hunters reported more than one means of transportation used; therefore, these figures do not indicate the actual number of either successful or unsuccessful hunters afield.

*** Unsuccessful moose hunters are not required to mark method of transporation on IBM harvest report card.

1/ Up to 1970 use this column for afoot. After 1970 "afoot" is combined with highway vehicle category.

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix V. Moose sex and age composition and ratios in Alaska's Game Management Unit 16, Peters Hills Count Area, 1967-1973.

Area*	Date	Large M	Small M	Total M	F W/0	F W/1	F W/2	Total F	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)
1.	12/4-6/67	121	52	173	443	205	31	679	852	2	269	0	1121	8.9
2.	12/9-20/68	60	32	92	225	115	10	350	442	5	140	5	587	10.1
3.	11/12-23/70	67	42	109	177	131	18	326	435	0	167	0	602	N/A
3.	11/8-9/71	94	40	134	354	153	5	512	646	1	164	5	815	19.3
3.	11/6/72	82	12	94	366	122	12	500	594	2	148	0	742	18.4
3.	11/27-28, 12/1/73	74	31	105	303	181	23	507	612	4	229	15	856	20.8

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	25.5	7.7	43.0	4.6	38.7	39.6	13.1	24.0	126	1121
1968	26.3	9.1	53.3	5.5	45.7	40.0	8.0	23.8	58	587
1970	33.4	12.9	62.7	7.0	50.3	51.2	12.1	27.7	N/A	602
1971	26.2	7.8	42.6	4.9	48.8	32.0	3.2	20.1	42	815
1972	18.8	2.4	14.6	1.6	16.2	29.6	9.0	19.9	40	742
1973	20.7	6.1	41.9	3.7	27.1	45.2	11.3	27.2	41	856

Remarks: *1. Peters Hills to Kahiltna
2. Peters Hills and Petersville Road
3. Count Areas A, B, C, D, E, F

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix VI. Moose sex and age composition and ratios in Alaska's Game Management Unit 16 Sunflower Basin Count Area, 1973.

Date	Large M	Small M	Total M	F W/O	F W/1	F W/2	Total F	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)
10/23/73	64	25	89	206	89	7	302	391	0	103	0	494	5.8

Year	Total M per 100 F	Small M per 100 F	Small M per 100 Large M	Small M % in Herd	Small M per 100 M calves	Calves per 100 F	Incidence of Twins per 100 F w/calf	Calf % in Herd	Animals per Hour	Total Sample
1973	29.5	8.3	39.1	5.1	48.5	34.1	7.3	20.9	85	494

PREPARED BY: Jack C. Didrickson, Game Biologist III

Appendix VII. Moose sex and age composition and ratios in Alaska's Game Management Unit 16, Mt. Susitna - Mt. Beluga Count Area, 1968 - 1973.

Date	Large M	Small M	Total M	F W/0	F W/1	F W/2	Total F	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)
12/12, 14, 17/1968	105	19	124	191	64	3	258	382	0	70	5	457	8.5
1969	Not Flown												
12/1/1970	49	9	58	64	22	3	89	147	0	28	0	175	2.1
10/29/1971	240	65	305	445	181	8	634	939	1	198	2	1139	18.4
12/6-7/1972	80	4	84	330	69	1	400	484	2	73	0	557	14.0
11/25-26, 12/3/1973	49	12	61	108	63	8	179	240	0	79	5	324	9.9

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	48.1	7.4	18.1	4.2	54.3	27.1	4.5	15.3	54	457
1969	Not Flown									
1970	65.2	10.1	18.4	5.1	64.3	31.5	12.0	16.0	85	175
1971	48.1	10.2	27.1	5.7	65.6	31.2	4.2	17.4	63	1139
1972	21.0	1.0	5.0	0.7	11.0	18.3	1.4	13.1	40	557
1973	34.1	6.7	24.5	3.8	30.4	44.1	11.3	24.8	33	324

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Appendix VIII. Moose sex and age composition and ratios in Alaska's Game Management Unit 16, Alexander Creek Count Area, 1973.

Date	Large M	Small M	Total M	F W/0	F W/1	F W/2	Total F	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)
12/3/73	7	2	9	62	21	1	84	93	0	23	0	116	.25

Year	Total M per 100 F	Small M per 100 F	Small M per 100 Large M	Small M % in Herd	Small M per 100 M Calves	Calves per 100 F	Incidence of Twins per 100 F w/calf	Calf % in Herd	Animals per Hour	Total Sample
1973	10.7	2.4	28.6	1.7	17.4	27.4	4.5	19.8	464	116

Appendix IX. Moose sex and age composition and ratios in Alaska's Game Management Unit 16, Redoubt Bay Count Area, 1972 - 1973.

Date	Large M	Small M	Total M	F W/0	F W/1	F W/2	Total F	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)
12/3-4/72	24	2	26	183	54	4	241	267	1	63	0	330	7.3
12/1/73	26	15	41	124	53	11	188	229	3	78	0	307	8.5

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
1972	10.8	0.8	8.3	0.6	6.3	26.1	6.9	19.1	45	330
1973	21.8	8.0	57.7	4.9	38.5	41.5	17.2	25.4	36	307

PREPARED BY: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 17 - Bristol Bay

Season and Bag Limits

Aug. 20 - Dec. 31 One bull

Harvest and Hunting Pressure

The 1973 season produced a reported harvest of 42 moose from Unit 17 (Appendix I). Reporting residents were responsible for 63.4 percent of the harvest.

Composition and Productivity

No data are available.

Management Summary and Conclusions

The reported harvest of 42 moose is minimal for Unit 17. The majority of the actual harvest goes unreported since it occurs in the late winter and early spring after the season has closed. Unit residents killing moose for meat during this period are keeping moose populations depressed in most areas. Public relation efforts to obtain voluntary compliance with the regulations have not been successful in reducing the illegal harvest because the harvest is considered "traditional" by residents.

Recommendations

No changes in seasons or bag limits are recommended. Efforts to obtain compliance with the regulations should be continued.

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Regional Management Coordinator

MOOSE - GMU - 17 Bristol Bay

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 17

Year	Bulls	Cow*	Unid.	Total	Hunters	Percent Success
1964	31	1	-	32	-	-
1965	41	1	-	42	-	-
1966	25	1	-	26	90	28.9
1967	37	0	1	38	77	49.4
1968	45	0	1	46	66	69.7
1969	11	1	3	15	31	48.4
1970	23	0	2	25	35	71.4
1971	36	0	1	37	63	58.7
1972	35	0	3	38	74	51.4
1973	39	2	1	42	94	44.7

* No legal cow season has been held.

PREPARED BY: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 18 - Yukon-Kuskokwim Delta

Seasons and Bag Limits

Aug. 20 - Dec. 31 One Bull

Harvest and Hunting Pressure

Although the reported 1973 moose harvest was 10 moose, the actual harvest was possibly in excess of 50. Most moose are taken in areas adjacent to Units 19 and 21. There is considerable illegal moose hunting (mainly taking of females in a bull-only area) in the unit by local residents mostly enroute to hunting areas in Units 19 and 21. Numerous moose are also taken in the spring during the trapping season.

Range and Habitat

No formal studies of moose range or habitat have been conducted in Unit 18. Observations made during the course of other survey activities indicate that the unit should be capable of supporting a much larger moose population. Riparian willow habitats in other areas similar to Unit 18 support moose in the winter and it is unlikely that summer range or environmental conditions would exclude moose from many presently unoccupied areas.

Population Trends

Moose are not abundant in Unit 18 even in areas where they occur. Most of the unit is devoid of moose. Little change has occurred in recent years.

Management Summary and Recommendations

Village contacts are suggested in order to inform and instruct local residents of the use and value of moose harvest tickets.

Enforcement of the regulations should allow moose to pioneer and establish new populations in areas presently without moose.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 19 - McGrath

Seasons and Bag Limits

*Aug. 20 - Feb. 28	Two moose; one of which may be antlerless (antlerless moose may not be taken prior to Oct. 1).

* A portion of the unit was closed by field announcement on January 15, 1974.

Harvest and Hunting Pressure

The reported 1973-74 moose harvest was 170 bulls, 41 cows and 7 unspecified for a total of 218 animals. This represents the largest reported kill since the inception of the harvest ticket scheme in Unit 19. Most of the increase can be attributed to the expanded hunting effort of both local residents and hunters from adjacent units. In contrast to the 1972 season hunters found moose more abundant and available earlier in the fall. Heavy snowfall by late November prompted an early movement of moose into the river valleys. Moose were heavily concentrated along the Kuskokwim from the Selatna River to Big River by January 1, 1974. In order to prevent an excessive harvest of moose the season was closed along this section of the Kuskokwim on January 15, 1974. This closure accomplished its purpose as well as diverting late hunting pressure into the foothills of the Alaska Range, where the harvest of cows was more desirable.

Hunting pressure increased greatly in the drainages of the Holitna and Hoholitna Rivers during the early fall of 1973. Most of the hunters utilizing this area were residents of Unit 18. I would estimate this group was in excess of 200 hunters seeking moose along these drainages. Most of the moose taken by this group were not reported on harvest tickets. The estimated kill for Unit 19, including those unreported, possibly exceeded 500 moose.

Composition and Productivity

Sex and age composition counts were made in the McGrath and Farewell areas of Unit 19 during December 1973 (Appendices I and II). Of interest was the contrast in bull:cow ratios from these areas (Appendix III). The Farewell counts of 28.3 bulls:100 cows reflect the trophy oriented hunting effort common to this area. Likewise, the 48.2 bulls:100 cows represented by the McGrath sample suggests a more balanced take of cows. Calf productivity and survival apparently improved in both areas during the past year, even though survival was not high. In the Farewell area there were 30 calves per 100 cows and at McGrath there were 21 calves per 100 cows.

Range and Habitat

Snow depths for part of the reporting period are presented in Table 1. The data for the wooded areas represent an average from three stations. The McGrath airfield data were taken at the FAA facility. Measurements were made each month at the maximum depth following snowfall and before settling.

Table 1. Snowfall 1973-1974.

Location	Nov. 25	Dec.	Jan.	Feb.	March	April 15
Wooded Areas	35"	32"	36"	39"	43"	32"
McGrath	29"	24"	25"	28"	34"	20"

No ice layers were present in the 1973-74 snowpack. In fact, the snow was generally of a light and uncompacted nature most of the winter. Snowfall was generally lighter to the east of McGrath in the Alaska Range (with the exception of the Hoholitna and Holitna drainages).

Moose were heavily concentrated by deep snow along the Holitna and Hoholitna Rivers. Wolf predation was intensive due to deep snow and concentrations of moose. This resulted in substantial calf mortality. Over 100 wolves were present in this 4,300 sq. mi. drainage during the spring of 1974.

Population Trends

Moose populations in Unit 19 have shown an encouraging recovery from the severe losses of the 1971-72 winter. However, stocks of moose are not yet near the levels reached prior to 1970. In some areas recovery has been very slow or set back by adverse local conditions, such as in the Holitna-Hoholitna area. Conditions for production and survival over most of the unit have generally been good during the past two years.

Management Summary and Recommendations

The moose population in this unit is still down compared to 1970 and earlier levels. Restrictive changes in seasons and bag limit are thought unnecessary unless a severe winter causes concentrations of moose along the river systems.

In areas where human utilization is increasing such as the Holitna River drainage, wolves should be reduced as the hunter kill increases.

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Appendix I. Summary of moose population composition counts, Unit 19.

Area	Date	Large Bull	Small Bull	Total Bulls	Cow W/0	Cow W/1	Cow W/2	Total Cows	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
McGrath	12/11/73	49	5	54	89	23	--	112	166	--	23	--	189	2.5	75

Appendix II. Summary of moose population composition counts, Unit 19.

Area	Date	Large Bull	Small Bull	Total Bulls	Cow W/0	Cow W/1	Cow W/2	Total Cows	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Farewell L.	12/19/73	16	1	17	43	16	1	60	77	--	17	--	96	1	96

Appendix III. Moose sex and age ratios.

Area	Date	Total M/ 100 F	Small M/ 100 F	Small M/ 100 Large F	Small M % in Herd	Small M/ 100 M Calves	Calves/100 F	Twins/ 100 cows W/Calf	Calf % in Herd	Moose/Hr.	Total Moose
Farewell		28.3	1.7	6.3	1.0	11.1	30	5.9	18.8	96	96
McGrath		48.2	4.5	10.2	2.6	41.7	20.5	0.0	12.2	75	189

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

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

Seasons and Bag Limits

Aug. 20 - Nov. 30	One moose; bull moose may not be taken from October 1 - October 31

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported sport kill of moose for the 1973 season was 710 animals, an increase of 226 moose over the 1972 harvest, and well above the 5-year (1968-72) average annual harvest of 331. The 1973 harvest consisted of 339 males, 361 females and 10 sex unknown. Bulls comprised 48 percent of the known sex harvest and cows 52 percent, reflecting a marked variation from the 5-year (1968-72) average bull (66%) and cow (34%) composition of the harvest.

Corresponding to the steadily increasing harvest was an increase in hunting pressure since 1969. Table 1 summarizes trends in hunting effort and success in the subunit for the past five years and reflects a substantial increase in hunting pressure. Except for the 1971 season, hunter success has not declined in spite of increased harvest and hunting pressure. In fact, success in GMU 20A was considerably higher than that reported for Subunits 20B (19%) and 20C (31%) during 1973. The proportion of resident hunters has remained unchanged since 1969; residents (successful and unsuccessful) have comprised 83-88 percent of the total hunters over the past five seasons.

Table 1. GMU 20A moose hunting pressure and success, 1969-73.

Year	Total Hunters	Successful Hunters			Percent Success
		Res.	Non-res.	Unk.	
1969	639	162	51	44	40
1970	642	188	44	66	46
1971	904	257	85	5	38
1972	1,059	382	80	11	45
(preliminary compilation; final program not re-run.)					
1973	1,515	542	126	42	47

Appendix I lists those areas where substantial numbers of moose were harvested in 1973. Concentrated hunting effort in the Gold King-Japan Hills area for the second consecutive season accounted for 28 percent of the known-location harvest of both sexes. A total of 178 moose were harvested from these two areas in 1973 compared to 79 the previous season. Weather and snow conditions provided easy access into

the foothills of the Alaska Range along the Rex Trail, accounting for the heavy harvest in the vicinity of Gold King. Although this area has traditionally been noted for production of trophy bulls, the local demand for meat probably accounted for the lowered proportion of bulls in the harvest (46 percent compared to 69 percent in 1972). Areas comprising the Tanana Flats (McDonald Creek, Bonnifield Trail, Bombing Range, Blair Lakes, Salchaket Slough and Clear Creek) contributed 189 moose, or 29 percent of the known-location harvest.

The harvest chronology for 1973 (summarized in Appendix II) reflects a continued trend for a larger percentage of the harvest being taken during the November season. Thirty-one percent of the bulls and 49 percent of the cows were taken in November, and 41 percent of the total harvest occurred in the late season. Harvest chronology closely approximated that of the 1972 season; in contrast only 7 percent of the bull harvest, 10 percent of the cow harvest and 8 percent of both sexes were killed in the November 1969 season. The 12-day August harvest of bulls had been averaging 20-30 percent of the total male harvest during 1969, 1970 and 1971, but declined to 18 percent during the past two seasons. The September harvest of bulls has varied between 49 and 53 percent since 1970, a marked variation from the 1969 September male harvest of 72 percent. Hunting effort during the October cow season has been minimal the past four seasons; the percentage of females taken during this month has varied from 5-11 percent since 1970. The trend in later season female harvests is further reflected in the September female harvest which has declined from 41 percent of the total in 1970 to 29 percent in 1973.

Analysis of transportation types utilized by successful moose hunters during the 1972 and 1973 seasons (Appendix III), indicates that aircraft users accounted for approximately 40 percent of the harvest, while boat hunters took 15-20 percent of the moose. Hunters utilizing snow machines solely or in combination with another vehicle accounted for 20-22 percent of the harvest, and ATV users were responsible for 13-14 percent of the moose kill.

Composition and Productivity

Pre-calving surveys were conducted in standardized count areas on the Tanana Flats on May 16 - 18, 1973 to assess winter calf mortality and survival. Indices of moose survival (% yearlings in the herd and yearlings per 100 females) were lower than expected following the 1972-73 winter which was "mild" in terms of snow depth and duration. Data from spring surveys since 1969 (Table 2), reflect the population increase, decline and recovery following the severe winter of 1970-71. Yearling percent in the herd (13.4) showed a reduction from a fall 1972 calf crop of 20.6 percent on the Flats, indicating an overwinter calf loss of 35 percent, compared to a 39 percent loss in 1972. Yearlings per 100 females (20.3) showed a similar reduction (38.2%) from the fall 1972 calf crop. It appears that the upward trend in moose survival will continue in the absence of severe winters, allowing recruitment to approach the level achieved in 1970.

Table 2. GMU 20A spring survival surveys, 1969-1973.

	1969	1970	1971	1972	1973
% yearlings in herd	9.8	18.4	4.4	11.0	13.4
yearlings per 100 F	26.4	34.3	5.6	16.9	20.3

Extensive fall composition counts were conducted on portions of the Tanana Flats, Alaska Range foothills and upper Wood River in 1973. Surveys conducted on the Flats revealed 22 calves per 100 females (compared to 38:100 in 1972) and a calf crop of 13 percent (compared to 21% in 1972). Causes for this decline in calf production cannot be readily explained. In view of two successive mild winters and adequate sex ratios; poor initial calf production and/or losses due to predation may be responsible. The bull:cow ratio of 45 males per 100 females on the Tanana Flats was not a significant change from the 1972 ratio of 47:100. On the Tanana Flats changes in fall distribution or abundance of moose resulted in a sample size of 332 moose in 1973 compared to a total of 644 observed during 1972 surveys.

Composition data from the foothills of the Alaska Range and upper Wood River indicate lower bull:cow ratios than those found on the Flats. These two count areas both revealed bull:cow ratios of 35:100, reflecting the suspected disproportionate harvest of bulls in portions of the Alaska Range. This condition becomes more evident when sex ratios east of the Wood River (80:100) are compared with those from west of the Wood River (19:100), where harvest and hunting pressure are substantially greater.

Table 3 summarizes fall survey results for all three count areas since 1971 and reflects little significant change in bull:cow ratios, while calf production and the proportion of yearling bulls declined since 1972.

Table 3. GMU 20A fall sex and age composition summary 1971-73.

	1971	1972	1973
Males per 100 females	36.8	40.4	37.7
Calves per 100 females	26.7	29.6	22.5
% yearling bulls in herd	1.6	4.7	3.9
% calves in herd	16.3	17.4	14.0
% large bulls in herd	20.9	19.1	19.7
% lone cows in herd	45.6	42.0	49.0
% cows in herd	61.1	58.8	62.4
% adults in herd	83.6	82.6	86.0

Age composition data for the 1973 moose harvest in Unit 20 are shown in Appendix IV. The total Subunit 20A sample (116) represents 16 percent of the subunit harvest; 14 percent of the male harvest and 17 percent of the female harvest were sampled. Four- and five-year-old moose constituted 22 percent of the total sample, reflecting the good calf production and survival observed in the 1968 and 1969 calf crops (fall 1968 and 1969 surveys revealed 39 calves:100 females and 44 calves:100 females, respectively, while yearlings:100 females each succeeding year

were 26:100 and 34:100). Nine-year-old moose comprised only two percent of the sample which corresponds to the poor calf production (26 calves:100 females) and survival (8 yearlings:100 females) observed in the 1965 calf crop. It is interesting to note that age structure of the 1972 harvest indicated no animals in the eight-year-old class, while nine-year-old bulls are not represented in the 1973 harvest. Bulls older than five years represent 47 percent of the adult male harvest, while 67 percent of the adult female harvest was animals over five years old. The higher rate of exploitation of the bull segment of the population in this unit is also evidenced by the fact that 20 percent of the bull harvest was 10 years old or older, compared to 54 percent of the same age class in the female harvest. The average age of bulls (excluding calves) was 5.6 years, while cows averaged 7.7 years.

Analysis of age data for the harvest from the foothills of the Alaska Range in the vicinity of Gold King and the Japan Hills (where 29 males and 48 females were sampled) indicates that the four- and five-year cohorts comprised 10 and 21 percent, respectively, of the bull harvest. Fifty-six percent of the female sample was 10 years old or older, while only 21 percent of the bulls were in this category, reflecting the suspected high utilization of bulls in this area and the lower bull:cow ratio observed during fall surveys. Males and females averaged 5.8 and 7.9 years old, respectively, in the adult categories.

Management Summary and Recommendations

In 1973 Subunit 20A experienced its largest reported moose harvest since the harvest ticket program was established. Admittedly crude population estimates indicate that the hunter harvest may have equalled the 13 percent increment to the population in 1973, resulting in stabilization of herd numbers. Nevertheless, steadily increasing harvest and hunting pressure have not appreciably affected hunter success since 1969. Intense and selective hunting in portions of the Alaska Range may explain the depressed bull:cow ratios and the decline in the proportion of trophy bulls. However, sex ratios appear adequate to insure maximum calf production. Age structure of the harvest reflects the past disproportionate utilization of the male segment (average age 5.6 years); in contrast, the female segment is composed of older age animals (average age 7.7 years).

Recovery of the moose population in Subunit 20A following the severe winter of 1970-71 has not been dramatic; in fact, calf production and survival declined slightly in 1973, with the result that 49 percent of the population was composed of cows without calves. Unless substantial increases occur in calf production and survival, the management goal for this subunit should be stabilization of the harvest at 500 moose (250 males and 250 females). Consequently, the 1974 bull season was shortened 20 days, while 51 days were removed from the 1974 antlerless season.

An increased wolf population in the area was utilizing a significant portion of the moose population (unpublished report by Robert O. Stephenson).

At the present level of predation serious conflicts exist between human and wolf utilization of moose. As a result the moose population did not continue to recover or increase in 1973 and quite possibly decreased below 1972 levels.

Restrictions imposed on hunters in 1974 will reduce the harvest from the 1973 level; however, it is unlikely that a harvest reduction to about 500 animals will result in any significant population increase. If the level of predation increases in 1974 it is a distinct possibility the moose population will be significantly reduced. An overharvest will occur if future hunting and predation result in a kill exceeding recruitment. Further harvest restrictions may be necessary. No further changes in seasons or bag limits are recommended at this time in order to evaluate current changes affecting the 1974 harvest in conjunction with the restriction of no hunting the same day airborne.

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Appendix I. Areas contributing the majority of the 1973 moose harvest - GMU 20A.

Location	M	F	?	Total	Percentage of Known Location Harvest
Totatlanika River	8	9	-	17	3
Tatlanika River	7	9	1	17	3
Tanana River	10	14	1	25	4
Tanana Flats (McDonald Creek, Bonnifield Trail, Bombing Range, Blair Lakes, Salchaket Slough, Clear Creek)	69	116	4	189	29
Wood River	67	40	2	109	17
Delta River, Delta Creek, Little Delta River	27	34	-	61	10
Dry Creek	23	6	-	29	5
Gold King, Japan Hills	81	95	2	178	28
Yanert River	12	4	-	16	2
Known Location Harvest	304	327	10	641	

Appendix II. GMU 20A - 1973 moose harvest chronology by week and sex.

Date	Both Sexes Combined Number Taken	Percentage of Known Date Harvest of Both Sexes
Aug. 20-31	107	16
Sept. 1-7	54	8
8-15	58	9
16-23	82	12
24-30	66	10
Oct. 1-7	13	2
8-15	5	1
16-23	11	2
24-31	3	0.4
Nov. 1-7	38	6
8-15	40	6
16-23	89	13
24-30	111	16

Known Date Male and Female Kill - 677

Date	Males Number Taken	Percentage of Known Date Male Harvest
Aug. 20-31	60	18
Sept. 1-7	30	9
8-15	40	12
16-23	46	14
24-30	41	12
Oct.	7	2
Nov. 1-7	19	6
8-15	18	5
16-23	32	10
24-30	34	10

Known Date Male Total - 327

Appendix II. Continued.

Date		Females Number Taken	Percentage of Known Date Female Harvest
Aug.	20-31	47	13
Sept.	1-7	24	7
	8-15	18	5
	16-23	36	10
	24-30	25	7
Oct.	1-7	11	3
	8-15	2	1
	16-23	10	3
	23-31	2	1
Nov.	1-7	19	5
	8-15	22	6
	16-23	57	16
	24-30	77	22

Known Date Female Total - 350

Appendix III. GMU 20A, summary of successful moose hunters by transport method, 1972, 1973 seasons.

Transport Type	No. Moose Harvested 1972	1973	Percentage of Known Transport Harvest 1972	1973
Aircraft only	153	241	42	41
Boat only	74	88	20	15
Snow machine only	65	102	18	18
Snow machine with off-road highway vehicle	6	21	2	4
Off-road vehicle only	47	83	13	14
Highway vehicle only	18	44	5	8
Off-road with highway vehicle	3	4	1	1
Known transportation method harvest (includes only transport types which could be classified into above types).	366	583		

Appendix IV. Age composition of 1973 moose harvest (legal sport kill only for Units 20B and 20C. Legal sport kill plus 10 animals collected by moose research personnel in Unit 20A).

	GMU 20A				GMU 20B				GMU 20C[2]			
Age Class	M	F	No.[1]	%	M	F	No.	%	M	F	No.	%
Calf	1	2	6	5	3	4	7	10	-	-	-	-
1	3	3	7	6	11	4	15	22	4	-	4	13
2	5	2	7	6	5	3	8	12	2	1	3	10
3	6	2	8	7	3	3	6	9	2	-	2	7
4	6	4	11	9	2	-	2	3	3	-	3	10
5	8	7	15	13	6	2	8	12	3	-	3	10
6	1	2	4	3	3	-	3	4	3	-	3	10
7	5	3	8	7	1	1	2	3	3	-	3	10
8	4	1	5	4	-	-	-	-	1	-	1	3
9	-	2	2	2	2	3	5	7	1	-	1	3
10+	10	33	43	37	6	7	13	19	7	-	7	23
Total Sample Size	49	61	116		42	27	69		29	1	30	

[1] Including 6 unknown sex
[2] Excluding Taylor Highway, Eastern 20C

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 20B - Fairbanks, Central Tanana Valley

Seasons and Bag Limits

Aug. 20 - Oct. 7 Nov. 1 - Nov. 30	One moose; bull moose only may be taken from Aug. 20 - Sept. 30 and from Nov. 1 - Nov. 30, and antlerless moose only may be taken from Oct. 1 - Oct. 7.

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported sport kill of moose for the 1973 season was 301 animals, the largest harvest in Game Management Subunit 20B since the establishment of the harvest ticket program. The 1973 harvest represented a 59 percent increase over the 1972 kill of 189, the first year in which an antlerless season for the subunit was authorized. The bull harvest in 1973 consisted of 212 animals, a substantial increase over the 5-year (1968-72) average bull harvest of 152, while 84 cows were taken (compared to 69 in 1972). An additional five moose of unknown sex were reported.

The increased harvest corresponds to an increase in hunting pressure since 1969. Table 1 summarizes trends in hunting effort and success in the subunit during the past five years and reflects a substantial increase in hunting pressure. Except for the 1970 season, hunter success has been relatively poor, ranging from 17-25 percent. Despite road, trail and river access to portions of the subunit, much of the area remains inaccessible, resulting in heavy competition in traditional hunting locations.

Table 1. GMU 20B - Moose hunting pressure and success, 1969-73.

Year	Total Hunters	Successful Hunters			Percent Success
		Res.	Nonres.	Unk.	
1969	574	115	14	17	25
1970	640	152	11	54	34
1971	915	158	24	2	20
1972	1,098	170	14	1	17
(preliminary compilation; final program not re-run.)					
1973	1,599	251	40	10	19

Appendix I lists those areas supporting most of the moose harvest in Subunit 20B during 1973, and reflects the concentrated hunting effort along road systems in the area. One hundred and thirty-eight moose, or 49 percent of the known location harvest, were taken from the road network, while five off-road and river system areas (Yukon Training area, Murphy Dome, Goldstream Valley, Chena River and Chatanika River) furnished 137 moose, or 49 percent of the kill.

Harvest chronology data for the 1973 season, summarized in Appendix II, indicate the bulk of the bull harvest occurred uniformly during the months of August and September. Forty-eight males, or 23 percent of the total reported male harvest of known date kills, were killed from August 20 - 31, while 108 males, or 52 percent of the males were taken in September. Only 26 percent of the bull harvest occurred in November. The cow harvest in October amounted to 24 percent of the known date harvest.

Analysis of transportation types utilized by successful moose hunters in 1973, summarized in Appendix III, reflects hunting effort by road hunters in the unit. Hunters with highway vehicles killed 56 percent of the moose while ATV users accounted for 21 percent. Hunters utilizing snow machines solely or in combination with another vehicle took eight percent of the moose and boat hunters were responsible for 12 percent of the kill.

Composition and Productivity

Age structure of the 1973 moose harvest is summarized in Appendix IV. The mandatory return of jaws required by the 1972 antlerless hunt was not in effect during 1973, resulting in a lower sample size for the female segment of the harvest. The total jaw collection represents 23 percent of the subunit harvest; 20 percent of the male harvest and 32 percent of the female harvest were sampled. For the second consecutive year calves and yearlings comprised 32 percent of the sample, reflecting the high level of exploitation of the moose population in accessible areas of the subunit. Adults older than five years constituted 33 percent of the sample, while 32 percent of the adults were 10 years old or older. Forty-eight percent of the adult female harvest was over five years of age; in contrast, 31 percent of the adult male harvest consisted of animals older than five years. The average age of bulls (excluding calves) was 4.4 years, while cows averaged 5.8 years.

Aerial sex and age composition surveys were conducted in portions of the Chena (South Fork, Munson Creek, Little Chena River, Angel Creek, Stiles Creek, Colorado Creek, Chena Flats) and Goldstream drainages November 16 through 30, 1973. As in previous surveys, adequate samples (683 moose) were obtained in disturbed areas consisting of burns and willow draws of small drainages. A second consecutive mild winter in 1972-73 resulted in a slight increase in calf production and yearling survival, although recruitment has shown no dramatic recovery following the severe winter of 1970-71. Table 2 summarizes fall survey data in GMU 20B since 1970, and indicates an overall decline in bull:cow ratios

(from 34:100 in 1971 to 20:100 in 1973), good calf production but poor calf survival. Overwinter loss of the 1972 calf crop is calculated at 71 percent. Bull:cow ratios varied considerably between accessible hunting areas (2:100 in the Chena Flats and 11:100 in Angel Creek, Stiles Creek and Colorado Creek) and inaccessible areas (37:100 in Munson Creek and South Fork). Although sex ratios appear adequate to insure conception (10% and 64%, respectively, of the population are adult bulls and adult cows), 67 percent of the cows observed were without calves, while only 31 percent of the cows with calves had one calf. Yearling bull mortality due to hunting prior to aerial surveys may account for a portion of the low calculated survival (the age structure of the harvest indicates a high percentage of yearling bulls). Survival of the yearling age class is determined by the presence of small bulls seen during the fall composition counts. The scarcity of yearling bulls does not explain the poor calf survival and inability of the moose herd in this unit to recover during two successive mild winters.

Table 2. GMU 20B fall sex and age composition summary, 1970-73.

	1970	1971	1972	1973
males;100 females	24	34	28	20
calves:100 females	36	28	33	36
% yearling bulls in herd	10	3	2	3
% large bulls in herd	6	18	16	10
% lone cows in herd	41	44	43	43
% cows in herd	62	62	62	64
% adults in herd	78	83	79	77
% calves in herd	22	17	21	23

Management Summary and Recommendations

The legal sport harvest of moose in Game Management Unit 20B for 1973 was the highest ever reported. Despite the second year in which an antlerless season was authorized, 72 percent of the harvest consisted of bulls (compared to 64% in 1972). Management goals to further the sustained yield concept cannot be achieved if the bulk of the harvest continues to come from 13 percent of the population, resulting in a further decline in bull:cow ratios. Efforts should be made to balance the utilization of males and females in accessible areas to improve sex ratios. Periodic severe winters combined with limited moose range and predation may result in future low recruitment. The age structure of the harvest indicates that overexploitation of the male segment has continued to occur, while the female segment is composed of old-age animals. Improved access into lightly hunted areas and range rehabilitation are needed to insure greater dispersal of hunters, improve hunter success and reduce competition on the range.

I & E efforts in the Fairbanks area should be continued to demonstrate that continued antlerless harvests are necessary to further the sustained yield concept.

Moose distribution in most of the subunit during the first two antlerless seasons was such that a substantial harvest did not occur in early October. Inadequate snow cover precluded extensive snow machine use, resulting in an antlerless harvest adjacent to road systems. Consideration should be given to scheduling cow seasons during periods in November when moose may be more accessible and snow conditions allow better dispersal of hunters.

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Appendix I. Areas contributing the majority of the 1973 moose harvest, Game Management Unit 20B.

Location	M	F	?	Total	Percentage of Known Location Harvest
Road System Areas					
Chena Hot Springs Road	29	10	2	41	14
Steese Highway (includes Cleary Summit, Fairbanks Creek, Fish Creek, Gilmore Creek)	23	14	1	38	13
Elliott Highway	17	5	-	22	8
Nenana Highway	8	4	1	13	5
Fairbanks and vicinity (includes Richardson Highway, Steele Creek, Farmers Loop, Badger Road, Johnson Road, North Pole)	19	4	1	24	8
Off-Road Areas					
Eielson, Yukon Training Area	25	9	-	34	12
Murphy Dome	11	6	-	17	6
Goldstream Valley (included Dunbar, Standard)	16	4	-	20	7
River System					
Tanana (includes Moose Creek, Piledriver Slough)	8	1	-	9	3
Chena River	25	11	-	36	13
Chatanika River	19	11	-	30	11
Known Location Harvest	200	79	5	284	

Appendix II. GMU 20B - 1973 moose harvest chronology by week, both sexes combined.

Date	Number Taken	Percentage of Known Date Harvest of Both Sexes
Aug. 20-31	48	17
Sept. 1-7	29	10
8-15	27	10
16-23	25	9
24-30	27	10
Oct. 1-7	68	24
Nov. 1-7	6	2
8-15	9	3
16-23	21	8
24-30	19	7
Known Date Male and Female Kill	279	

Appendix III. GMU 20B - summary of successful moose hunters by transport method, 1973 season.

Transport Type	Number of Moose Harvested	Percentage of Known Transport Harvest
Aircraft only	6	2
Boat only	30	12
Snow machine only	18	7
Snow machine with off-road, highway vehicle	2	1
Off-road vehicle only	54	21
Highway vehicle only	146	56
Off-road with highway vehicle	4	2
Known Transport Method Harvest (includes only transport types which could be classified into above types).	260	

Appendix IV. Age composition of 1973 moose harvest (legal sport kill only for Units 20B and 20C. Legal sport kill plus 10 animals collected by moose research personnel in Unit 20A).

	GMU 20A				GMU 20B				GMU 20C[2]			
Age Class	M	F	No.[1]	%	M	F	No.	%	M	F	No.	%
Calf	1	2	6	5	3	4	7	10	--	--	--	--
1	3	3	7	6	11	4	15	22	4	--	4	13
2	5	2	7	6	5	3	8	12	2	1	3	10
3	6	2	8	7	3	3	6	9	2	--	2	7
4	6	4	11	9	2	--	2	3	3	--	3	10
5	8	7	15	13	6	2	8	12	3	--	3	10
6	1	2	4	3	3	--	3	4	3	--	3	10
7	5	3	8	7	1	1	2	3	3	--	3	10
8	4	1	5	4	--	--	--	--	1	--	1	3
9	--	2	2	2	2	3	5	7	1	--	1	3
10+	10	33	43	37	6	7	13	19	7	--	7	23
Total Sample Size	49	61	116		42	27	69		29	1	30	

[1] Including 6 unknown sex
[2] Excluding Taylor Highway, Eastern 20C

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 20C - Tok, Upper Tanana, Kantishna

Seasons and Bag Limits

Aug. 20 - Oct.	One moose; provided that bull moose only may be taken from Aug. 20 - Sept. 30 and from Nov. 1 - Nov. 30 and only antlerless moose may be taken from Oct. 1 - Oct. 7.

Harvest and Hunting Pressure

The legally reported sport harvest of moose in Subunit 20C for the 1973 season was 665 animals, consisting of 555 males, 93 females and 17 unknown sex. This represents an increase of 191 moose over the 1972 harvest of 474 and was higher than the 5-year (1968-72) average unit harvest of 577. The Subunit 20C harvest has averaged 485 moose for the 1971 and 1972 seasons following the establishment of Subunit 20D. Bulls comprised 86 percent of the known sex harvest and cows 14 percent, corresponding closely to the 5-year (1968-72) average bull (82%) and cow (18%) composition of the harvest.

The increase in harvest during 1973 coincides with an increase in hunting pressure since 1969. Table 1 summarizes trends in hunting effort and success in the subunit the past five years and reflects a substantial increase in hunting pressure. Percent success has averaged 30 percent since 1971, a considerable decline from relatively high success in 1969 and 1970. Despite good river, trail and road access into portions of the subunit, much of the area remains inaccessible, resulting in heavy competition in such traditional hunting locations as the Taylor Highway, Salcha River, Goodpaster River, Yanert River, Beaver Creek, Nome Creek, Minto Flats and Stampede Trail.

Table 1. GMU 20C - Moose hunting pressure and success, 1969-73.

Year	Total Hunters	Successful Hunter			
		Res.	Nonres.	Unk.	% Success
1969	1411	506	93	96	49
1970	1480	419	45	141	41
1971	1681	436	49	11	30
1972	1597	350	92	20	29
(Preliminary compilation; final program not rerun)					
1973	2146	549	71	45	31

Appendix I lists those areas contributing substantial numbers of moose to the 1973 harvest and reflects hunting effort along river systems and off-road areas. The road system contributed 160 moose, or 38 percent of the known location harvest in 1973.

Harvest chronology data summarized in Appendix II for southwestern 20C (including the drainages of the Totatlanika, Yanert, Nenana, Teklanika, Toklat, Savage, and Kantishna Rivers) indicate the major portion (67%) of the known date bull harvest occurred in September, while only 14 percent of the males were taken in November. During the 1973 season 201 moose were harvested from these drainages (compared to 123 the previous year).

The Taylor Highway area contributed 98 animals (79 bulls and 19 cows) to the 1973 moose harvest. Miles 50-75 proved to be the most productive with 27 animals coming from that section. The 1973 harvest represents an increase of 28 animals over the 1972 harvest of 66 moose. Seven animals were taken from the Taylor Highway during November.

That portion of Subunit 20C between the Johnson and Robertson Rivers produced 27 animals (25 males, 1 female, 1 unknown), 15 of which came from the Robertson River area.

Data collected from the Taylor Highway check station at 35-Mile indicated that slightly over 500 people hunted the Taylor Highway, about the same number that have hunted the area for the past five years. The Taylor Highway remains a popular hunting area, particularly with residents of Southeastern Alaska, despite mediocre hunting success.

Most roadside areas along the Taylor Highway have rather sparse moose populations. Hunting success there increases dramatically after about September 15 when bulls entering the rut period increase their movements and are seen crossing the highway. Local moose populations are probably more important for maintaining hunting success in areas away from the highway. Offroad vehicles continue to increase in popularity with Taylor Highway moose hunters. While increased use of ORV's tends to decrease the number of people hunting along the road, it has increased hunter competition along some of the more popular trails. The overall results are locally depressed moose populations and/or distorted sex ratios, most notably on Mt. Fairplay, Taylor Mountain and probably Sixtymile Butte. Harvest levels in these areas may depend more on local moose populations than transient or migratory moose.

Composition and Productivity

Fall 1973 composition surveys were conducted in the Lignite-Savage River area from Healy to the Sushana River (Dec. 1) and the Yanert drainage (Nov. 29, 30). Although the small sample (n=76) obtained in the Lignite-Savage area may not reflect the actual status of the moose population west of the Nenana River and north of McKinley Park, depressed bull:cow ratios (12 males:100 females), poor survival (absence of yearling males), and low calf production (19 calves:100 females) were noted. Boundaries of this count area have varied in 1966, 1970 and 1973; nevertheless,

declining sex ratios and calf production, in conjunction with poor survival are evident. The status of the population inhabiting the Yanert drainage is somewhat improved in terms of sex ratios (29 males:100 females) and survival (6% yearling males), while calf production remains poor (13 calves:100 females). Table 2 summarizes indices of production, survival and sex ratios for count areas which were surveyed in 1966, 1970, 1971 and 1973. The Rex Dome-Totatlanika drainages were sampled in 1970 and 1971, reflecting adequate sex ratios, good calf production and poor survival following the extreme winter of 1970-71.

Table 2. GMU 20C (portions of Yanert drainage in GMU 20A) fall sex and age composition summary, 1966-1973, surveys not conducted in 1967, 1968, 1969 and 1972.

	Rex Dome-Totatlanika			Lignite-Savage (Healy to Sushana R.)			Yanert*		
Year	Males: 100F	Yrling Males: 100F	Calves: 100F	Males: 100F	Yrling Males: 100F	Calves: 100F	Males: 100F	Yrling Males: 100F	Calves: 100F
1966	Not Surveyed			50	ND	42	32	1	11
1970	26	9	23	30	11	24	Not Surveyed		
1971	30	5	32	Not Surveyed			Not Surveyed		
1973	Not surveyed			12	ND	19	29	9	13

* 1966 figures include portions of Rex Dome-Totatlanika count area.

Age data for the 1973 moose harvest in GMU 20 are summarized in Appendices III and IV. Due to the small sample from Subunit 20C, other than the Taylor Highway (n=30), effects of hunting on the age structure of the population cannot be evaulated in most areas. Efforts should be made to increase jaw collections from portions of the unit receiving heavy hunting pressure.

Sex and age composition data from the Taylor Highway since 1968 are summarized in Appendix V. Bull/cow ratios appear reasonably good in the areas surveyed, except for Sixtymile Butte-Upper West Fork where the ratios have declined to 29 bulls per 100 cows. The sample size in this area was less than half of what it had been in the past, which may partly account for the comparatively poor sex ratio. The sex ratio has apparently not decreased enough to affect reproduction, but bull hunting success may decrease somewhat.

Calf survival through November was poor with calf percentages in the herd ranging from one percent in the Upper West Fork to six percent

in the Kechumstuk and Mt. Fairplay areas. The reasons for the poor calf survival are unknown, but predation and range conditions may be two of several possible causes.

Appendix IV shows the aged jaw samples obtained from the Taylor Highway since 1966. The age classes are well represented by the 10-12-year-old group and the under 5-year-old group. While nearly 24 percent of the 1972 sample was of the 5-year-old class, only 6 percent of that year class was represented in 1973, perhaps indicating that despite a large sample size (over 50% of the Taylor Highway harvest) it was not representative of the Taylor Highway moose population.

Range and Habitat

Little is known of moose range conditions in Subunit 20C. Fires in past years appear to have created favorable range conditions, however, natural plant succession has caused these burns to be less productive than they were earlier. Intensive fire suppression activities in the Fortymile River drainage have generally prevented creation of favorable browse conditions which usually follow wildfires. The Y-66 burn is beginning to show some willow resprouting, but it is expected to be several more years before there is sufficient willow regrowth to affect moose populations to any great extent.

Unless the trend for increased fire suppression is reversed smaller moose populations can be expected throughout much of the subunit.

Population Trends

Even though population trend counts have not been conducted in many areas, various indices such as harvests, hunting success, sex and age composition and casual range observations indicate that moose populations are probably not increasing. Significant increases in production or populations are not evident from fall surveys. Populations which have been reduced because of harsh winters do not show a characteristic increase in calf survival in subsequent years. Possibly poor range conditions or increased influence of predation on smaller populations are preventing or obscuring increases in calf production.

Management Summary and Recommendations

The 1973 moose harvest in Subunit 20C was the highest reported since the establishment of Subunit 20D in July 1971 and the subsequent loss of a potential harvest of some 100 moose (due to closure of the latter to hunting for three years). The subunit cannot be expected to support larger harvests in the future under present conditions.

Further distortion of sex ratios can be expected in most areas if 86 percent of the subunit harvest continues to come from the male segment of the population.

Bulls comprised 84 percent of the harvest from southwestern portions of the subunit in areas characterized by poor calf production and survival.

The harvest of 200 moose in these areas may have been excessive to the point that low recruitment did not compensate for losses due to predation and hunting, resulting in a decline in the population.

Management goals aimed at utilizing the female segment of the population should be maintained to prevent further distortion of sex ratios. In areas with stable or potentially declining moose herds, reducing the length of the bull season may be desirable, especially if there is a shift in hunting pressure from Subunit 20A (which will have a 20 day and 51 day shorter bull and antlerless season, respectively, in 1974). Generally, more conservative seasons may be necessary to offset the effects of poor calf survival and recruitment, particularly if wolf populations remain high.

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Appendix I. Areas contributing the majority of the 1973 moose harvest, GMU 20C.

Location	Male	Female	Unknown	Total
Road System Areas				
Richardson Highway	3	...	...	3
Elliott Highway (Livengood, Manley)	20	1	1	22
Nenana Highway	16	6	1	23
Steese Highway (Central, Circle, Baker Creek)	13	1	...	14
Taylor Highway	79	19	...	98
Total Road System Harvest	131	27	2	160
River System, Off-road Areas				
Central 20C				
Shaw Creek	11	1	...	12
Healy Lake, Healy R. (Delta area)	12	2	...	14
Goodpaster River	23	8	1	32
Salcha River	30	2	1	33
Volkmar River	4	2	...	6
Northern 20C				
Yukon River	5	...	...	5
Nome Creek	13	2	...	15
Beaver Creek	16	3	1	20
Birch Creek	11	...	...	11
Hess Creek	6	3	...	9
Medicine Lake	3	...	...	3
Eastern 20C				
Alaska Range (Johnson to Robertson R.)	25	1	1	27
Western 20C				
Minto Flats, Tolovana River	38	3	2	43
Kantishna River	22	...	1	23
Minchumina, Muddy River	12	...	...	12
Tanana River	9	4	1	14
Southwestern 20C				
Totatlanika River, California Creek	8	1	...	9
Sevenmile Lake (Rex Trail)	10	6	...	16
Nenana River	16	4	...	20
Clear Creek, Fish Creek	4	1	...	29
Savage River, Toklat River, Stampede	27	2	...	29
Rex, Ferry, Healy & vicinity, Lignite Usibelli, Otto Lake	55	15	...	70
Yanert River	13	...	...	13
Total River System, Off-road Harvest	373	60	8	441

Appendix II. 1973 moose harvest chronology by week, both sexes combined. Southwest portions of GMU 20C (drainages of Totatlanika, Yanert, Nenana, Teklanika, Toklat, Savage, Kantishna Rivers).

Date	Number Taken	% of Known Date Harvest of Both Sexes
Aug. 20-30	32	16
Sept. 1-7	11	6
8-15	34	17
16-23	48	24
24-30	21	11
Oct. 1-7	29	15
Nov. 1-7	7	4
8-15	6	3
16-23	3	2
24-30	7	4
Known Date Male & Female Kill	198	

Appendix III. Age composition of 1973 moose harvest (legal sport kill only for Units 20B and 20C. Legal sport kill plus 10 animals collected by moose research personnel in Unit 20A).

	GMU 20A				GMU 20B				GMU 20C[2]			
Age Class	M	F	No.[1]	%	M	F	No.	%	M	F	No.	%
Calf	1	2	6	5	3	4	7	10	--	--	--	--
1	3	3	7	6	11	4	15	22	4	--	4	13
2	5	2	7	6	5	3	8	12	2	1	3	10
3	6	2	8	7	3	3	6	9	2	--	2	7
4	6	4	11	9	2	--	2	3	3	--	3	10
5	8	7	15	13	6	2	8	12	3	--	3	10
6	1	2	4	3	3	--	3	4	3	--	3	10
7	5	3	8	7	1	1	2	3	3	--	3	10
8	4	1	5	4	--	--	--	--	1	--	1	3
9	--	2	2	2	2	3	5	7	1	--	1	3
10+	10	33	43	37	6	7	13	19	7	--	7	23
Total Sample Size	49	61	116		42	27	69		29	1	30	

[1] Including 6 unknown sex
[2] Excluding Taylor Highway, Eastern 20C

Appendix IV. Age composition of the Taylor Highway moose harvest.

	1966			1967			1968			1969			1970			1971			1972			1973		
Age	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%
calf	0	0	--	1	0	2.3	0	1	2.6	1	2	5.1	1		4.0	--	4	10.8	1	0	2.4	1	2	6
1	0	0	--	3	0	6.8	0	0	--	2	0	3.4	5		20.0	--	1	2.7	3	0	7.1	2	0	4
2	1	0	4.0	1	0	2.3	3	1	10.5	2	1	5.1	3		12.0	2	0	5.4	3	0	7.1	5	1	12
3	4	0	16.0	4	0	9.1	2	0	5.3	7	0	11.9	1		4.0	6	0	16.2	2	0	4.8	3	0	6
4	5	0	20.0	4	0	9.1	5	1	15.8	2	0	3.4	1		4.0	2	0	5.4	1	2	7.1	4	1	10
5	7	0	28.0	6	0	13.6	3	3	15.8	6	0	10.2	4		16.0	4	0	10.8	10	0	23.7	3	1	8
6	2	0	8.0	9	1	22.7	4	0	10.5	5	2	11.9	1		4.0	1	0	2.7	1	0	2.4	2	1	6
7	3	0	12.0	6	0	13.6	5	1	15.8	5	1	10.2	1		4.0	2	0	5.4	1	0	2.4	1	0	2
8	1	0	4.0	4	1	11.4	1	0	2.6	6	1	11.9	1		4.0	2	0	5.4	1	0	2.4	2	0	4
9	0	0	--	0	0	--	1	0	2.6	4	0	6.8	2		8.0	1	1	5.4	2	0	4.8	2	0	4
10	0	0	--	1	0	2.3	1	1	5.3	5	0	8.5	1		4.0	2	2	10.8	2	0	4.8	7	1	16
11	0	1	4.0	1	0	2.3	1	1	5.3	2	1	5.1	2		8.0	1	0	2.7	7	0	16.7	3	1	8
12	1	0	4.0	1	0	2.3	0	0	--	2	0	3.4	1		4.0	1	2	8.1	3	0	7.1	2	2	8
13	0	0	--	0	1	2.3	1	0	2.6	2	0	3.4	1		4.0	1	0	2.7	1	0	2.4	0	1	2
14	0	0	--	0	0	--	0	1	2.6	0	0	--	0		--	1	1	5.4	1	0	2.4	2	0	4
15	0	0	--	0	0	--	1	0	2.6	0	0	--	0		--	0	0	--	0	1	2.4	0	0	0
Total (M+F)	25			44			38			59			25			37			42			50		

Appendix V. Fall sex and age composition surveys.

Year	Bulls/100 Cows	Calves/100 Cows	Calf %	Moose/Hr.	Total Moose Seen
Kechumstuk					
1968	53	11	7	57	145
1969	61	9	5	45	78
1970	52	16	9	58	155
1971	58	8	5	37	63
1972	47	15	9	69	138
1973	51	10	6	91	155
Mt. Fairplay					
1968	36	14	9	38	76
1969	78	56	24	21	21
1970	11	25	19	47	38
1971	0	13	12	24	17
1972	23	8	6	13	34
1973	31	8	6	15	18
Upper West Fork					
1968	186	24	8	32	77
1969	60	23	12	57	171
1970	67	40	18	70	128
1971	44	27	15	55	100
1972	35	21	13	31	143
1973	29	2	1	30	54

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Subunit 20D - Delta Junction

Seasons and Bag Limits

No open season

Harvest and Hunting Pressure

Subunit 20D has been closed for three hunting seasons, 1971 through 1973. The 1971 moose season was closed by Commissioner's Announcement and remained closed by Board action in the following years. The unit is small, easily accessible and has a ready supply of hunters. Under certain conditions an overharvest is possible. The reported harvest from 1971 through 1973 is the result of inaccurate reporting, illegal harvest or error in the harvest ticket system. Reported moose harvests for Subunit 20D follow.

	1964	1966	1967	1968	1969	1970	1971	1972	1973
Harvest	171	131	115	116	115	105	21	15	15
Percent Bulls	64	54	68	72	64	70	60	67	73

Composition and Productivity

Aerial composition counts in November indicated calf production was up moderately from the two previous years with 22 calves per 100 cows. The average for the last four years was 22 per 100 cows. This year's count showed 21 bulls per 100 cows, the average for the past four years has been 18.5 per 100. A summary of moose surveys in 20D follows:

	1960	1970	1971	1972	1973
Bulls per 100 cows	36	8	19	26	21
Calves per 100 cows	51	31	15	19	22
Calf percent in herd	27	22	11	13	15
Moose per hour	---	17.5	32	18	36
Sample Size	257	133	441	491	267

Moose composition surveys, although conducted in a comparable manner, have often been analyzed or reexamined in different ways. The analysis presented in this report differs from the 1972 report by including the yearlings in different categories. The 1973 analysis follows the breakdown more commonly used.

Population Trends

Based on counts made in November 1972 the moose population was estimated at 600 moose. Composition surveys in 1973 have shown little change, therefore, the population level is assumed to be approximately 600 moose.

Management Summary and Recommendations

Moose populations in Subunit 20D appeared stable and showed no trend. Until some form of meaningful habitat rehabilitation is initiated it is unlikely that the area will support a larger population or an annual harvest of more than 100 animals. Subunit 20D is a small, very accessible area and the herd could be overharvested with present day hunting pressure without very restrictive regulations. Hunting effort should be directed to less accessible areas during a registration controlled hunt.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 21 - Middle Yukon

Seasons and Bag Limits

*Aug. 20 - Feb. 28	Two moose; only one of which may be antlerless.

* Opening of the season was delayed in the lower part of the unit from Aug. 20 to Sept. 10 by field announcement.

Harvest and Hunting Pressure

The reported moose harvest in 1973-74 was 169 bulls, 64 cows and 6 unspecified for a total of 239. This represents the highest reported kill for Unit 21 since the inception of the harvest ticket program. Hunting pressure has increased measurably in the Nowitna River and Holy Cross areas, largely through an influx of resident hunters, from adjacent units, into these areas. The moose harvest on the Nowitna has doubled since 1970 despite reduced populations. Part of the attraction to Unit 21 is, no doubt, the liberal bag limit of two moose and the choice of a cow or bull coinciding with open season.

Conflicts between unit residents and fly-in hunters from adjacent units have become severe in the past few years. Such was the case in the heavily subsistence hunted Holy Cross-Shageluk area in 1973. In a move to alleviate these conflicts the opening of moose season was delayed in lower Unit 21 until September 10, 1973. This emergency closure did not accomplish its intended purpose. Both local residents and hunters from other areas openly flaunted the closure and continued to hunt during the August 20 to September 10 closure. Much of the original conflict was precipitated by illegal harvest of moose by aircraft originating in Bethel. This problem has been resolved with the arrest and conviction of the major participant. Hopefully, such a situation will not arise again.

The total reported and unreported harvest in Unit 21 may have been over 700 moose in 1973-74.

Composition and Productivity

Aerial surveys of the Middle Yukon, Koyukuk and Nowitna areas were conducted in early April 1974. These counts suggested fair calf production and survival, including a general population increase in the Holy Cross-Grayling area. Moose populations elsewhere (Koyukuk and Nowitna) also appeared in better condition than those seen in 1972 (Table 1). Early movement off the river bars prior to the survey was felt to have been significant, thus resulting in a much lower total count than expected.

Table 1. Yukon, Koyukuk, and Nowitna spring moose population counts, April 1974.

Area	Date	Adults	Calves	% Calves in Herd	Total Moose	Hours Flown
Holy Cross to Nulato	4/2/74	462	54	10	516	2.45
Koyukuk River	4/3/74	924	109	11	1033	5.05
Nowitna River	4/4/74	146	25	15	171	1.2
Total		1532	188		1720	9.10

Range and Habitat

Snow depths were comparable to those reported in Unit 19, although weather records suggested snowfall in the Koyukuk and Galena areas was much lighter. However, temperatures were lower for a longer period during mid-winter. Moose appeared to have moved off river bars along the Middle Yukon earlier than in the past two years, possibly as a result of the lighter snowfall.

Population Trends

Increasing population trends were evident over much of the unit. Wolf populations were high and loss of calves to predation in some areas may have been depressing a more rapid population recovery of the moose in the unit. An unusually dry spring and early breakup along with the mild winter of 1973-74 may result in better than average production and calf survival in 1974.

Management Summary and Conclusions

Better than average winter and spring conditions have provided ample reasons to expect rapid recovery of this population to former levels. Present population levels are sufficient to accommodate most of the local subsistence demands. Competition between unit residents continued to result in serious social problems, particularly concerning hunters from outside the unit such as Bethel and Fairbanks. Regulations which have been designed to accommodate the needs and desires of persons residing within the unit should not be changed. However, because these regulations have been designed for resident subsistence needs, they likewise have become attractive to residents of adjacent units with more restrictive regulations. Reduction of the two moose bag limit and a later opening of the cow season may tend to alleviate some of this pressure and reduce the conflict between local hunters and residents from outside the unit.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 22 - Seward Peninsula

Seasons and Bag Limits

Unit 22, only that portion consisting of the drainages of the Kuzitrin and Kruzgamepa (Pilgrim) Rivers and all the area between the Sinuk and Nome Rivers	Aug. 20 - Sept. 14	One bull
Remainder of Unit 22	Aug 1 - Jan. 31	One moose; antlerless moose may be taken only from Jan. 1 - Jan. 31.

Harvest and Hunting Pressure

The reported harvest in Unit 22 in 1973 was 136 moose which was a record high and was three times greater than last year (Appendix I). The apparent increased harvest reflects both an increased effort to get better compliance in returning harvest tickets and 32 female moose that were taken during the first antlerless season in a portion of Unit 22. The known harvest for the short season area was 37 bulls, of which 40 percent was yearlings, and 57 percent was 3-7 years old. This is the first time that the 3-7-year-old segment of the population comprised over half of the harvest. Out of a sample of 52 moose taken from the entire unit 42 percent were yearlings and 49 percent were 3 years old or older.

Over half of the bulls were taken the last three weeks of August with most of the rest being taken in January 1974 when the antlerless season was also open. Most females were taken in late January.

The Shismaref and Kuzitrin areas accounted for 50 percent of the harvest. The following is a breakdown of the harvest by area:

Area	Males	Females	Total
Shishmaref	10	21	31
Agiapuk	14	3	17
Nome	10	1	11
Kuzitrin	37	0	37
Pish	9	2	11
Koyuk	8	1	9
Unalakleet	13	1	14
Unknown	3	3	6

Composition and Productivity

Moose tend to concentrate along major river drainages during late winter and early spring. Minimum populations and calf survival can be ascertained by aerial surveys at that time. During the fall moose are more widely distributed but sexes can be determined for composition counts. During aerial surveys in 1973 the following composition, productivity, calf survival and minimal populations were recorded.

River System	Males/100F	Calves/100 F	Calf % in Herd Fall	Calf % in Herd Spring	Minimum Population
All Kuzitrin drainages	50	45	23	20	369
Koyuk	45	72	36	31	109
Serpentine	400	100	17	22	69
Niukluk	58	47	23	28	39
American	90	48	20	-	76

Management Summary and Recommendations

Due to unseasonally warm weather in late January 1974 the limited antlerless hunt did not succeed in removing sufficient moose from the critical wintering habitat. Willows in these areas show signs of heavy browsing pressure. A long bull season in all of Unit 22 and a permit hunt for antlerless moose should be used to reduce moose populations on the principal wintering areas.

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Appendix I. Historical moose harvest in Unit 22 (from harvest ticket data).

Year	Sex			Total
	M	F	Unk	
1963	68	1	-	69
1964	57	-	-	57
1965	55	3	2	60
1966	52	1	1	54
1967	56	-	1	57
1968	33	1	1	35
1969	69	1	2	72
1970	70	-	1	71
1971	59	-	1	60
1972	44	0	-	44
1973	103	32	1	136

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 23 - Kotzebue Sound

Seasons and Bag Limits

Aug. 1 - Nov. 30	One moose; antlerless moose may not be taken prior to Sept. 1.

Hunting and Harvest Pressure

The reported harvest in Unit 23 in 1973 was 103 moose, 81 of which were bulls (Appendix I). This is the largest harvest on record and probably reflects the intensity of effort to get local residents accustomed to using harvest tickets. The actual harvest was probably about three times the recorded harvest. Only an insignificant number of the moose harvested were aged.

The chronology of the reported harvest revealed that over 90 percent of the moose were taken by mid-September. This probably reflects the preference of residents in Unit 23 for caribou which are usually available from mid-September through the winter. Most of the reported harvest was taken on the Noatak and Kobuk Rivers. The following table is a breakdown of the reported harvest by area:

Area	Male	Female	Unknown	Total
Lower Noatak	20	11	2	33
Remainder of Noatak	10	0	0	10
Lower Kobuk	20	3	1	24
Middle Kobuk	4	1	0	5
Upper Kobuk	3	1	0	4
Kotzebue Area	3	0	2	5
Selawik	1	0	0	1
Buckland	13	1	0	14
Unknown	5	0	0	5

It is apparent that residents in Selawik and along the mid and upper Kobuk River are not reporting all of the moose harvested in those areas.

Composition and Productivity

Limited aerial surveys were flown in Unit 23. The number of moose seen on the surveys was considered to be the "minimum population", recognizing that few areas were surveyed and that not all moose present in the survey areas were seen.

Results of the moose aerial surveys are listed below:

Drainage	Minimum Population	Calf % in Herd
Buckland	55	13
Kiwalik	70	14
Kugruk	56	16
Goodhope	19	31
Pish	35	40
Noatak	110	17

Management Summary and Recommendations

Despite the inadequacies in the harvest accounting system and moose surveys, they tend to show that moose are both plentiful and productive in areas where they are hunted. Moose seem to be increasing throughout most of the unit. Efforts should continue to get residents to use their moose harvest tickets, particularly on the Selawik and upper Kobuk Rivers.

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Appendix I. Historical moose harvest in Unit 23 (from harvest ticket data).

Year	Sex			Total
	M	F	Unk	
1963	76	1	0	77
1964	73	0	0	73
1965	44	0	1	45
1966	68	0	1	69
1967	65	10	0	75
1968	30	4	0	34
1969	53	13	1	67
1970	36	24	1	61
1971	50	13	1	64
1972	46	11	0	57
1973	81	17	5	103

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 24 - Koyukuk

Seasons and Bag Limits

Aug. 20 - Dec. 31	Two moose; only one of which may be antlerless

Harvest and Hunting Pressure

The following table contains the reported moose harvest information for Unit 24 from 1969 to 1973. The actual harvest was probably several times greater than the harvest indicated by the return of harvest tickets. Harvest tickets may not be commonly used by persons who reside in Unit 24. The reported harvest generally does not provide a basis for extrapolating the total kill or indicating annual trends in the harvest.

	Males	Females	Unknown	Total
1969	59	12	--	71
1970	46	7	4	57
1971	62	15	2	79
1972	34	13	--	47
1973	74	20	3	97

A substantial increase in hunting pressure and harvest in Unit 24 during 1973 originated from outside the unit and therefore was reflected in the reported moose harvest. In conjunction with efforts to determine the hunting pressure and impact of the fall grizzly bear season the Department was able to evaluate some of the effects of the increase in moose hunting efforts in Unit 24. Excerpts of Spencer Linderman's report dated October 19, 1973, which pertain to the moose situation in Unit 24 are included in Appendix 1.

Composition and Productivity

Neither composition nor productivity surveys were conducted in Game Management Unit 24 in 1973.

Range and Habitat

Heavy snowfall and snow accumulation in recent years have concentrated moose onto critical wintering habitat along streams and rivers in Unit 24. Casual observations in the spring of 1973 indicated that severe hedging of riparian willow communities may have occurred on the lower Koyukuk River. Similar conditions are likely to exist at other locations in the unit.

Population Trends

Lacking surveys to determine population trends, the status of moose populations is based on assumptions based upon harvest trends, wintering conditions, casual observations of the effects of moose browsing and the apparent status of wolf populations. In recent years heavy hunting and trapping pressure on wolves has probably offset some of the depressing effects upon moose populations of heavy snowfall and snow accumulation. The influence of the increased harvest on the moose population has not been determined, however, there was little or no indication of substantial increases or decreases in the population.

Management Summary and Recommendations

Our limited information does not indicate any alarming trends in the moose population. Efforts should be made to evaluate long-term environmental effects upon recent habitat changes in Unit 24, i.e. the effects of wildfire. An effort should also be made to obtain moose composition and population data, particularly from the upper drainages of the Koyukuk River. If the harvest continues to increase, accurate information will be needed on moose populations, habitat and areas utilized by hunters. If present or future hunting is altered by the establishment of National Parks, Refuges, or the exclusive use of private lands, moose populations may be undesirably affected.

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Appendix I. Excerpts from a report entitled Operation Grizzly by Spencer Linderman. Prepared for Oliver Burris, Page 3, October 19, 1973.

The local charter operators estimated moose hunting has increased about tenfold from last year. Moose were extremely easy to get with either float or wheel planes. Few, if any, hunters had to be flown more than 20 minutes from Bettles and set down on a lake to wait for a moose to walk out on the shore. This was not a spot and land operation, yet I remember only one unsuccessful hunter, even though many went for only two or three day hunts. Some hunters got two or three moose in this time just by sitting on a lake. Hunter-owned aircraft on wheels could land especially well on the numerous gravel bars of the Koyukuk River. I personally know of about 50 moose in two weeks which came through Bettles. Facilities for storage in, and transportation out of Bettles are not good. Wien Air Alaska had as many as four flights on some scheduled days instead of one to try to backhaul meat to Fairbanks, but this was limited economically by having something "extra" on hand in Fairbanks which needed to be freighted to Bettles. Abnormally warm temperatures and total absence of snow through the 20th of September did not help the situation. Also, hunters were not prepared with containers for shipping or even meat sacks in most cases. Much meat was shipped out in frail, plastic garbage bags donated by Bettles Lodge.

The most common reason for hunting the Brooks Range seemed to be increasing competition elsewhere coupled with generally decreasing abundance of game in more southern regions. This reason was cited especially often by moose hunters.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 25 - Fort Yukon

Seasons and Bag Limits

Aug. 20 - Dec. 31	Two moose; only one of which may be antlerless

Harvest and Hunting Pressure

The following table contains the reported moose harvest information for 1969 through 1973. The actual harvest in Unit 25 was probably several times larger than the harvest indicated by the return of harvest tickets. The reported harvest may indicate harvest trends but a great degree of reliability cannot be placed upon conclusions made from these data.

	Males	Females	Unknown	Total
1969	77	31	0	108
1970	42	15	1	58
1971	53	21	0	74
1972	55	26	2	83
1973	105	46	2	153

Composition and Productivity

No composition or productivity data are available for the moose population in Game Management Unit 25.

Management Summary and Recommendations

The limited information available from Unit 25 does not indicate any alarming trends in the moose population. Recent information was not available from this unit. Biological reconnaissance work has recently been initiated in this area, particularly in conjunction with proposed nonrenewable resource development and removal from the Arctic. This information was not yet available; therefore, not analyzed to determine the significance to moose management in Unit 25. No changes in season or bag limit are recommended.

The apparent substantial increase in the 1973 harvest increases the urgency for information on moose abundance, distribution, composition and habitat.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1973

Game Management Unit 26 - Arctic Slope

Seasons and Bag Limits

Aug. 20 - Dec. 31 — One moose

Harvest and Hunting Pressure

Based upon harvest ticket returns the moose harvest for the 1973 season was 31 animals. This harvest was within the range of moose harvests reported from this unit for the past several years. The reported harvest is not considered to be indicative of the actual harvest, however. Harvest tickets were not generally utilized by residents of Unit 26 and other methods of estimating the harvest have not been adapted to the unit.

Composition and Productivity

Composition and productivity surveys have not been conducted in Unit 26 by the Department since October 1971. It has been reported that surveys have been conducted in 1972 and 1973 by Renewable Resources Ltd. The results of these surveys were not available at this time.

Population Trends

Surveys have been conducted on the Chandler River from its confluence with the Ayiyak River to the confluence of the Chandler River with the Colville in 1971 and 1973. The results are listed below.

Chandler River moose surveys.

Date	Observers	Type Aircraft	Flight Time	Moose/ Hour	Total Moose
March 25, 1971	Stephenson, Ludlow	Cessna 185	1 hr. 20 min.	119	158
May 14, 1971	Stephenson, Crook, Ludlow	Cessna 185	45 min.	177	133
May 25, 1973	Stephenson,	Cessna 185	1 hr. 10 min.	51	61

It could be concluded from these surveys that there has been a decrease in population along the Chandler River. This conclusion should be considered tentative until more is known about seasonal moose distribution, which may account for the changes in moose numbers, or until other evidence or subsequent counts confirm the population decrease.

Management Summary and Recommendations

The general paucity of information about moose populations in Unit 26 makes it very difficult to determine the status of this resource. Moose populations in general appear to be restricted to the riparian willow communities and, therefore, may be easily identifiable and manageable. At this time it is not known if the apparent decline in the moose population on the Chandler River is representative of the moose population in the entire Colville drainage or other drainages in Unit 26. Moose habitat is very limited in Unit 26 and winter browse is particularly scarce. Surveys should be initiated to determine the degree of utilization and the condition of critical moose habitat. Considering the unknown degree of human utilization on the moose resource, and the potential for increased utilization as a result of changes in land use patterns, surveys should be undertaken which will provide a comparison of moose populations with observations made throughout the unit in 1969 and 1970.

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