ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
William A. Egan, Governor

DEPARTMENT OF FISH AND GAME
James W. Brooks, Commissioner

DIVISION OF GAME
Frank Jones, Director

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

Edited and compiled by
Donald E. McKnight, Research Chief

Volume III
Federal Aid in Wildlife Restoration
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MEMORANDUM OF TRANSMITTAL

January 29, 1973

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.

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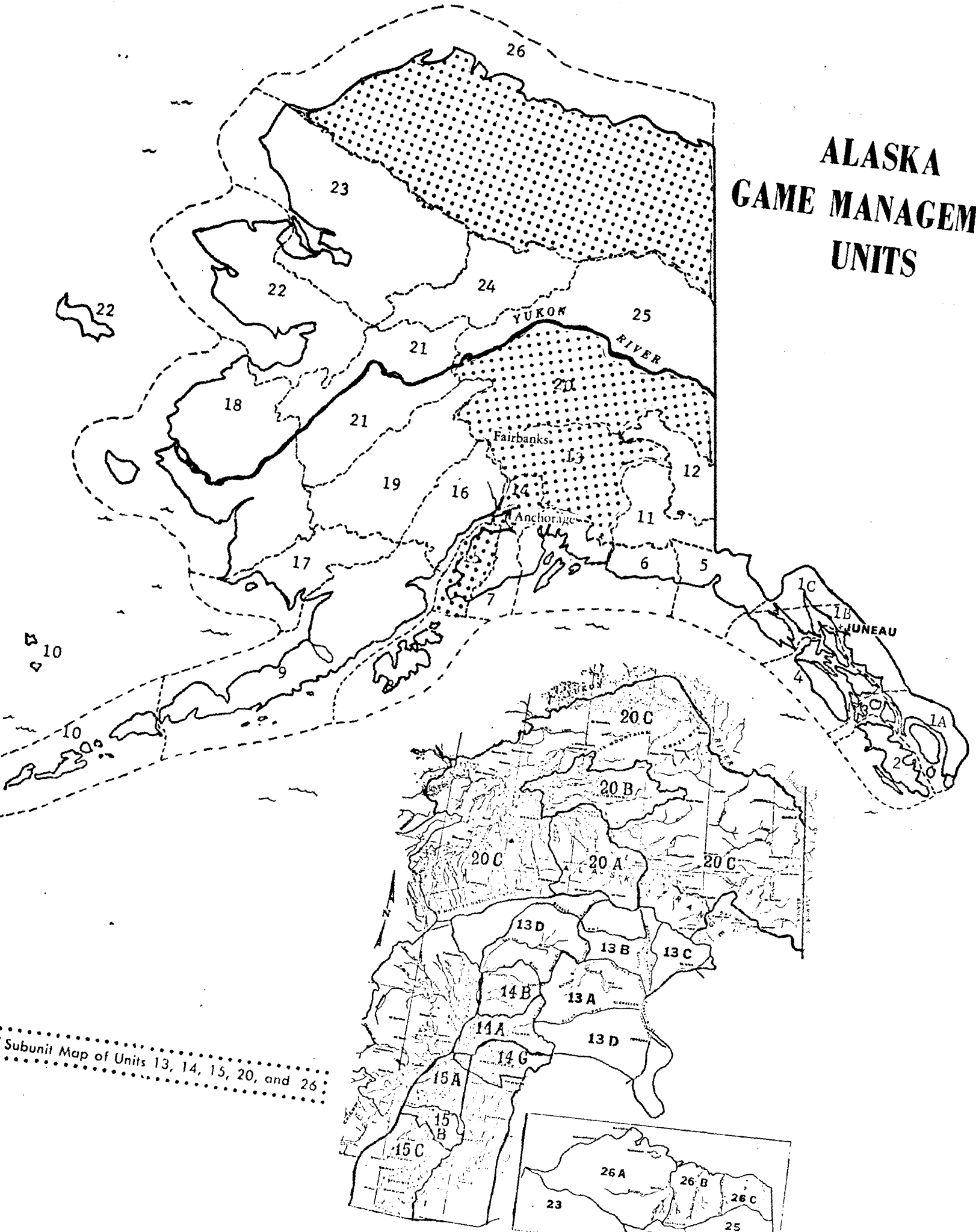
ALASKA GAME MANAGEMENT UNITS



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

STATEWIDE HARVESTS AND POPULATION STATUS

Moose

Data derived from the harvest ticket program show that 8,883 moose were reported as legally harvested in Alaska during 1971. This reported legal harvest, consisting of 5721 males, 3038 females and 124 of unknown sex, was the largest since 1963 when the harvest ticket program was initiated. Game Management Unit 13, easily accessible to both Fairbanks and Anchorage, sustained the largest reported harvest of the 26 management units (1815 animals).

Because harvest tickets are not widely used by subsistence hunters in remote areas of the state, the reported harvest does not reflect actual harvest in these areas. For example, even though the reported harvest in Unit 19 was 189 animals, the biologist intimately familiar with that unit estimated its real harvest to be from 500 to 700 animals. The reported harvest of 8,883 moose statewide in 1971 should be considered a minimum figure and the actual total harvest was probably in the order of 10,000 to 12,000 animals.

Although several moose herds in the Interior and the Stikine River herd in Southeastern suffered considerable reduction resulting from winter losses during the 1970-71 winter, overall Alaska's moose populations remained in good condition.

Deer

The 1971 deer harvest in Alaska, as determined from personal interviews of a sample of deer hunters, was approximately 6,810 animals. Over half of the statewide harvest came from Game Management Unit 4, Admiralty, Baranof and Chichagof islands.

Deer herds throughout the state remain at low levels resulting from severe winters during two of the past three years.

Elk

In 1971 the reported elk harvest on Afognak Island was 27 animals; 15 males and 12 females. This was the lowest reported harvest since general open seasons were declared.

The severe 1970-1971 winter resulted in an overall decrease in herd size of approximately 50 percent.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

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

Seasons and Bag Limits

Unit 1B except the Stikine River drainages	Sept. 15 - Oct. 15	One bull
Stikine River drainages	Oct. 15 - Oct. 31	One bull

Harvest and Hunting Pressure

Unit 1B has a small moose herd along the Stikine River and another in Thomas Bay. In 1971, according to fairly intensive hunter contacts on the Stikine River, 21 bulls were taken by 101 hunters. It is estimated the actual kill on the river was 25 bulls taken by 125 hunters. At least 10 bulls were also taken from Thomas Bay. The total reported kill from harvest ticket returns for Unit 1B was 30 moose.

Composition and Productivity

Six counts, from a Piper PA-12, were made on the Stikine River between June 22, 1971 and April 25, 1972. The four counts made between June 22 and August 11 gave a calf:cow ratio of 44:100 and a bull:cow ratio of 15:100. Total moose counted was 134. The two counts made in April (one by helicopter) showed a lowered calf:adult ratio of 18:100. Total moose counted on the two flights was 168. The December count was not used because of incomplete coverage and poor visibility.

Management Summary and Recommendations

The aerial surveys this year indicated better calf and bull:cow ratios than in preceding years. Possibly this is a result of the attempt to reduce the 1970 bull harvest by a reduction in season length. The number of bulls killed that year was still the same as the average of the preceding years, but perhaps the pre-season bull population was higher than estimated and the season did in effect reduce the proportion of bulls taken.

This winter was one of the most severe in recent years and the difference between the summer and winter calf:cow ratios indicates substantial calf loss. Only one dead moose was found during the winter surveys, however. The two main wintering areas on the river appeared to be the Barnes Lake - Boundary area and the area around Limb Island.

The 1971 season was late by previous standards and was not well received by many of the hunters. Weather traditionally is bad the last part of October and makes the boat access to the river difficult. The river was partially frozen the last few days of the season and water levels dropped low enough to make jet boats a necessity for many areas. These factors restricted hunting somewhat. Many complaints were also heard anticipating poor quality of the meat from such a late season.

This year an either-sex permit hunt was recommended to balance bull:cow ratios. Wrangell hunters, who comprise about 80 percent of those who hunt on the Stikine, were strongly opposed to the permit hunt. About a third of the hunters in Wrangell were personally contacted concerning this permit hunt and while many were opposed to a cow harvest, the main objection was the loss of hunting opportunity to all those not drawing a permit. The regulation set by the Board for 1972 allows an early (September 15-30) 30 permit antlerless hunt followed by a later (October 10-25) general bull season and should satisfy most hunters while considerably increasing the moose harvest.

Of the 47 moose hunters from Wrangell who were personally contacted concerning the antlerless permit hunt, 44 were against it and three were for it. Fourteen of the successful hunters from the 1971 season were also contacted and asked about meat quality. Eleven said the meat was good to excellent while three said it was poor. Forty-two hunters were questioned on the length of time they had been hunting moose on the Stikine and the average years hunted was 10.8 years, indicating a strongly traditional form of recreation. Fourteen people specifically commented on cow shooting. Five indicated they were either for a small cow harvest or not against it, while nine said they were opposed to any cow hunting.

Submitted by: Robert E. Wood, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 1C - Juneau

Seasons and Bag Limits

Unit 1C except Berners Bay drainages	Sept. 15 - Oct. 15	One bull
Berners Bay drainages	Sept. 15 - Oct. 15	One moose by permit only; 40 permits will be issued.

Harvest and Hunting Pressure

Moose hunter harvest ticket returns indicate that 24 bulls and 17 cows were killed in GMU 1C in 1971 (78 percent of tickets issued were returned). This included 21 bulls from the Taku River drainage, two bulls and 16 cows from Berners Bay and two additional bulls from an unspecified area within Unit 1C. The reported Berners Bay harvest by permit holders to the Juneau Game office was three bulls and 20 cows. Harvest figures for Unit 1C since 1963 are listed in Appendix I.

Forty either-sex permits were issued for Berners Bay drainages in 1971. Of 291 applicants, 280 qualified for a drawing held in Juneau, on August 20, 1971. All permit recipients were residents of Juneau, Douglas and Auke Bay (Appendix II). Twenty-eight permit holders actually hunted at Berners Bay. Of these, 23 were successful in taking one moose.

Composition and Productivity

Sex and age composition counts made in the Berners Bay area in November, 1971 showed a bull:cow ratio of 7:100 and a calf:cow ratio of 50:100. Of 67 animals observed, 32.8 percent were calves. Fall composition counts were not made in the Taku area in 1971.

The mean cementum age of 17 moose harvested in Berners Bay was 3.7 years (excluding calves) in 1971. The mean ages of two bulls and 15 cows were 1.5 years and 4.0 years, respectively.

Management Summary and Recommendations

Herd composition information for the Berners Bay area indicates a depressed bull segment of the population. However, calf production showed signs of considerable improvement over findings in 1969 and 1970 when the calf:cow ratios were 19:100 and 14:100.

The issuance of either-sex permits for the harvest of moose in Berners Bay should be continued. Either-sex hunting should bring

bull:cow ratios into better balance. This herd has attained a size where the annual increment should be cropped to maintain it in balance with available habitat.

No changes in seasons and bag limits are recommended for the remainder of Subunit 1C.

Submitted by: David Zimmerman, Game Biologist II

MOOSE - GMU 1C - Southeast Mainland

APPENDIX I

Moose Harvest

Year	Bull	Cow	Sex Unknown	Total
1963	18	-	-	18
1964	41	-	-	41
1965	34	-	2	36
1966	39	-	-	39
1967	47	-	1	48
1968	34	-	1	35
1969	31	-	-	31
1970	23	1	-	24
1971*	24	17	-	41

*Three bulls and 20 cows reported to Juneau by permittees.

Submitted by: Dave Zimmerman, Game Biologist II

MOOSE - GMU 1C - Southeast Alaska

APPENDIX II

Berners Bay Moose Permit Drawing Results, 1971

Address	Number of Applications	Percent	Number Drawn	Percent
Juneau	184	65.7	28	70.0
Douglas	41	14.6	3	7.5
Auke Bay	41	14.6	9	22.5
Ketchikan	4	1.4		
Sitka	3	1.1		
Petersberg	3	1.1		
Haines	2	0.7		
Tenakee	1	0.4		
Anchorage	1	0.4		
Qualified Applications	280	100.0	40	

Submitted by: David Zimmerman, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 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

Unit 1D (previously 1C) primarily includes the Haines area. Hunter harvest ticket returns for 1971 were 72 bulls and 32 cows (34 cows reported to Haines Highway check station). Hunting pressure information as reflected by number of hunters is not available at this time.

Composition and Productivity

Aerial composition counts made in the Chilkat Valley indicated ratios of 16 bulls and 20 calves per 100 cows in November, 1971. Of 231 identified animals counted, 15 percent were calves. Comparable counts were not made in 1970.

Mean cementum ages of 11 bulls and 18 cows (data collected from hunter-killed moose from September 1-15) were 2.4 years and 4.3 years, respectively.

The mean cementum age of bulls harvested in 1971 is not comparable to the 1970 mean age due to collection period differences. The 1970 mean age for cows was 3.8 years.

Management Summary and Recommendations

Heavy hunting pressure is probably still the major contributing factor effecting the low bull:cow ratio. Harvest levels since 1969 appear to have stabilized at about 100 per year.

Either-sex hunting has been allowed in Unit 1D since 1964. About 40 cows are taken annually. Populations appear to be reasonably stable; however, bull:cow ratios are still lower than desired. A higher proportion of cows could be taken from this unit.

Submitted by: David Zimmerman, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 5 - Yakutat

Seasons and Bag Limits

Aug. 10 - Nov. 30 One moose

Harvest and Hunting Pressure

Harvest ticket returns indicated that 230 moose were killed in 1971. The harvest consisted of 104 bulls (45.2%), 124 cows (53.9%) and 2 unknowns (0.9%). The 1970 harvest was 288 moose (141 bulls, 140 cows and 7 unknowns) (Appendix I).

Of 472 hunters reporting, 48.7 percent were successful. The number of individuals using the U. S. Forest Service cabins on the Yakutat foreland decreased from 838 in 1970 to 542 in 1971.

Composition and Productivity

Late fall 1971 sex and age composition information collected in the Yakutat foreland area (counts were not conducted in the Situk - Dangerous River area) revealed 19 bulls and 30 calves per 100 cows. Of 334 identified animals counted, 20 percent were calves.

Composition counts in the Malaspina forelands revealed 38 bulls and 32 calves per 100 cows. Of 570 identified moose counted, 19 percent were calves.

The mean cementum age of 79 moose (excluding calves) harvested in 1971 was 4.0 years. The mean ages of 33 bulls and 42 cows were 3.7 years and 4.0 years, respectively.

Management Summary and Recommendations

Herd composition and harvest information indicate that the moose population in Game Management Unit 5 is relatively stable. No seasons or bag limit changes are recommended.

Either-sex hunting has been allowed in Unit 5 for many years. The kill is normally equally divided between cows and bulls. The fairly low bull:cow ratio from composition counts indicates that bull populations are either not truly represented in the count areas or that some have shed their antlers and are miscounted as cows. The actual sex ratio must be much closer than counts indicate.

Submitted by: David Zimmerman, Game Biologist II

MOOSE - GMU 5 - Yakutat

APPENDIX I

Moose Harvest, 1963-1971

Year	Male	Female	Sex Unknown	Total
1963	189	111	2	302
1964	154	111	-	265
1965	153	125	4	282
1966	116	90	6	212
1967	154	108	1	263
1968	177	133	3	313
1969	163	161	-	324
1970	141	140	7	288
1971	104	124	2	230

Submitted by: David Zimmerman, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 6 - Prince William Sound - East of the Copper River

Seasons and Bag Limits

Aug. 20 - Sept. 30 Nov. 1 - Nov. 30*	One moose by permit; conditions 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 15, 1971 throughout the season; (2) successful hunters were required to report their kill to the Cordova Fish and Game office within 48 hours.

Harvest and Hunting Pressure

A total of 76 moose, 39 bulls and 37 cows, were taken east of the Copper River during the 1971 season. This year's harvest is below the 1970 estimated harvest of 100 animals (Appendix I).

Chronology of the harvest indicates a hunter preference toward bulls during the early season whereas cows are preferred during the November season.

Two hundred and forty-three permits were issued giving a permittee success ratio of 31 percent. The overall hunter success ratio is unknown but is estimated to be 80 percent or better. Inaccessibility and weather kept many permittees from going afield.

Composition and Productivity

A sex and age survey was flown over the Martin River count area December 2, 1971. Overall survey conditions were excellent and 261 moose were observed. The bull/cow ratio of 37.6 per 100 remained good but the calf/cow ratio dropped to 15.9 per 100. The small calf crop can probably be attributed to a late spring (Appendix II).

No survey was flown over the Bering River - Controller Bay count area this fall.

Age analysis for the Martin River herd basically indicates a normal distribution of age classes (Appendix III). The lack of old bulls in the harvest reflects the area hunted rather than their scarcity. Large bulls can readily be seen during the hunting season in the upper reaches of the Martin River but are usually inaccessible to the airplane and airboat hunters.

Management Summary and Conclusions

Analysis of the available data on the Martin River herd indicates it is healthy even though the calf crop was poor this year. The major problem will be to obtain an adequate annual harvest. An annual harvest rate of approximately 30 percent is desired. This season a maximum of 22 percent were harvested.

Recommendations

The recommended hunting season would be:

Remainder of Unit 6	Aug. 20 - Nov. 30*	One moose by permit; conditions and numbers of permits will be described by Commissioner's announcement.

*The addition of the month of October is necessary to achieve the desired harvest.

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - East of the Copper River

APPENDIX I

Moose Harvest, Unit 6 - East of the Copper River.

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

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

**Estimated harvest.

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - East of the Copper River

APPENDIX II

Moose Sex and Age Ratios - Unit 6 - East of the Copper River

Date	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	Animals per Hour	Total Sample
1964-65							36.4	26.0	UNK	NA	52
1965-66							20.8	31.0	UNK	NA	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	NA	207
1968-69							25.0	21.4	UNK	NA	201
1969-70							17.4	20.3	POOR	NA	138
1970-71	41.2	14.5	54.3	8.1	76.0	38.2	6.4	21.3	GOOD	NA	235
1971-72	37.6	14.1	60.0	9.2	177.8	15.9	13.6	10.3	EXCELLENT	NA	261

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - East of the Copper River

APPENDIX II (Continued)

Moose Sex and Age Composition - Unit 6 - East of the Copper River

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 & Age	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	24	8	0	32	39	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
12/2/70	40	24	64	148	19	3	170	234	2	27	0	261	3.1	NA

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - East of the Copper River

APPENDIX III

1969, 1970 & 1971 Cementum Age Data, Unit 6 - East of Copper River

	MALES							FEMALES					
	1969		1970		1971			1969		1970		1971	
Age	No.	%	No.	%	No.	%	Age	No.	%	No.	%	No.	%
Calf	0	0	0	0	0	0	Calf	0	0	0	0	0	0
1	4	44.4	5	50.0	6	28.6	1	1	25.0	2	16.7	7	26.9
2	2	22.2	1	10.0	5	23.8	2	0	0	1	8.3	1	3.8
3	2	22.2	1	10.0	6	28.6	3	0	0	6	50.0	3	11.5
4	0	0	1	10.0	3	14.3	4	0	0	0	0	5	19.2
5	1	11.1	0	0	1	4.8	5	0	0	1	8.3	3	11.5
6			2	20.0			6	1	25.0	0	0	3	11.5
7							7	1	25.0	1	8.3	1	3.8
8							8	1	25.0	0	0	1	3.8
9							9			1	8.3	1	3.8
10							10					0	0
11							11					0	0
12							12					1	3.8
Total	9	99.9	10	100.0	21	100.1	Total	4	100.0	12	99.9	26	99.6

Submitted by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 6 - Prince William Sound - West of the Copper River

Seasons and Bag Limits

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

The conditions of this hunt were: (1) any person could apply for a permit at the Cordova Fish and Game office from July 15 until noon August 20, 1971; (2) a drawing for 60 permits was held on the afternoon of August 20; (3) successful hunters were required to report their kill to the Cordova Fish and Game office within 48 hours.

Harvest and Hunting Pressure

The 1971 harvest was composed of 12 bulls and 27 cows for a total of 39 moose. The harvest was lower than those of the past two seasons but approximated the desired harvest of 40-50 animals (Appendix I).

For the 60 permits, 399 applications were received. The actual number of hunters was 49; 11 either did not hunt or hunted in another area. Thus the hunter success ratio was 80 percent versus the permittee success ratio of 65 percent.

Weather during this six-day hunt was excellent until the last day of hunting.

Composition and Productivity

A sex and age composition survey was flown November 2, 1971 west of the Copper River. General counting conditions were fair and 175 moose were observed. Composition of this herd was 13.3 bulls per 100 cows which is adequate and 41.6 calves per 100 cows which is excellent. The herd composition compares favorably with the 1970 survey (Appendices II, III).

Cementum age data were obtained from 34 of the 39 moose taken. These data indicate a normal distribution of age classes for the female segment of the herd; the data on males indicate a reduction of hunting pressure on the male segment of the herd (Appendix IV).

Management Summary and Conclusions

The basic objective, to obtain an adequate harvest with controlled hunting pressure, was accomplished through the present regulations.

The short, either-sex season has reduced the hunting pressure on the male segment of the herd and has made a greater distribution of age classes available to the hunter and to the aesthetic viewer. Either-sex hunting has been well accepted by the public. The public has also accepted controlled hunting by the permit system.

Recommendations

No change in the regulations is recommended.

The number of permits issued should be increased slightly to obtain a larger harvest.

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - 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	N O O P E N S E A S O N			
1962	25	0	0	25
1963	15	2	0	17
1964	15	0	0	15
1965	20	0	0	20
1966	20	1	0	21
1967	23	0	0	23
1968	28	8	0	36
1969	30**	12	0	42**
1970	14	32	0	46
1971	12	27	0	39

* First harvest since introduction of moose to Unit 6.

**Estimated.

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - 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	UNK	67
1963-64	Z E R O	D A T A								
1964-65							18.8	31.0	UNK	121
1965-66	Z E R O	D A T A								
1966-67	Z E R O	D A T A								
1967-68	13.5	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

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - West of the Copper River

APPENDIX III

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	20	20	21	0	22	24	67	2.3	NA
1963-64	Z E R O		D A T A											
12/9-10/64	5	6	11	9	26	6	41	52	0	38	31	121	4.7	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
1/15-16/69	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

*Plus 1 female with 3.

Submitted by: Julius Reynolds, Game Biologist III

MOOSE - GMU 6 - Prince William Sound - West of the Copper River

APPENDIX IV

1969, 1970 & 1971 Cementum Age Data, Unit 6 - West of the Copper River

	MALES							FEMALES					
	1969		1970		1971			1969		1970		1971	
Age	No.	%	No.	%	No.	%	Age	No.	%	No.	%	No.	%
Calf	0	0	1	10.0	0	0	Calf	0	0	0	0	2	8.3
1	19	86.4	7	70.0	5	50.0	1	2	18.2	5	21.8	5	20.8
2	1	4.5	1	10.0	1	10.0	2	2	18.2	2	8.7	2	8.3
3	2	9.1	1	10.0	3	30.0	3	0	0	4	17.4	3	12.5
4					0	0	4	1	9.1	2	8.7	3	12.5
5					0	0	5	1	9.1	1	4.3	3	12.5
6					1	10.0	6	1	9.1	3	13.1	2	8.3
7							7	1	9.1	0	0	2	8.3
8							8	1	9.1	1	4.3	0	0
9							9	1	9.1	3	13.1	0	0
10							10	0	0	1	4.3	1	4.2
11							11	0	0	1	4.3	0	0
12							12	1	9.1			0	0
13							13	0	0	0	0	1	4.2
TOTAL	22	100.0	10	100.0	10	100.0	TOTAL	11	100.0	23	100.0	24	99.9

Submitted by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

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 River drainages.	Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose; 30 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement.
Remainder of Unit 7	Aug. 20 - Sept. 30	One bull

Harvest and Hunting Pressure

Harvest report returns indicate that hunters harvested 152 bulls, 14 cows and two unidentified moose during the 1970 season for a total harvest of 181 moose (Appendix I). Hunters afield dropped from 556 in 1969 to 520 in 1970 while hunter success increased slightly from 32.2 in 1969 to 34.7 in 1970. Information on the antlerless harvest was reported in 1970. The 1970 bull harvest was 20.6 percent above the average for the previous five years but was down 12.7 percent from 1969.

The 1971 moose harvest, as reported by harvest reports, was 153 bulls, 14 cows and two unidentified sex. Hunters afield rose from 520 in 1970 to 563 in 1971, while hunter success dropped from 34.7 to 30.0 percent.

The antlerless season in 1971 was held Sept. 1 - 30. Sixty-three permits were issued.

Composition and Productivity

As in 1970, composition counts were conducted in only a portion of Unit 7 (Appendices II, III, IV, V). A reliable unit trend is not available from these data. Data in 1971 show, as they did in 1970, that areas that receive heavy hunting pressure such as Juneau Creek (Count Area 12), Twentymile River (Count Area 6) and Placer River (Count Area 5) had rather low bull/cow ratios and good calf production. Those areas surveyed that received light hunting pressure, such as Resurrection Creek (Count Area 10) and the drainages into the Chickaloon River (Count Areas 8, 9, 20, 21) had relatively high bull/cow ratios and poor calf production. The bull/cow ratios in areas with heavy hunting pressure averaged 9.2 bulls/100 cows and the cow/calf ratios averaged 38.2 calves per 100 cows. Those areas with light hunting pressure averaged 29.0 bulls per 100 cows and 12.9 calves/100 cows.

Age data for 10 of 14 cows taken in Unit 7 are presented in Appendix VI. Because of the small size of this sample, valid conclusions cannot be drawn.

Management Summary and Conclusions

The bull harvest has remained fairly constant since 1968, varying from a high of 174 in 1969 to a low of 152 in 1970. The variation is of small magnitude and may only reflect local differences in hunting conditions during the various hunting seasons.

Good productivity and low bull/cow ratios noted in areas receiving heavy hunting pressure in contrast to high bull/cow ratios and low calf production in lightly hunted areas demonstrates the adverse effects of harvesting bulls only. Production and bull/cow ratios could be improved in some parts of this unit by allowing a balanced harvest of both bulls and cows.

Recommendations

Moose hunting in the Twentymile River and Placer River drainages should be regulated to allow the taking of some antlerless moose to maintain the present high levels of production.

Submitted by: Paul A. LeRoux, Game Biologist III

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	*	*	9	*		
	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	1	3	164	481	34.0
1969	Comb.	174	4	1	179	556	32.2
1970	1st	104	0	1	105		
	2nd	23	0	1	24		
	Ant.[1]	0	14[3]	0	14		
	Comb.	152	14[3]	2	168[2]	520	34.7
1971	1st	110	14	2	126		
	2nd	25	0	0	25		
	Comb.	153[2]	14	2	169[2]	563	30.0

*Data not available.

[1]Antlerless season held December 2-6.
[2]Total exceed total of various seasons because kills for which date was not given.
[3]Data from source other than harvest tickets.

Submitted 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 Ad.	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	12.50	87
1971 11/1-4	132	84	216	782	163	17**	962	1178	6	204	11	1392	15.69	88.5

* Not available.
**Includes 1 set of triplets.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - Seward

APPENDIX III

Moose Sex and Age Ratios - Unit 7

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	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	63.8	6.4	83.2	21.2	9.4	14.7	5,6,10,12 8,9,20,21	88.5	1392

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - Seward

APPENDIX IV

Moose Sex and Age Composition by Trend Area for 1971 - 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	11/1/71	1	4*	5	47	34	7	88	93	0	48	0	141	2.0	70.5
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	58	11	6**	72	80	0	24	0	104	1.67	62.3
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
12	11/19/70	14	18	32	157	52	1	210	242	0	54	0	296	3.5	85
12	11/3/71	10	6	16	113	42	2	157	173	3	49	0	222	2.08	106.7
8,9 20,21	11/2/70	29	12	41	110	20	1	131	172	0	22	0	194	3.0	65
8,9 20,21	11/3-4/71	81	13	94	354	39	1	394	488	3	44	8	538	5.2	103.6

* Small bulls not properly identified.
**Includes 1 set of triplets.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - Seward

APPENDIX V

Moose Sex and Age Ratios by Trend Area for 1970-71 - Unit 7

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	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
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
1970	29.2	10.2	53.3	6.8	88.9	18.0	4.8	12.8	10	92.0	350
1971	37.1	*	*	*	*	15.5	2.6	10.1	10	81.3	386
1970	15.2	8.6	128.6	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
1970	31.3	9.2	41.1	6.2	91.6	16.8	4.8	11.3	8,9,20,21	65.0	194
1971	23.9	3.3	13.8	2.5	59.0	11.2	2.6	8.3	8,9,20,21	103.7	538

* Small bulls not properly identified.
**Includes 1 set of triplets.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - Seward

APPENDIX VI

Female moose harvest age structure 1971-72 season, Sept. 1-30
Juneau Creek and Resurrection Creek drainages - Unit 7

Age	Number	Percent
Calf	2	20
1	0	0
2	3	30
3	1	10
4	1	10
5	1	10
6	1	10
7	0	0
8	0	0
9	0	0
10	0	0
11	1	10

(N = 10)

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 9 - Alaska Peninsula

Season and Bag Limits

Aug. 20 - Dec. 31*	Two moose; provided that only one moose may be an antlered bull.

* Antlered moose may not be taken between Oct. 1 - Oct. 31

Harvest and Hunting Pressure

Harvest data from the harvest ticket program show the 1971 season produced the second largest take of moose in Unit 9 history. Bull moose made up 72 percent (317 moose) of the total reported harvest of 440 animals (Appendix I). A kill of 116 cow moose was reported. The cow harvest was up 38 percent over 1970 (84 cow moose) and 57 percent over the average cow moose harvest for the past five years (73.8 cow moose).

Nearly two-thirds (62.5 percent) of the harvest occurred during the first 40 days of the open season. Only 6.6 percent of the kill occurred in October when the season was closed to the taking of antlered bulls. However, 18.1 percent of the total cow harvest occurred during the month of October.

Residents took a reported 244 moose and nonresidents 182 moose. Hunter success for Alaskan residents hunting the unit was 66.7 percent and for nonresidents, it was 87.9 percent. The overall hunter success for all hunters that reported hunting Unit 9 was 74.4 percent. Only 32 hunters exercised the option to take a second moose.

Composition and Productivity

Spring productivity flights were conducted during the first two weeks of June (Appendix II). The winter of 1970-71 was one of the hardest on record on the Alaska Peninsula. Record low temperatures were reported from both King Salmon and Cold Bay. Spring break-up and the emergence of new vegetation was approximately three weeks later than in other years. In probable response to the severe winter and the delayed spring, calving peaked approximately one week later than in 1970 (Figure 1).

At peak calving only 40.2 percent of the cows had calves and the maximum production recorded was 53.9 calves per 100 cows. For the second year, following peak calving there was a definite decline in the abundance of calves. The hard winter of 1970-71 undoubtedly influenced the loss of calves, but during the relatively mild winter of 1969-70 the same type of pattern was recorded.

It appears that many cows are not carrying their calves to parturition and those calves born are in poor physical condition and are suffering a high mortality rate.

Fall sex and age compositions were conducted in five trend areas and a small "patch" of moose habitat located immediately in between two trend areas. A sample size of 1,091 moose was recorded as the sum of all areas (Appendices III and IV). Again this year the bull/cow ratio showed a continued decline (Appendix V). However, the inclusion of the unhunted Katmai trend area kept the overall figure of 46.8 bulls per 100 cows from being lower than the 44.9 bull/cow ratio obtained in 1970. (If the Katmai trend area data are excluded, the 1971 bull/cow ratio becomes 36.7 bulls per 100 cows.) The lowest bull/cow ratio was obtained from the heavily hunted Mother Goose trend area.

A survey of the Chekok trend area near the east end of Lake Iliamna produced only seven animals, although conditions for the survey were excellent. First surveyed in 1969, this trend area had a sample size of 34 moose. The marked reduction in sample size this year probably resulted because moose had not moved into the trend area from the surrounding hills. Because of the small sample size, sex and age ratios obtained for this trend area should be considered unreliable.

The poor reproductive success recorded during the spring surveys was confirmed by the fall surveys. A calf/cow ratio of 10.2 calves per 100 cows was even lower than a similar ratio of 12.4 calves per 100 cows obtained in 1970.

Management Summary and Conclusions

Moose first appeared on the Alaska Peninsula west of Naknek River during the late 1920's and early 1930's. The population grew slowly at first and then gained rapidly until it peaked in the mid-1960's. At this time the population appears to be making a downward adjustment toward the actual carrying capacity of the range. Spring productivity surveys and fall sex and age composition surveys indicate that poor reproductive success is the means by which this adjustment is occurring. To date, the Peninsula moose herd has not experienced the large winter mortality often exhibited by big game populations that have exceeded the carrying capacity of their range.

The reported hunter harvest for Unit 9 has not had a discernible effect upon the total population. Moose hunting has basically been either guided trophy hunts or meat hunts by unit residents. The only noted effect this hunting has had has been to alter the bull/cow ratios, but even in heavily hunted areas, the ratio is not so altered as to be detrimental to good reproduction. As hunting cannot be considered a contributing factor to the downward trend of the moose population, restriction in the existing seasons or bag limits would be meaningless in an effort to return the population to its former abundance.

The restriction against taking antlered bulls during the month of October has no biological justification. Meat taken during the rut is palatable if properly cared for. Wanton waste and baiting brown bears with moose carcasses is already illegal in other sections of the regulations. The October bull closure has not enhanced enforcement of these regulations. However, the closure has been a hardship for the meat hunting unit resident by restricting his harvest options during what is often the last favorable period of weather prior to freeze-up. Also, it has taken the option of multispecies hunts away from Peninsula based guides and therefore restricted their opportunity to earn a livelihood.

Recommendations

The Unit 9 moose season should run from August 20 through December 31 without a closure on antlered moose for any portion of that season. The bag limit should remain unchanged.

Submitted by: James B. Faro, Game Biologist III

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	67.0
1968	366	72	5	443	583	75.5
1969	317	70	6	393	527	74.6
1970	266	84	2	352	457	77.0
1971	317	116	7	440	519	74.4

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX II

Moose Productivity, Unit 9 - Alaska Peninsula 1971

Date	Calves per 100 FF	Calves per 100 FF and Yearlings	Percent FF with Calves	Percent FF with Twins	Total Sample
6/2	43.3	32.6	28.4	52.6	214
6/5	53.9	38.9	40.2	33.3	221
6/12	23.8	19.2	20.0	19.4	237

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX III

Moose Sex and Age Ratios, 1971 - 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 Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Sample
Chekok	16.7	-	-	-	-	-	-	-	5.8	7
Katmai	85.6	8.3	10.8	4.2	146.7	11.4	15.4	5.8	162.5	260
Meshik	50.9	22.6	80.0	13.6	300.0	15.1	-	9.1	40.0	88
Mother Goose	23.6	8.6	57.5	6.7	255.6	6.7	-	5.2	145.0	348
Dog Salmon	56.9	17.5	44.4	10.0	184.7	19.0	4.2	10.8	104.8	241
Patch	43.0	8.0	22.9	5.4	400.0	4.0	-	2.7	267.3	147
TOTALS	46.8	12.2	31.6	7.1	219.7	10.2	4.5	6.5	105.9	1,091

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX IV

Moose Sex and Age Composition - Unit 9 - 1971

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
Chekok	11/22	1	0	1	6	0	0	6	7	0	0	7
Katmai	10/24	102	11	113	119	11	2	132	245	15	0	260
Meshik	11/24	15	12	27	45	8	0	53	80	8	0	88
Mother Goose	11/21	40	23	63	249	18	0	267	330	18	0	348
Dog Salmon	11/27	54	24	78	113	23	1	137	215	26	0	241
Patch	11/21	35	8	43	96	4	0	100	143	4	0	147
TOTALS		247	78	325	628	64	3	695	1,020	71	0	1,091

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

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	53.9	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

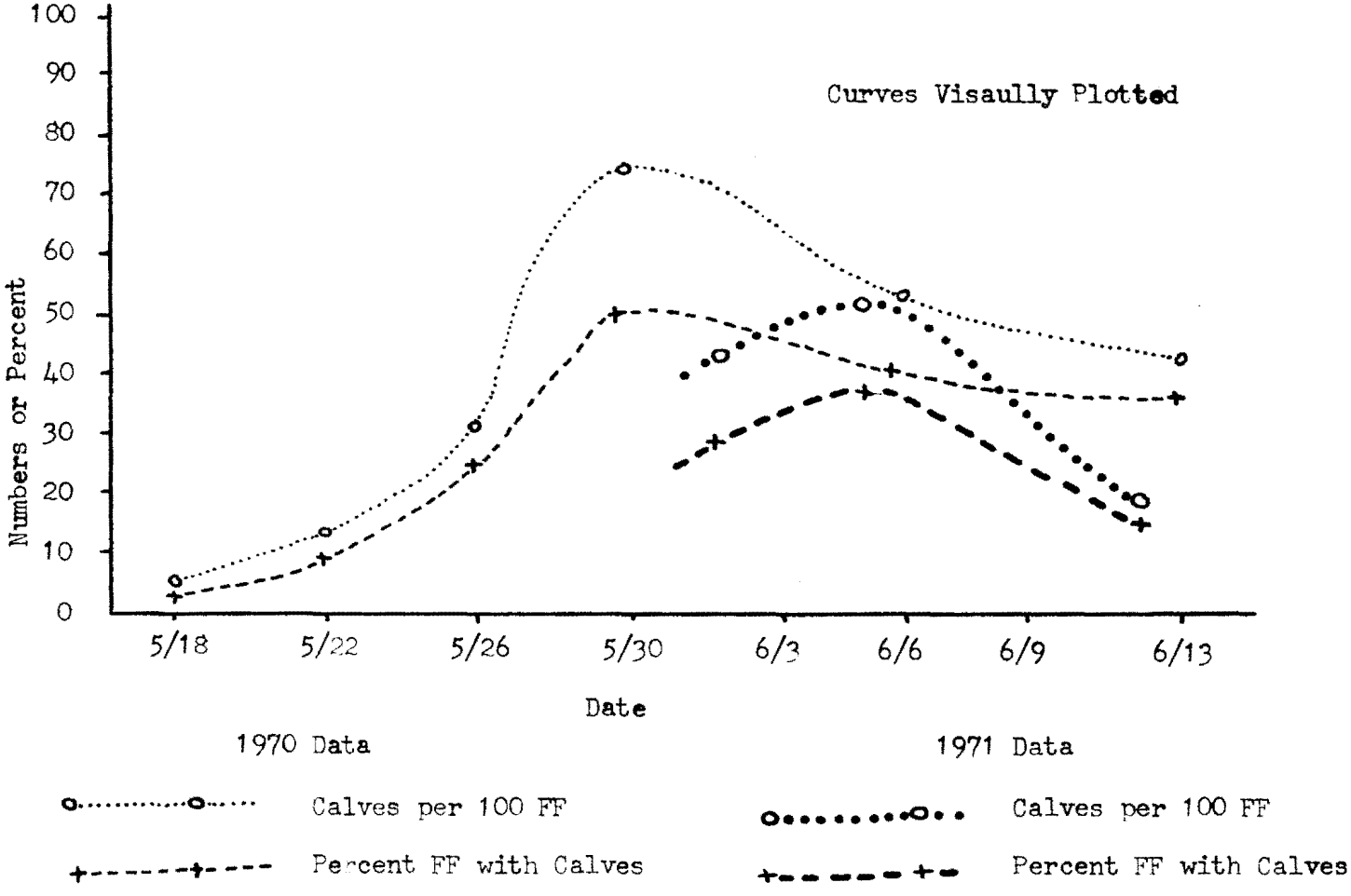
*Sex and age composition counts were not conducted in 1965.

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

FIGURE 1

Moose Productivity, Unit 9, Alaska Peninsula 1970–1971



Submitted by: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 11 - Wrangell Mountains - Chitina River

Seasons and Bag Limits

Aug. 20 - Sept. 30	One Moose
Nov. 1 - Nov. 30	

Harvest and Hunting Pressure

Harvest data for 1970 and 1971 are presented in Appendix I. In 1970 there was an increase in hunting pressure plus a record kill of 242; 126 bulls, 115 cows and one sex unknown. Hunter success was 43 percent, the same as 1969. Harvest chronology shows that 45 percent of the male kill and 71 percent of the female kill (57 percent of the total) occurred during the November season. The Nabesna Road area accounted for 66 percent of the total Unit 11 harvest, 67 males and 100 females.

During 1971 the Unit 11 harvest dropped to 181; 90 males, 89 females and two sex unknown. Hunting pressure remained nearly the same while success was the lowest ever recorded (33 percent). The November season produced 65 percent of the known date kills: 78 percent of the females and 51 percent of the males. The harvest from the Nabesna Road area decreased from 167 in 1970 to 104 in 1971. The 1971 harvest for the Nabesna Road area was 41 males and 63 females which makes up 58 percent of the Unit 11 total.

Composition and Productivity

Lack of time, budgetary limitations and low priority precluded aerial sex and age composition counts in the Mt. Sanford - Mt. Drum count area. The area receives only light hunting pressure, mostly for trophies, and access is limited to aircraft. Historical data for this count area are presented in Appendices II and III.

A trend area has never been established in the Nabesna Road area of Unit 11 but the general area was surveyed in 1965, 1968 and 1971 (Appendices IV, V). Although sample sizes are small and the areas surveyed are not completely consistent from year to year there are distinct indications of lowered productivity and survival. Small bulls per 100 cows, calves per 100 cows, bulls per 100 cows and moose per hour are all reduced.

Management Summary and Conclusions

Hunting has had little measurable effect on the overall moose population in Unit 11. Selective trophy hunting combined with lowered production has altered sex ratios (Appendices II, IV). The Nabesna Road

area has been one of concern for several years. Well developed access, especially for all-terrain vehicles, and a 70-day either-sex season have attracted numerous hunters. For the past four years over half of the Unit 11 harvest has come from this limited area. Harvest and hunter success for this area dropped in 1971. More restrictive seasons and bag limits are indicated.

Recommendations

It is recommended that the part of Unit 11 accessible via the Nabesna Road be subdivided from the remainder of the unit. Seasons and bag limits in the new subunit should be changed to coincide with that portion of the Nabesna Road in Unit 12: August 20 - October 7, November 1 - November 30. One moose; provided that antlerless moose only may be taken October 1 - 7. Seasons and bag limits for the remainder of the unit should remain unchanged.

Submitted by: Loyal J. Johnson, Game Biologist III

MOOSE - GMU 11 - Wrangell Mountains - Chitina River

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 11

Year	Male	Female	Unid.	Total	Hunters	Success Percentage
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

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 11 - Wrangell Mountains - Chitina River

APPENDIX II

Moose Sex and Age Ratios - Mt. Drum - Unit 11

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
11/21/55	144.9	29.0	25.0	10.3	163.2	35.5	18.8	12.7	75	300
10/23/56	145.0	15.0	11.5	5.5	100.0	30.0	20.0	10.9	54	55
11/13/57	70.5	6.8	10.7	3.3	35.3	38.6	0.0	18.5	92	92
10/29/-30/58	140.6	12.3	9.6	4.5	72.2	34.0	2.9	12.4	94	291
11/18/60	80.0	16.0	25.0	7.3	88.9	36.0	12.5	16.4	48	110
1961*										
1962*										
1963*										
1964*										
10/25-27/65	80.6	25.4	45.9	12.7	272.0	18.7	0.0	9.3	81	268
1966*										
11/10/67	71.8	10.1	16.4	5.0	69.7	29.1	3.1	14.5	117	456
1968*										
11/12/69	65.2	11.0	20.2	5.7	75.6	27.8	4.9	14.4	85	299
10/28/70	60.3	14.9	32.7	8.5	213.0	14.0	0.0	8.0	59	199
1971*										

*Sex and age composition counts not conducted.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 11 - Wrangell Mountains - Chitina River

APPENDIX III

Moose Sex and Age Composition - Mt. Drum - Unit 11

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.)
1955	124	31	155	75	26	6	107	262	0	38	0	300	4.0
1956	26	3	29	15	4	1	20	49	0	6	0	55	1.0
1957	28	3	31	27	17	0	44	75	0	17	0	92	1.0
1958	136	13	149	71	34	1	106	255	0	36	0	291	3.1
1959*													
1960	32	8	40	34	14	2	50	90	0	18	2	110	2.3
1961*													
1962*													
1963*													
1964*													
1965	74	34	108	109	25	0	134	243	0	25	1	268	3.3
1966*													
1967	1140	23	163	163	62	2	227	390	0	66	0	456	3.9
1968*													
1969	84	17	101	114	39	2	155	256	0	43	0	299	3.5
1970	52	17	69	98	16	0	114	183	0	16	0	199	3.2
1971*													

*Sex and age composition not conducted.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 11 - Wrangell Mountains - Chitina River

APPENDIX IV

Moose Sex and Age Composition - Unit 11 - Nabesna Road Area

Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)
11/65[1]	10	9	19	30	14	2	46	65	-	18	-	83	1.6
11/68[2]	15	5	20	93	13	-	106	126	-	13	1	140	3.2
12/71[3]	4	-	4	28	9	-	37	41	-	9	-	50	2.5

[1]Nabesna Road area, Platinum Creek, Jack Creek, Caribou Creek, Mentasta Lodge, Tanada Creek, Upper Copper River

[2]Copper Lake, Tanada Lake, Nabesna Road area, Suslota Creek

[3]Nabesna Road, Suslota Creek, Natat Creek, Tanada Creek, Rock Creek

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 11 - Wrangell Mountains - Chitina River

APPENDIX V

Moose Sex and Age Ratios - Unit 11 - Nabesna Road Area

Date	Total MM per 100 FF	Sm. MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM Per 100 of Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Animals per Hour	Total Sample
11/9/65[1]	41.3	19.6	90.0	10.8	100.0	39.1	12.5	21.7	51.9	83
11/16/68[2]	18.9	4.7	33.3	3.6	76.9	12.3	-	9.3	43.7	140
12/14/71[3]	10.8	-	-	-	-	24.3	-	18.0	20.0	50

[1]Surveyed by H. Wood

[2]Surveyed by L. Jennings.

[3]Surveyed by N. Steen.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 12 - Upper Tanana - White River

Seasons and Bag Limits

August 20 - October 7 November 1 - November 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 reported moose harvest from Unit 12 since 1963 when use of the moose harvest ticket was initiated.

Year	M	F	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

Hunting pressure on all the road systems is increasing, placing more pressure on roadside moose populations. Increased use of ATV vehicles is expected to help remedy the situation somewhat by allowing more hunters to reach formerly inaccessible moose populations away from road systems. Most hunting pressure in Unit 12 is now along the Tok-Slana Highway.

Composition and Productivity

Aerial composition surveys conducted during November indicated that calf production during 1971 was lower than in 1970, and lower than the past four-year average. The severe winter of 1970-71 is believed partly responsible for the decreased calf survival. Number of moose seen per hour of flying has remained high, however, possibly indicating a relatively large moose population exists in the Tok River drainage. Survey data are summarized below:

Year	Calves/ 100 Cows	Moose/ Hour	Bulls/ 100 Cows
1968	39	52	26
1969	23	60	25
1970	31	126	6
1971	16	126	6

The above table represents combined Tok River and Dry Tok figures. All counts made by Larry Jennings.

Management Summary and Recommendations

Because of periodically favorable water conditions in the Slana and Tok rivers during the past several moose seasons, the upper Tok and Dry Tok valleys have been subjected to heavier than normal hunting pressure. This has caused the bull/cow ratio to drop from approximately 25 bulls per 100 cows to 6 per 100 cows. Such a low bull/cow ratio results in unproductive bull hunting. Unless the ratio restores itself (due to high water conditions, thus not permitting vehicular access) to at least 15/100 cows some regulation changes would be desirable.

Willow browse utilization in the Tok River valley (along the Tok-Slana Highway) was extremely heavy during the winter of 1971-72. Although browse transects have not yet been established here, casual observations indicate that available browse utilization was about 100 percent (all twigs showing some use).

Snow depths approached three feet in this area by January, confining animals to the valley floor. Deep snow combined with low temperatures placed much stress on the wintering moose population. Some winter mortality occurred, however the extent is not known at this time.

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

Submitted by: Larry Jennings, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 13 - Nelchina Basin

Seasons and Bag Limits

Units 13A and 13D	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One bull
Unit 13B	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; 400 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement.
Unit 13C	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; 300 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 data since 1963 are summarized in Appendix I. The 1971 bull harvest of 1,126 is the lowest on record and follows a trend of decreasing harvest. Even with a declining trend, the bull harvest has remained amazingly constant with a high of 1,385 in 1963 to the 1971 low of 1,126, a variation of only 18.7 percent in nine years. Hunting pressure and success data available since 1967 are not meaningful since they vary greatly with the type of antlerless seasons held. The record number of hunters, 4,881 reported in 1971, is undoubtedly the result of liberalized antlerless seasons in 13B and 13C. Hunting license sales statewide have increased by 54 percent since 1963, also indicating increased pressure.

Results of the 1971 antlerless moose registration hunts for 13B and 13C are presented in Appendix II. The kill of 697 antlerless moose is the largest on record for Unit 13. Total time allowed for hunting antlerless moose was 59 days, whereas previous antlerless seasons were considerably shorter. The Denali Closed Area was redesignated the Clearwater Creek Controlled Use Area by the Board of Fish and Game and was open to hunting for the first time this year.

Age data for hunter-killed moose are presented in Appendix III. Permit stipulations required each successful hunter to bring the lower

jaw from his moose to a Fish and Game office, thus providing us with the largest sample ever examined for Unit 13. The outstanding characteristic of the female age structure for both 13B and 13C and especially 13C, is the large number of animals in the older age classes. Over 50 percent of the adult females in the Unit 13 sample are seven years old or older. An age structure weighted toward old animals is one of the classic signs of population decline. Mean ages for females (Appendix IV) declined slightly from 1970 but still remained exceptionally high. The change is probably not related to hunting as only about 220 antlerless moose were taken in 1970. Male age structure remains young, the result of many years of unbalanced harvest. Source of most male jaws was the Denali Check Station.

As previously mentioned the Clearwater Creek Management Area, formerly the Denali Closed Area, was opened to hunting for the first time. All vehicular transportation involving hunting or transportation of game was prohibited. This hunt was well received by most who participated. Known harvest for the area was 45 males and 110 females. Comparative age data within and adjacent to the Clearwater Creek Management Area are presented in Appendix V. Female age structure is virtually identical, which is expected. The past female harvest in Unit 13 has been limited and would not have much effect on the age structure. Male age structure is slightly older within the Clearwater Area, but certainly not old enough to represent an unhunted population. It appears that few moose actually winter in the area and that movement out of the Clearwater occurs early, possibly September and October, which would have exposed those animals to some hunting. One boundary of the Denali Closed Area was the Denali Highway, which was heavily hunted. Limited movement by moose summering in the closed area along the highway would have exposed them to legal hunting.

Returned antlerless permits provided an opportunity to check the accuracy of the harvest ticket system. In Unit 13 antlerless moose permits indicated a female harvest of 671 compared to harvest ticket returns of 614; a difference of 8.5 percent. If this is an indication of the reliability of our harvest ticket system, the data are satisfactory for management purposes.

Composition and Productivity

Sex and age composition surveys were conducted within all established count areas in October and November (Appendices VI, VII, VIII, and IX). The total of 5,256 moose was the third highest ever recorded, however 98 hours were spent counting; this was 10 percent longer than the previous high count time for the Nelchina Basin. The ratio of bulls/100 cows at 24.5 is the lowest on record and continues a downward trend. This is the result of a disproportionate harvest of bulls. Production and survival continue to be poor; ratios of calves and small males per 100 cows are among the lowest ever.

The winter of 1971-72 was the most severe ever recorded in the Nelchina Basin, at least in terms of total snowfall and accumulation.

The visible effect of this heavy snow accumulation began expressing itself on the moose population in December 1971, when calf moose began dying of malnutrition. Attempts to measure this winter's loss were made in April 1972. Aerial surveys conducted over the Copper, Gulkana, Gakona, and Chistochina rivers produced a sample of 495 moose of which 37 (7.5 percent) were calves (10 months old). The percentage of calves in November 1971 for those areas was 10.5 in a sample of 1,080 moose. This provides the crude estimate of calf losses from November through April to be about 30 percent. Based on the number of calves dead from malnutrition and wolf predation which were found in conjunction with other activities, the 30 percent estimate appears to be low.

Management Summary and Conclusions

The data for Unit 13 indicate a declining moose herd. Productivity, as measured by calves per 100 cows, has shown a downward trend since the early sixties. Survival, as indicated by small males per 100 females, has also dropped. Sample sizes of the composition surveys have remained high but the amount of flying required to obtain these samples has increased. The bull harvest, while remaining remarkably constant, is slowly dropping. This decrease, in face of accelerating hunting pressure and increasingly sophisticated means of transportation, indicates inadequate recruitment of male calves to replace those removed by hunting and other mortality. This is also demonstrated by rapidly dropping bull ratios. Female age structure data also indicate a population decline.

Reasons for a population decline are not clear. Possible explanations have included: range deterioration brought on by changing climatological patterns, range deterioration brought on by high population levels, and wolf predation. One of the most plausible possibilities is the reduction in number and extent of wildfires. Bureau of Land Management records on wildfires are available since about 1953. Acreages burned in the Gulkana Basin are shown in Appendix X. Historical records provided by Lutz (1956) are also given in Appendix X. These records show that prior to 1950, large fires were common in interior Alaska. After that date, fire suppression efforts prevented large scale burns. Lutz reports that in interior Alaska, in the absence of repeated fires, black spruce tends to perpetuate itself. It is therefore probable that the absence of large and repeated fires since the 1950's is the most important single contributing factor in the present population decline.

There is evidence that moose populations in the area have undergone previous fluctuations. The population level in the early 1960's was apparently at its highest since about 1850. In the early 1900's, moose were reportedly quite rare in the area (Powell, 1910).

Moose management in Unit 13 has primarily consisted of bull-only seasons with a few token antlerless hunts. There is a local group which has strongly opposed antlerless hunting, resulting in a low degree of effectiveness in managing moose in the area. The only discernable results were a lowering of the bull to cow ratio and a reduction in male age. This type of management had no influence on population size or female age structure.

In 1970 a five-year management program was designed to demonstrate the importance of harvesting a portion of the female segment. The unit was subdivided into four subunits with antlerless hunting in 13B and 13C and bull-only hunting in 13A and 13D. The Department felt that if they could obtain the desired annual antlerless harvest (400 in 13B and 300 in 13C) after five years, the following things could be shown: improvement in production and survival, reduction in age of female segment, stabilized or increased bull ratios and increased harvest. Subunits 13A and 13D are to be used as controls and will provide comparative data. In 1970 only 220 antlerless moose were taken, far below the desired kill, however in 1971 the antlerless harvest was 697. If the harvest can be maintained, we should see results in several years.

If suitable moose habitat in Unit 13 is indeed deteriorating, whether from lack of wildfires or from other environmental factors, no amount of antlerless hunting will bring the population back to its previous high. However, if a sustained balanced harvest can be obtained, production and survival should increase and we can more efficiently utilize present population levels.

Recommendations

The five-year program should be completed to demonstrate the soundness of antlerless moose hunting. After its completion, management objectives for the entire unit should be formulated considering such aspects as trophy production, maximum utilization and high quality hunting. The feasibility of habitat improvement in Unit 13 should be investigated.

LITERATURE CITED

Lutz, H.J. 1956. Ecological Effects of Forest Fires in the Interior of Alaska. U.S. Department of Agriculture Tech. Bull. No. 1133. 121 pp. + I.

Powell, A. M. 1910. Trailing and Camping in Alaska. Newold Publishing Co., New York. 379 pp.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 13

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	37.6
1971	1st	703	333				
	2nd	205	338				
	Total	1126*	671****	18	1815	4881	36

* Date unknown kills are included.
** 220 antlerless moose were known killed.
*** Adult, antlerless bulls killed during late antlerless season included.
****Data from antlerless permit returns.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX II

Antlerless Moose Permit Hunts, 1971 - GMU 13

Unit	13B	13C	13C	Total 13C	Total Unit
Date of season	9/1-20/71	9/1-20/71	11/1-19-71	39 days	59 days
Permits issued	2577	1121	1165	2286	4863
Kill: Female[1]	333	141	197	338	671
Male, Calves	17	6	3	9	26
Total antlerless	340	147	200	347	697
Returned permits, unsuccessful	1469	680	579	1259	2728
Outstanding permits[2]	658	247	337	584	1242
Hunter success[3]	13.5	13.1	17.2	15.2	14.3

[1]Includes adult females and female calves only.

[2]As of 1/15/72. Final cutoff date.

[3]Based on total antlerless kill by all permit holders.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX III

Moose Age Structure, Unit 13 - Nelchina Basin

	13A				13B				13C				13D				Total Unit*			
	MM		FF		MM		FF		MM		FF		MM		FF		MM		FF	
Class	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Calf			1	16.7	18	11.3	24	7.6	9	24.3	13	4.2	23	44.2			27	10.3	38	6.0
1	5	41.7			47	31.1	41	12.7	4	10.8	15	4.9	132	5.0			79	31.4	56	8.7
2	4	33.3			34	22.5	40	12.7	6	16.2	18	5.8	7	13.5			57	22.6	58	8.7
3	2	8.3			24	15.9	29	9.2	2	5.4	35	11.1	3	5.8			35	13.5	64	10.0
4	2	16.7	2	33.3	7	4.6	19	6.0	4	10.8	24	7.8					16	6.4	45	7.2
5			1	16.7	3	2.0	20	6.3	3	8.1	20	6.5	1	1.9			6	2.4	41	6.5
6			1	16.7	1	0.7	14	4.4			15	4.9			1	100.0	2	0.8	31	4.9
7					5	3.3	14	4.1	2	5.4	27	8.8	1	1.9			7	2.8	41	6.4
8					2	1.3	19	6.0			29	9.5	1	1.9			3	1.2	48	7.6
9					4	2.7	20	6.0	3	8.1	28	9.1	1	1.9			8	3.2	48	7.6
10					3	1.3	18	5.7			26	8.5	1	1.9			4	1.2	44	7.0
11					3	2.0	24	7.6	2	5.4	20	6.5					6	2.4	44	7.0
12					1	0.7	15	4.8	1	2.7	18	5.9	1	1.9			2	0.8	33	5.3
13			1	16.7			5	1.6			10	3.3					1	0.4	16	2.5
14					1	0.7	3	1.0	1	2.7	5	1.6					2	0.8	8	1.3
15							7	2.2			1	0.3							8	1.3
16							4	1.3			4	1.3							8	1.3
17							1	0.3			2	0.7							3	0.5
18											1	0.3							1	0.2
19							1	0.3											1	0.2
Sample Size	13	100.0	6		151	100.1	318	99.8	37	9.9	311	100.1	52	99.9	1	100.0	252	100.2	636	100.1

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX IV

An analysis of female moose harvested in Game Management Unit 13, exclusive of calves. Subunits 13B and 13C.

	Subunit 13B			Subunit 13C								
				Early 13C			Late 13C			Total 13C		
Year	Mean	Mode	N	Mean	Mode	N	Mean	Mode	N	Mean	Mode	N
1970	7.3	7	65	N.A.			8.0	9	90	7.8	6	122
1971	6.3	1	294	6.8	3&8	110	7.4	3	185	7.2	3	295

Submitted by: Loyal Johnson, Game Biologist III

APPENDIX V

Age structure of moose harvested from Clearwater Creek Controlled Use Area and adjacent area south of the Denali Highway. Calves not included in mean ages. 1971, Game Management Unit 13.

Clearwater Controlled Use Area		Age	Adjacent Area to South	
Males	Females	Class	Males	Females
4	11	C	4	8
9	11	1	15	15
10	11	2	7	11
6	11	3	5	11
2	8	4	3	6
1	8	5	1	5
1	7	6	0	3
3	7	7	0	5
0	8	8	1	6
1	5	9	1	7
1	9	10	0	6
1	10	11	0	9
1	4	12	0	9
0	2	13	0	3
0	1	14	0	1
0	4	15	0	3
0	2	16	0	1
0	1	17	0	0
0	0	18	0	0
0	1	19	0	0
40	121	N	37	110
3.6	6.8	Mean	2.4	6.6
2	1,2,3	Mode	1	1
0	36 (32.7%)	N 10 yrs.+	0	32 (31.4%)

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX VI

Moose Sex and Age Ratios - Nelchina Basin - Unit 13

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
1952	60.9	13.5	28.6	6.7	67.6	40.0	17.2	19.9	-	683
1953	107.4	38.5	56.0	12.4	85.8	89.8	17.4	28.8	-	1100
1954	109.0	28.4	35.3	9.9	72.2	78.7	16.4	27.3	-	1700
1955	99.7	28.8	41.8	11.5	110.0	52.4	10.1	21.0	-	2491
1956	66.3	12.5	23.3	6.5	94.9	26.4	1.9	13.7	38	1154
1957	69.3	15.9	29.8	7.5	76.6	41.5	6.0	19.7	104	2387
1958	70.6	11.4	19.2	5.5	60.9	37.4	4.4	18.0	113	3781
1959*										
1960	85.2	20.4	31.5	8.2	73.8	55.3	11.6	22.4	55	1467
1961	63.5	20.3	47.1	9.7	88.7	45.9	10.1	21.9	70	2977
1962	64.0	20.3	45.0	10.5	147.1	28.1	5.5	14.6	87	2357
1963	54.5	13.7	33.6	7.0	68.2	40.1	5.7	20.6	123	2061
1964	39.6	11.4	40.2	6.8	79.8	28.4	4.5	16.9	73	1524
1965	47.6	12.9	37.2	7.5	98.7	26.2	2.2	15.2	82	6150
1966	40.5	6.4	18.8	3.8	48.3	26.6	2.1	15.9	60	4534
1967	39.9	8.6	27.5	5.1	62.1	27.8	3.0	16.6	71	5794
1968	29.9	4.8	18.9	2.9	29.0	32.8	4.1	20.2	63	3042
1969	28.9	10.1	53.7	6.2	62.3	32.4	5.2	20.0	58	4397
1970	30.0	9.4	38.9	5.7	63.6	29.6	8.6	18.0	51	4549
1971	24.5	7.2	41.4	4.9	61.4	23.4	6.8	15.8	53	5256

*Not sufficient data.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX VII

Moose Sex and Age Composition - Nelchina Basin - Unit 13

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.)
Nov. 1952	161	46	207	224	96	20	340	547	0	136	0	683	-
Nov. 1953	243	136	379	83	223	47	353	783	0	317	0	1100	-
Nov. 1954	476	168	644	195	331	65	591	1235	4	465	0	1700	-
11/16-21/55	686	287	973	522	426	48	996	1969	0	522	0	2491	-
10/19-25/56	322	75	397	444	152	3	599	996	0	158	0	1154	30.8
11/6-15/57	605	180	785	654	394	25	1132	1917	0	470	0	2387	21.0
10/26-11/2/58	1077	206	1283	1167	622	29	1818	3101	0	680	0	3781	33.5
1959*													
11/13-18/60	384	121	505	309	260	34	593	1098	0	328	41	1467	26.6
11/11-21/61	614	289	903	830	532	60	1422	2325	0	652	0	2977	42.3
10/23-11/24-12/1/62	482	217	785	900	309	18	1277	2012	0	345	0	2357	27.0
11/3-19/63	432	145	577	657	379	23	1059	1636	0	425	0	2061	16.7
12/4-5/64, 3/17-22/65	256	103	359	660	236	11	907	1256	0	258	0	1524	20.3
10/20-11/4/65	1237	460	1697	2653	894	20	3567	5267	0	933	3	6150	75.5
11/6-19/66	924	174	1098	2012	683	15	2711	3809	8	721	5	4534	75.9
11/8-12/12/67	1079	297	1376	2520	900	28	3448	4824	3	959	11	5794	82.7
11/23-12/6/68	470	89	559	1282	562	24	1868	2427	3	613	2	3042	48.2
11/11-16/69	510	274	784	1880	791	43	2714	3498	3	880	19	4397	75.3
10/28-11/11/70	621	237	858	2133	676	35	2864	3753	4	790	37	4549	88.5
10/21-11/15/71	616	255	871	2790	709	52	3551	4422	18	831	3	5256	98.2

*Not sufficient data.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX VIII

Moose Sex and Age Ratios by Count Area, Nelchina Basin - Unit 13, 1971

Count Area	Date	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
1	10/31,11/1,2	16.87	6.02	55.56	4.46	68.18	17.67	12.82	13.10	46.93	336
2	11/1,3,4	35.66	10.49	41.67	6.00	53.57	39.16	5.77	22.40	51.76	250
3	11/3 & 4	30.92	8.43	37.50	5.08	48.28	34.94	11.54	21.07	58.25	413
5	10/27,29,11/4,5	28.66	7.52	35.58	4.94	63.79	23.58	8.57	15.49	49.60	749
6	11/3,4,5	29.96	4.22	16.39	2.76	37.04	22.78	3.92	14.92	39.52	362
7	11/4 & 5	26.34	8.44	47.14	5.29	50.77	33.25	7.08	20.83	49.92	624
8	11/1 & 8	17.35	7.15	70.00	5.18	70.00	20.41	5.55	14.82	31.25	135
9	10/29	40.00	0.00	0.00	0.00	0.00	22.86	0.00	14.04	22.09	57
10	10/26,28,29	23.89	4.05	20.41	2.84	45.45	17.81	2.38	12.50	81.29	352
12	11/3,15	20.88	12.09	137.50	7.33	55.00	43.96	5.56	26.67	25.00	150
13	10/29,11/2,3,4	11.94	6.77	131.03	5.11	65.52	20.68	7.41	15.59	99.20	744
14	10/27,11/4	27.09	8.37	44.74	5.67	80.95	20.69	5.00	14.00	36.76	300
15	10/29	51.77	7.80	17.74	4.44	64.71	24.11	6.45	13.71	40.72	248
16	10/26	24.73	11.54	87.50	8.54	221.05	10.44	0.00	7.72	140.57	246
17	10/26	15.95	3.88	32.14	3.10	85.71	9.05	0.00	7.24	173.65	290
Unit Total		24.53	7.18	41.40	4.85	61.37	23.40	6.83	15.81	53.40	5256

*Lone calves not included in twin rate.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE - GMU 13 - Nelchina Basin

APPENDIX IX

Moose Sex and Age Composition by Count Area, Nelchina Basin - Unit 13 - 1971

Count Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total MM	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)
1		27	15	42	210	34	5	249	291	0	44	1	336	7.16
2		36	15	51	91	49	3	143	194	1	55	0	250	4.83
3		56	21	77	171	69	9	249	326	0	87	0	413	7.09
5		104	37	141	387	96	9	492	633	2	116		749	15.10
6		61	10	71	186	49	2	237	308	1	54		362	9.16
7		70	33	103	275	105	8	391	494	9	130		624	12.50
8		10	7	17	80	17	1	98	115	1	20		135	4.32
9		14	0	14	27	8		35	49		8		51	2.58
10		49	10	59	205	41	1	247	306	1	44	2	352	4.33
12		8	11	19	55	34	2	91	100	2	40		150	6.00
13		29	38	67	453	100	8	561	628		116		144	7.50
14		38	17	55	163	38	2	203	258		42		300	5.16
15			11	73	110	29	2	141	214	1	34		248	6.09
16		24		45	163	19		182	227		19		246	1.75
17		28	9	37	211	21		232	269		21		290	1.67
Total		616	255	871	2790	709	52	3551	4422	18	831	3	5256	98.24

Submitted by: Loyal Johnson, Game Biologist III

APPENDIX X

Wildfire Records in Gulkana Basin

Year	Acreage Burned	Source
1915	458,000[1]	Lutz (1956)
1927	128,000[2]	Lutz (1956)
1947	125,000[2]	Lutz (1956)
1953	2,266	Bureau of Land Management
1954	1,484	Bureau of Land Management
1955	348	Bureau of Land Management
1956	360	Bureau of Land Management
1957	925	Bureau of Land Management
1958	5,000	Bureau of Land Management
1963	227	Bureau of Land Management
1966	282	Bureau of Land Management
1967	2,244	Bureau of Land Management
1968	16	Bureau of Land Management
1969	3,000	Bureau of Land Management
1970	23	Bureau of Land Management
1971	35	Bureau of Land Management

[1]Two fires only; total for area probably much higher.

[2]One fire only; total for area probably much higher.

Submitted by: Loyal Johnson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 14A - Palmer

Seasons and Bag Limits

Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; 500 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

The final 1971 IBM report indicated a harvest of moose in Subunit 14A totaling 1,018 animals; 529 males, 479 females, and 10 unknown sex. Appendix I presents IBM data from 1965 through 1971.

Two antlerless hunts were held in Subunit 14A during 1971 with all of the subunit open to hunting except a portion of the Matanuska Valley floor shown in Appendix II. The first antlerless season ran from September 1 to September 20 with 101 female moose reported taken by hunters who turned in harvest tickets. The second antlerless season ran from November 1 to November 14 with 233 female moose reported harvested. Hunters who did not list the kill date reported taking 145 females.

Because the antlerless moose permits stipulated that individuals must report to Alaska Department of Fish and Game field stations and bring in moose incisors for aging, biologists were able to tally more successful hunters than those reporting on harvest tickets. The data collected reveal that 146 female adults, 14 female calves, 5 male calves and 1 sex and age unknown were taken during the September 1 to September 20 season. During the November 1 through November 14 season, 337 female adults, 6 female calves and 11 male calves were harvested.

The number of persons who participate in recreational and subsistence hunting roughly doubles in Subunit 14A when antlerless seasons are held (Appendix I). For example, in 1970, 897 persons reported hunting in 14A when antlerless seasons were not held as opposed to 2,090 persons who reported hunting in the same area in 1971 when antlerless seasons were held.

The antlerless permit hunt for 14A was on a first come, first serve basis with the permits issued the first week in August for the first season. Five hundred and two permits were issued, and 491 were turned in (Department biologists contacted some nonreturnees) for a 98 percent return (Appendix III).

Permit issuance for the second antlerless season began October 15. Of 687 permits issued, 647 (94 percent) were returned (Department biologists contacted some nonreturnees). The 354 (71 percent of 500) persons who were successful during the second antlerless season in 14A during 1971 brought the total number of antlerless moose harvested to 520, which was four percent higher than the stipulated harvest.

Due to report deadlines the data collected on moose mortality during 1971 in 14A, from factors other than hunting, are not yet available. Appendix IV discloses verified moose mortality to other than hunting for Subunit 14A during the period June 1, 1970 through May 31, 1971. Documented highway-killed moose totaled 99, illegal kills 52, train kills 22, incidental kills 31 and winter kills 15, for a total of 219 moose killed by factors other than hunting.

The ratio of adult female to adult male moose killed by factors other than hunting is approximately 2:1. Sixty-one percent of the calf moose killed by factors other than hunting were female.

Composition and Productivity

Sex and age composition surveys evaluated a total of 2,063 moose during the period November 23 and 24, 1971 in Count Areas 1 through 8 (Appendix V). The bull/cow ratio rose slightly, from 9.2 bulls/100 cows in 1970 to 9.9 bulls/100 cows in 1971, in spite of the male moose harvest of 529 animals and a female harvest of 504. The calf ratio dropped slightly from 42.1 calves/100 females to 39.9 calves/100 females. The incidence of twins also dropped from 8.1 twins/100 females with calf in 1970 to 3.4 twins/100 females with calf in 1971.

Successful moose hunters were required, as a condition of the permit, to turn in their antlerless moose jaws to an Alaska Department of Fish and Game office. As a result, 437 female moose incisors were among those processed and read in the Palmer office. Of these, 44 percent were five years or older (Appendix VI), which represents a reduction in the percentage (68 percent) of that segment of the moose population given in last year's report.

If each of the two seasons is examined in greater detail, 38 percent of the female moose taken from September 1 to September 20, 1971 (Appendix VII) are five years of age or older, while 43 percent of the female moose taken from November 1 to November 14, 1971 (Appendix VIII) are five years of age or older. The gain in percentage of the older age class female moose taken during the second season may be due to an influx of moose moving from the highlands surrounding 14A. The average age of the few male moose whose jaws were acquired during the 1971 season indicates a young male segment (average 1.33 years excluding calves) but the sample size is too small (15) to be meaningful.

Management Summary and Conclusions

Antlerless seasons were reinstated during the period covered by this report, and 479 female moose were harvested, as reported to IBM, or 504

female moose as reported by hunters returning antlerless moose permits. In addition, 529 males were taken. Sex and age composition surveys indicate a very slight gain in the bull/cow ratio.

Antlerless seasons were generally well accepted by the public in 1971, due primarily to the permit system which essentially controls the number of hunters who enter 14A to take antlerless moose. Seasons should now be held at the present level to ascertain the effect on the 14A moose herd over a number of years.

Recommendations

No regulation changes are proposed for 1972-73.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14A - Palmer

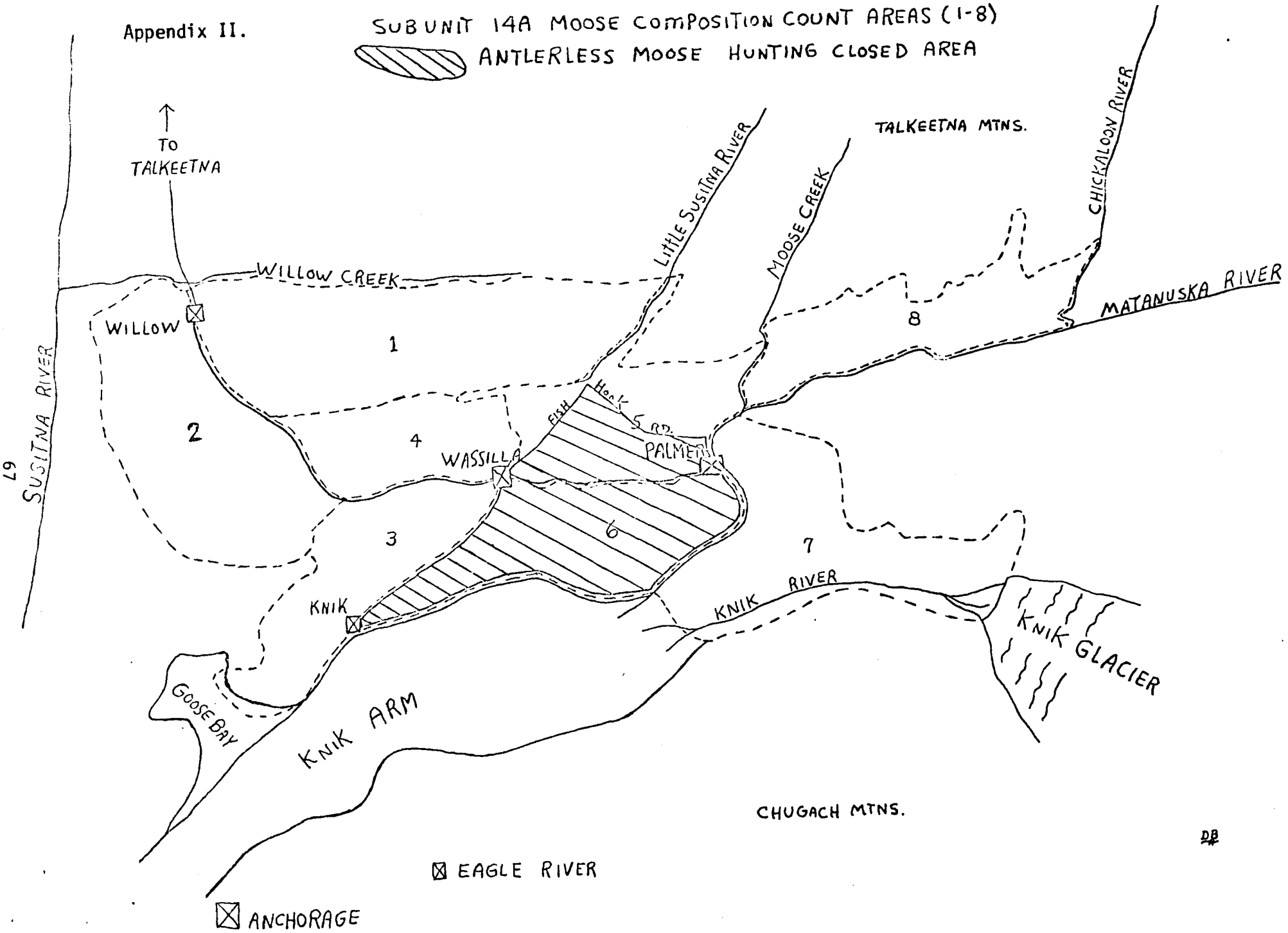
APPENDIX I

Moose Harvest and Hunting Pressure - Subunit 14A

Year	Date	Season	Bulls	Cows	Unid.	Total	No. of Hunters	Percent Success
1965*	8/20-9/30	1st						
	11/1-11/30	2nd No Date						
	11/23-11/25	Antlerless		705		705		
		Unknown Date						
		Total	658	705	6	1369	No Data	No Data
1966	8/20-9/30	1st	144	4	0	148		
	11/1-11/30	2nd	129	5	1	135		
	9/29-9/30	Antlerless	0	80	0	80		
		Unknown Date	9	3	2	14		
		Total	282	92	3	377	No Data	No Data
1967	9/20-9/30	1st	127	0	0	127		
	11/1-11/20	2nd	62	0	0	62		
	11/1-11/20	Antlerless		Season cancelled by public pressure				
		Unknown Date	11	0	0	11		
		Total	200	0	0	200	1111	18.4
1968	8/20-9/30	1st	187	0	0	187		
	11/1-11/20	2nd	209	0	0	209		
	To be announced	Antlerless		Season cancelled by public pressure				
		Unknown Date	15	0	3	18		
		Total	411	0	3	414	1773	23.4
1969	8/20-9/20	1st	213	0	4	217		
	11/1-11/20	2nd	84	1	2	87		
	1/28-2/5/70	Antlerless	28	93	3	124		
		Unknown Date	109	47	0	156		
		Total	434	141	9	584	1169	50.4*
1970	8/20-9/20	1st	182	0	1	183		
	11/1-11/20	2nd	102	0	6	108		
	To be announced	Antlerless		Season cancelled by public pressure				
		Unknown Date	79	2	4	85		
		Total	363	2	11	376	897	41.9
1971	8/20-9/20	1st	177	0	1	178		
	11/1-11/20	2nd	225	0	0	225		
	9/1-9/20	Antlerless - 1st	0	101	0	101		
	11/1-11/14	Antlerless - 2nd	0	233	0	233		
		Unknown Date	127	145	9	281		
		Subunit Total	529	479	10	1018	2090	ND

*Using 589 successful (IBM) instead of the 584 taken from the chronology (IBM)
Prepared by D. Bader
Submitted by: Jack C. Didrickson, Game Biologist III

Appendix II.



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MOOSE - GMU 14A - Palmer

APPENDIX III

Antlerless Moose Permit Information, Subunit 14A, 1971

Season	Permits Issued	Permits Returned	Antlerless moose (female adults, male and female calves) harvested
Sept. 1 - Sept. 20	502	491 (98%*)	166 (33% of 500)
Nov. 1 - Nov. 14	687	647 (94%*)	354 (71% of 500)
Both seasons	1189	1138 (95%*)	520 (104% of 500)

*Not completely voluntary returns; Alaska Department of Fish and Game contacted as many nonreturnees as possible.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14A - Palmer

APPENDIX IV

Verified moose mortality (excluding hunting) Subunit 14A, June 1, 1970 through May 31, 1971.

	Adult Male	Adult Female	Calf Male	Calf Female	?*	Total
Road kill	18	31	15	31	4	99
Train kill	6	4	-	1	11	22
Incidental kill	2	10	7	10	2	31
Illegal kill	3	20	5	6	18	52
Winter kill	1	6	5	3	-	15
Subunit Total	30	71	32	51	? Sex-10 ? Sex & Age-25	219

* ? = unknown sex or age.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14A - Palmer

APPENDIX V

Moose Sex and Age Composition and Ratios - Subunit 14A

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 12/4-20	73	131	204	861	608	40	1509	1713	13	701	10	2424	46.3	52
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	59.20	34.8

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 Moose
1967	13.5	8.7	64.2	5.4	37.4	46.4	6.2	28.9	52	2424
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

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14A - Palmer

APPENDIX VI

Ages of moose taken by hunters during the combined September 1 through September 20 and November 1 through November 20* moose seasons, Subunit 14A, 1971.

Age	No. of Females	No. of Males
Calf	39	13
1+	62	16
2+	85	7
3+	57	3
4+	41	1
5+	24	0
6+	18	0
7+	35	0
8+	28	1
9+	25	0
10+	10	0
11+	17	0
12+	13	1
13+	6	0
14+	7	0
15+	5	0
16+	2	0
17+	1	0
18+	0	0
19+	1	0
Total	476 (436 adults)	42 (29 adults)
Incl. Calves Av. Age	4.73	1.50
Incl. Calves Med. Age	3.91	1.50
Excl. Calves Av. Age	5.15	2.17
Excl. Calves Med. Age	4.35	1.91

*Antlerless season November 1 through November 14, 1971.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE - GMU 14A - Palmer

APPENDIX VII

Ages of moose taken by hunters during the September 1 through September 20, 1971 moose season, Subunit 14A.

Age	No. of Females	No. of Males
Calf	14	3
1+	23	8
2+	23	5
3+	19	2
4+	19	0
5+	7	0
6+	1	0
7+	11	0
8+	5	0
9+	10	0
10+	1	0
11+	5	0
12+	2	0
13+	5	0
14+	2	0
15+	2	0
16+	1	0
17+	0	0
18+	0	0
Total	150 (136 adults)	18 (15 adults)
Incl. Calves Av. Age	4.52	1.33
Incl. Calves Med. Age	3.79	1.75
Excl. Calves Av. Age	4.99	1.64
Excl. Calves Med. Age	4.16	1.94

Submitted by: Jack Didrickson, Game Biologist III

APPENDIX VIII

Ages of moose taken by hunters during the November 1 through November 20, 1971* moose season, Subunit 14A.

Age	No. of Females	No. of Males
Calf	25	10
1+	39	8
2+	62	2
3+	38	1
4+	22	1
5+	17	0
6+	17	0
7+	24	0
8+	23	1
9+	15	0
10+	9	0
11+	12	0
12+	11	1
13+	1	0
14+	5	0
15+	3	0
16+	1	0
17+	1	0
18+	0	0
19+	1	0
Total	326 (301 adults)	24 (14 adults)
Incl. Calves Av. Age	4.83	1.63
Incl. Calves Med. Age	3.97	1.25
Excl. Calves Av. Age	5.23	2.79
Excl. Calves Med. Age	4.52	1.88

*Antlerless season November 1 through November 14, 1971.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 14B - Talkeetna

Seasons and Bag Limits

Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose; 350 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

IBM harvest data for 1970 and 1971 are presented in Appendix I. The average bull harvest for the years 1967 through 1969 has been 148. The bull harvest in 1970 was 81 and in 1971, it was 124. The decrease in 1970 may be attributable to reduced hunting pressure.

IBM harvest data for the 1971 antlerless hunts, held from September 1 through September 30 and November 1 through December 15, reveal that 39 female moose were taken during the early period and 101 female moose were taken during the latter period. An additional 43 female moose were harvested during the combined seasons, but specific dates of harvest were not given. Harvest reports indicate that 183 female moose were taken in 14B in 1971.

Because the permits stipulated that successful antlerless moose hunters had to return moose incisors for aging, biologists were able to tally more successful hunters than reported on harvest reports. During the first antlerless season, 66 female adults, 10 female calves and two male calves were taken by permit holders for a total of 78 antlerless moose. During the November 1 through December 15, 1971 season, 161 adult females, one female calf and 14 male calves were taken. The total for both antlerless seasons in Subunit 14B was 227 adult females, 16 male calves and 11 female calves.

Appendix II presents data on the percentage of permits returned by permittees during each season, and the combined seasons in 14B. The increase in the percentage of returns during the second season (90 percent as opposed to 70 percent in the first season) was probably due to the verbal instructions given each permittee at the time the permit was issued.

Access for the purpose of hunting continues to be poor in this subunit. One main highway traverses the area from south to north, with short side roads emanating from it. The majority of the subunit is

inaccessible mountainous terrain with a band of swampy lowlands on the western boundary. The moose herd in Subunit 14B is capable of sustaining higher harvest, but improved access is needed.

The moose in Subunit 14B also succumb to other types of mortality as shown in Appendix III. Depending on snow depth in any given year, train-moose encounters can be frequent. The significance of the train kill becomes apparent when compared with harvest. During the fall-winter period of 1970-71, 115 moose were killed by trains in Subunit 14B while hunters harvested 81 moose.

Herd Composition and Productivity

The 1967 to 1971 sex and age composition counts for Subunit 14B are presented in Appendix IV. In 1971, 1,810 moose were tallied, with a ratio of 25.3 males/100 females observed. A downward trend in this ratio has continued since 1968, when there were 34.8 males/100 females. Contributing to the reduction of the bull/cow ratio this year was a documented winter kill from which a sample of 81 moose revealed that adult males were found in an approximate 3:1 ratio to adult females (Appendix III).

The calf/cow ratio also dropped during the 1971 count, from 41.4 calves/100 cows in 1970 to 29.5 calves/100 cows. The decrease was not unexpected, due to the probability of severe winter conditions influencing the condition of pregnant females during the previous winter of 1970-1971. Most of the winter kills documented were found along the single highway transecting Subunit 14B.

Because successful antlerless moose permit holders were required to present incisors from the moose taken to an Alaska Department of Fish and Game office, 229 incisor tooth samples were obtained, sectioned and aged. As Appendix V reveals, the yearling age class is very poorly represented in the sample. This is believed to be a reflection of the severe 1970-71 winter, when a winter kill sample was comprised of more than 50 percent calves (Appendix III).

Management Summary and Conclusions

Productivity as well as harvest of moose in Subunit 14B could be increased. Data presented in this report are indicative of a moose population responding to conditions of range and weather, with hunting having little influence on the herd except in a narrow strip coinciding with access along the single highway through the subunit. Present antlerless bag limits should be maintained and possibly increased as access in the area improves. It is important that data from a series of years of antlerless seasons are documented and analyzed before extensive regulatory changes are proposed.

Recommendations

No regulatory changes are recommended at this time.

Submitted by: Jack C. Didrickson, Game Biologist III.

MOOSE - GMU 14B - Talkeetna

APPENDIX I

Moose Harvest and Hunting Pressure* - Subunit 14B

Year	Date	Season	Bulls	Cows	Unid.	Total	No. of Hunters	Percent Success
1967	8/20-9/30	First	100	0	0	100		
	11/1-11/20	Second	75	0	0	75		
	11/13-11/20	Antlerless	Season cancelled by public pressure.					
		Unknown Date	6	2	1	9		
		Total	181	2	1	184	732	17.07
1968	8/20-9/30	First	67	0	0	67		
	11/1-11/20	Second	67	0	0	67		
	To be announced	Antlerless	Season cancelled by public pressure.					
		Unknown 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		
		Unknown Date	30	16	0	46		
		Total	121	46	0	167	310	54.2
1970	8/20-9/30	First	34	0	0	34		
	11/1-11/20	Second	21	0	1	22		
	To be announced	Antlerless	Season cancelled by public pressure.					
		Unknown Date	26	0	0	26		
		Total	81	0	1	82	264	31.0
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		
		Unknown Date	40	43	0	83		
		Total	124	183	5	312	890	No Data

*As reported by IBM runs only.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE - GMU 14B - Talkeetna

APPENDIX II

Antlerless Moose Permit Information, Subunit 14B, 1971

Season	Permits Issued	Permits Returned	Antlerless moose (female adults, male and female calves) harvested
Sept. 1 - Sept. 30	992	692 (70%)	78 (22% of 350)
Nov. 1 - Dec. 15	570	512 (90%*)	176 (50% of 350)
Both seasons	1562	1204 (77%)	254 (73% of 350)

*Increased percentage of returns may be due to individually instructing permittees during second season.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE - GMU 14B - Talkeetna

APPENDIX III

Verified moose mortality (excluding hunting) Subunit 14B, June 1, 1970 through May 31, 1971.

	Adult Male	Adult Female	Calf Male	Calf Female	?*	Total
Road kill	-	7	-	-	3	10
Train kill	16	43	7	9	40	115
Indidental kill	-	-	-	-	-	-
Illegal kill	1	-	-	1	-	2
Winter kill	24	9	19	24	5	81
Subunit Total	41	59	26	34	? Sex-35 ? Sex & Age-13	208

*?=unknown sex or age.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14B - Talkeetna

APPENDIX IV

Moose Sex and Age Composition and Ratios - Subunit 14B, Willow to Talkeetna

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 1/25-27	-	-	-	-	223	10	-	579	6	249	1	829	10.5	79
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	34.65	52.2

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 Moose
1967	-	-	-	-	-	-	-	30.0	79	829
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

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14B - Talkeetna

APPENDIX V

Ages of moose taken by hunters in Subunit 14B during the combined September 1 through September 30 and November 1 through December 15, 1971* moose seasons.

Age	No. of Females	No. of Males
Calf	26	6
1+	11	1
2+	28	2
3+	21	3
4+	17	3
5+	16	3
6+	14	0
7+	9	0
8+	9	1
9+	17	0
10+	9	0
11+	11	0
12+	12	0
13+	4	0
14+	5	0
15+	0	0
16+	1	0
17+	0	0
18+	0	0
Total	210 (184 adults)	19 (13 adults)
Incl. calves av. age	5.44	2.58
Incl. calves med. age	5.13	3.17
Excl. calves av. age	6.21	3.77
Excl. calves med. age	5.94	4.17

*Antlered moose season November 1 through November 20. Some bulls which had shed their antlers were taken as antlerless moose between November 20 and December 15.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 14C - Anchorage

Seasons and Bag Limits

Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose, antlerless moose may be taken by permit on the Fort Richardson Military Reservation (50 permits will be issued). Dates and conditions of the hunt will be described by Commissioner's announcement.

Harvest and Hunting Pressure

The final IBM moose harvest data for Subunit 14C are available for 1970 and 1971. Appendix I presents the 1970 harvest, which was 65 bulls, five cows and six unknown sex, for a total of 76 moose. The five female moose were taken during an either-sex hunt on International Airport which ran from November 1, 1970 to February 28, 1971.

IBM harvest data for 1971 reveal that 98 bulls, 38 cows and one unknown sex, for a total of 137 moose were taken in Subunit 14C (Appendix 1). The average bull harvest in Subunit 14C over the previous five years has been 80.

Antlerless seasons on Fort Richardson were not held in 1967, 1969 and 1970. The 1971 hunt on Fort Richardson was held from December 21 through 23 with 50 permits issued on a drawing basis; 38 adult females were taken, compared to 37 taken in 1968. In addition, two male adults, three male calves and one moose for which sex and age were unknown were taken in 1971.

From November 15, 1971 to March 31, 1972, an archery season for moose of any sex or age was held on Anchorage International Airport in 14C. Three hundred and twenty-six archers hunted 1,474 hours and took 50 shots to take four moose, three males and a female.

The total moose harvest was up slightly (137) in 1971 over the previous five years' average which was 117. In 1965, hunters in Subunit 14C harvested about 500 moose nearly equally divided between males and females. Although the moose in this subunit are capable of sustaining a greater harvest, restrictive regulations imposed due to the proximity of a large human population and the advent of a firearm discharge closure within one mile of any road or trail in Chugach State Park limit the harvest.

Verified moose mortality excluding hunting in 14C for the period October 1, 1970 to May 31, 1971 was 95. The majority (65 moose) occurred in moose-auto collisions (Appendix II), but there were 12 winter kills, nine illegal kills, three train kills, and six incidental kills.

Composition and Productivity

Sex and age aerial composition counts for Subunit 14C during 1971 are presented in Appendix III. The bull/cow ratio in the five count areas of 14C declined slightly, from 23.7 bulls/100 cows in 1970 to 21.3 bulls/100 cows in 1971. Past years' data are indicative of fluctuating calf/cow ratios on Fort Richardson also. For example, in 1957 the ratio was 60.3 calves/100 cows, in 1966 it was 39.5 calves/100 cows, in 1968 it was 27.7 calves/100 cows, and in 1970 it was 60.9 calves/100 cows.

The bull/cow ratio in Hunter Creek, which is unhunted, remains the highest in Subunit 14C at 34.4 bulls/100 cows. In the remaining four hunted areas, Eagle River, Ship Creek (east of Arctic Ski Bowl), Fort Richardson and Eklutna River, the ratio of bulls to cows runs from 18.0 to 20.4.

Age data from the Fort Richardson antlerless moose hunt in 14C (Appendix IV) reveal that 40.5 percent of the adult female moose taken are five years of age or older, indicating that a fair number of the moose taken are in the older age classes. The average age of the 42 female moose sampled was 4.83 years and the median age was 4.20 years when calves are excluded.

Management Summary and Conclusions

Hunter harvests of moose in Subunit 14C increased from a low of 61 in 1967 to 137 in 1971 due primarily to reinstatement of the Fort Richardson antlerless hunt. Sex and age composition data reveal that productivity has fluctuated widely regardless of hunting pressure. Age data reveal 40.5 percent of the adult female moose harvested on Fort Richardson are five years of age or older. Moose mortality by other than hunting in 14C may exceed or closely approximate the legal harvest. Restrictive access regulations on Chugach State Park further depress hunter harvest in 14C. Antlerless seasons now in effect should remain unchanged for several years to ascertain effects on the moose population.

Recommendations

No changes are recommended in seasons or bag limits.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14C - Anchorage

APPENDIX I

Moose Harvest and Hunting Pressure, Subunit 14C, 1971

Year	Date	Season	Bulls	Cows	Unid.	Total	No. of Hunters	Percent Success
1967	8/20-9/30	First	43	0	0	43		
	11/1-11/20	Second	11	0	0	11		
	None Scheduled	Antlerless	0	1	0	1		
		Unk. Date	1	0	5	6		
		TOTAL	55	1	5	61	403	29.8
1968	8/20-9/30	First	60	0	0	60		
	11/1-11/20	Second	14	0	0	14		
	2/20-22/69 Fort	Antlerless	14	37	0	51		
	Richardson	Unk. Date	2	1	0	3		
		TOTAL	90	38	0	128	368	35.0
1969	8/20-9/30	First	49	0	1	50		
	11/1-11/20	Second	20	0	1	21		
	Canceled	Antlerless	0	10*	0	10		
		Unk. Date	23	4	0	27		
		TOTAL	92	14	2	108	227	51.1
1970	8/20-9/30	First	39	0	3	42		
	11/1-11/20	Second	14	0	0	14		
	To be announced	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	No data

*Airport archery

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14C - Anchorage

APPENDIX II

Verified moose mortality (excluding hunting) Subunit 14C, June 1, 1970 through May 31, 1971.

	Adult Male	Adult Female	Calf Male	Calf Female	?*	Total
Road kill	10	26	10	15	4	65
Train kill	1	1	-	-	1	3
Incidental kill	-	1	-	1	4	6
Illegal kill	1	4	-	-	4	9
Winter kill	1	11	-	-	-	12
Subunit Total	13	43	10	16	? Sex-13 ? Sex & Age- 0	95

* ? = unknown sex or age.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14C - Anchorage

APPENDIX III

Moose Sex and Age Composition and Ratios - Subunit 14C, 1966-71

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
1966[1]	16	19	35	125	64	3	192	227	1	71	2	300	7.0	42.9
1967[2]	5	10	15	36	31	1	68	83	2	35	10	128	5.2	24.6
1968[3]	36	21	57	188	54	7	249	306	1	69	1	376	5.1	73.7
1970[4]	60	40	100	235	175	12	422	522	1	200	35	757	16.6	45.6
1971[5]	58	65	123	434	140	4	578	701	2	150	19	870	14.3	60.8

[1]Fort Richardson, Campbell Creek, Ship Creek
[2]Eagle River
[3]Fort Richardson
[4]Fort Richardson, Eagle River, Ship Creek, Eklutna, Peters Creek, Hunter Creek
[5]Fort Richardson, Ship Creek, Eagle River, Eklutna, Hunter Creek

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	Moose per Hour	Total Moose
1966	18.2	9.9	118.8	6.3	53.5	37.0	4.5	23.7	43	300
1967	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	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

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 14C - Anchorage

APPENDIX IV

Ages of moose taken by hunters during the December 20 through December 22, 1971 antlerless moose season on Fort Richardson, Subunit 14C.

Age	No. of Females	No. of Males
Calf	2	3
1+	7	1
2+	6	1
3+	7	0
4+	5	0
5+	4	0
6+	2	0
7+	3	0
8+	1	0
9+	1	0
10+	1	0
11+	1	0
12+	1	0
13+	2	0
14+	1	0
15+	0	0
16+	0	0
17+	0	0
18+	0	0
Total	44 (42 adults)	5 (2 adults)
Incl. calves av. age	4.61	Insufficient sample
Incl. calves med. age	4.00	" "
Excl. calves av. age	4.83	" "
Excl. calves med. age	4.20	" "

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 15A - Kenai

Seasons and Bag Limits

Unit 15(A) East, that portion of Subunit 15(A) 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; 200 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement only if conditions warrant.
Unit 15(A) West, that portion of Subunit 15(A) lying west and north of the Moose River and Chickaloon River.	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; 300 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement only if conditions warrant.
Unit 15(A) South, the remainder of Subunit 15(A).	Aug. 20 - Sept. 20 Nov. 1 - Nov. 20	One moose; 200 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement only if conditions warrant.

Harvest and Hunting Pressure

Harvest ticket returns indicate that hunters harvested 291 bull moose in 1970 (Appendix I). The bull harvest showed an increase for the third straight year but was still 14 percent below the preceding five-year average because of large harvests in 1965 and 1966. The antlerless hunt held December 16 - 20, 1970 produced 209 animals; 191 females, 15 males and three sex unknown.

Harvest ticket returns from 1971 show 369 bulls harvested (Appendix I). This is the fourth consecutive year the bull harvest has increased.

The 369 bulls taken were a 25 percent increase over the average for the past five years.

Antlerless hunts by permit registration were held in Subunits 15A East and 15A West from September 1-20 and November 1-17. In 15A East, 478 permits were issued in September and 73 antlerless animals were taken. During November, 333 permits were issued and 105 antlerless moose killed. In 15A (West), 644 antlerless permits were issued during September with 150 animals taken. During November, 156 antlerless moose were harvested by 503 permittees.

The Subunit 15 (A) South antlerless moose hunt provided for by regulation was not held. This hunt was to be held only if a buildup of moose occurred before midwinter.

The harvest ticket return data for the antlerless harvest differ somewhat from the above data which were obtained from permit returns from the registration hunt. Harvest ticket data show 427 females taken. An additional 18 male calves may have been reported as males. This would make a total of 445 reported--eight percent less than indicated by permit returns.

Composition and Productivity

Sex and age composition counts conducted in 1971 showed 21.4 bulls/100 cows and 31.5 calves/100 cows (Appendices II, III). The bull/cow ratio increased from 1970 and the calf/cow ratio remained about the same.

The cementum annuli technique was used to age 446 antlerless moose (Appendix IV). Of these, 16 percent were ten years old or older and 36 percent were six years old or older. The mean age of females older than calves dropped from 6.87 in 1970 (n = 132) to 5.61 in 1971 (n = 368).

An early accumulation of snow that persisted all winter in 1971-72 caused considerable calf mortality. The mortality is being documented and will be included in the 1972 survey-inventory report.

Management Summary and Conclusions

The increased bull/cow ratio for 1971 reversed what appeared to be a declining trend from 1968-1970. That the bull/cow ratio increased substantially at the same time the bull harvest increased by 27 percent over the preceding year implies a substantial recruitment of bulls. However, it is improbable that yearling recruitment was large enough to account for both the increased bull/cow ratio and the increased harvest. Taking 484 antlerless animals including 78 calves could not have accounted for the increased bull/cow ratio.

Production of 31.5 calves/100 cows was consistent with 32.1 calves/100 cows in 1970 but was 13 percent below the preceding five-year average of 36.2 calves/100 cows. It is questionable that the increased harvest in 1971 was sufficient to increase calf production and survival.

The decreased mean age for females from 6.87 in 1970 to 5.61 in 1971 may be attributable to the harvesting of the animals in 1971 prior to the time many older animals moved down from higher elevations.

The 1971 harvest ticket returns for 427 females and possibly 18 male calves is eight percent less than the known antlerless kill from permit returns. If this level of accuracy also holds for the bull harvest report, our report system is giving data of acceptable accuracy for present management intensity.

Recommendations

It is recommended that 300 cows be harvested from 15 (A) West, 200 from 15 (A) East and 200 from 15 (A) South by permit registration hunt. A special antlerless hunt should be held if the full quota is not approached during the regular season.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15A - Kenai

APPENDIX I

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

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	0	0	*		
	2nd	*	267	0	*		
	Combined	513	267	0	780	*	*
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	274	1092	25
1969	1st	*	*	*	*		
	2nd	*	*	*	*		
	Antlerless		N O T H E L D				
	Combined	287	*	7	294		
1970	1st	134	0	3	137	*	*
	2nd	69	0	1	70	*	*
	Antlerless	16	191	3	209	*	*
	Combined	291	191	11	493	918	54
1971	1st	153	223[2]	1			
	2nd	141	261[2]	0			
	Antlerless						
	Combined	369	484[2]	4	853	1637	52

*Data not available

[1]Totals of first and second seasons may be less than for combined seasons because of the inclusion of animals for which date of kill was not given.

[2]These data come from permit returns from the registration hunt. The numbers include both male and female calves.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15A - Kenai

APPENDIX II

Moose Sex and Age Composition - Subunit 15A

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	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	29	92
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	27.4	
11/8-16/71	185	98	283	940	367	17	1324	1607	14	415	5	2027	40.8	49.7

*Lowlands only.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15A - Kenai

APPENDIX III

Moose Sex and Age Ratios - Subunit 15A

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*	16.7	7.9	89.4	4.8	35.8	43.8	14.9	27.0	-	1568
1964*	-	-	-	-	-	-	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

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

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15A - Kenai

APPENDIX IV

Cow moose harvest age structure 1971-72 season, September 1-20 and November 1-17 - Subunit 15A.

Age	Number	Percent
Calves	78	18
1	66	15
2	48	11
3	35	8
4	34	8
5	24	5
6	24	5
7	21	5
8	20	4
9	23	5
10	14	3
11	13	3
12	17	4
13	11	2
14	11	2
15	4	1
16	2	4
17	1	4

n = 446
n - calves = 368
$\bar{x}$ - 5.61 (not including calves)

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 15 (B) - Soldotna

Seasons and Bag Limits

Unit 15(B) East, that portion of Subunit 15(B) east of the Funny River and a line from the headwaters of the west fork of the Funny River to the mouth of Shantalik Creek.	Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose; 150 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement.
Unit 15(B) West, the remainder of Subunit 15(B).	Aug. 20 - Sept. 30 Nov. 1 - Nov. 20	One moose; 50 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 reports indicate a harvest of 69 bulls during the 1970 season. The bull harvest was down 42.1 percent from 1969 and down 42.5 percent from the average for the previous five years. The antlerless harvest was reported in the 1970 Survey-Inventory Report.

Harvest reports from the 1971 season indicate that 128 bulls were taken. The bull harvest was up 85.5 percent from 1970 and was 31.9 percent above the average for the previous five years.

A permit antlerless moose season was held September 1-30 and November 1-30 in 15(B) East. Hunters were required to report their kills within four days and to turn in the front portion of the lower jaw. A portion of 15(B) East, off the Kenai National Moose Range, with road access, was excluded from the open area to prevent an excessive concentration of hunters.

Permits were issued on a first-come, first-serve basis with no limit on the number of permits. Hunters obtaining permits were advised that access to the open portion of the unit was feasible only by boat, horse or aircraft.

Sixteen hundred and eighteen permittees took 86 antlerless moose during the 1971 season in 15(B) East. The harvest was composed of 78

cows, one female calf and seven male calves. Fifty-four antlerless moose were taken by 1149 permittees during the September season and 469 permittees harvested 32 antlerless moose during the November season.

Subunit 15(B) West was not opened for antlerless hunting although a permit hunt is provided for by regulation. Antlerless hunts will be held in this unit when timing of the migration causes population build-ups before midwinter.

Composition and Productivity

Sex and age composition counts were not conducted in 1971. Counts conducted in 1970 (Appendices III and IV) show a relatively high bull/cow ratio, 37.8 bulls/100 cows and a very low calf/100 cow ratio of 14.5.

The age structure of the cow segment of the 15(B) East population, as determined from teeth collected in 1971, is presented in Appendix II. The average age of cows taken during September was 4.51 years while the average age of cows taken in November was 5.46 years. The overall average age was 4.85 years. The average age of cows taken during the 1970 hunt held in February was 6.63 years and the age of the cows taken during the 1970 hunt held in December was 6.62 years.

Management Summary and Conclusions

The 1970 bull harvest was 69, the lowest since 1967, while the 1971 bull harvest was 128, the largest on record since 1965. The cause of this drastic change in harvest level is not known but is probably influenced by timing of the migration. The large number of antlerless permits issued in this unit may also have drawn more hunting pressure to this unit resulting in an increased harvest.

The average age of cows taken during the 1971 season was 4.85 years, while the average age was 6.63 in 1970 and 6.62 in 1969. In 1971 the average age of animals taken in September was 4.51 years while those taken in November averaged 5.46 years. Since the harvest of 55 antlerless moose in 1969 and 75 in 1970 was not sufficient to have produced a change in the age structure, it is apparent that timing of the harvest influences the average age of animals taken. The older average age of animals taken in the late hunts held in 1969 and 1970 (February 19-22 and December 16-20, respectively) and the older average age of cows taken in November 1971 indicates that cows that become available later in the season are older. Since animals from the highlands are migrating down at this time of year, it is apparent that the highland population is composed of older animals.

Calf production, as indicated by the 1970 survey, is very low while the bull/cow ratio is high. An increased harvest would benefit this population by stimulating calf production. Since this unit is to be managed for trophy bulls, cows should be harvested at as high or at a higher level than bulls to maintain a high bull/cow ratio. Since highland

animals are little affected by early season hunts, seasons should be set to harvest more cows from the highland population when they have moved to accessible areas.

Recommendations

No changes are recommended.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX I

Moose Harvest and Hunting Pressure - Subunit 15B - Soldotna

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	0	0	*		
	2nd	*	193	0	*		
	Combined	183	193	0	376	*	*
1966	1st	60	26	0	86		
	2nd	56	0	0	56		
	Combined	119	26	0	145	*	*
1967	1st	51	0	0	51		
	2nd	18	0	0	18		
	Combined	69	0	0	69	233	30
1968	1st	67	5	0	72		
	2nd	35	0	0	35		
	Combined	108	6	2	116	282	41
1969[3]	1st	29	0	0	29		
	2nd	33	0	0	33		
	Antlerless	28[1]	55[1]	0	83[1]		
	Combined	119[2]	55[1]	0	174	*	*
1970[4]	1st	14	0	1	15		
	2nd	23	0	0	23		
	Antlerless	4	75	1	80		
	Combined	69[2]	75	2	146	283	52
1971[5]	1st	36	54[1]	2	93		
	2nd	62	32[1]	2	96		
	Combined	128[2]	86[1]	0	214	488	44

*Data not available.

[1]Known harvest from source other than harvest tickets. (Antlerless permit returns.)
[2]Seasons totals exceeds sum of season because of inclusion of animals for which data of kill is unknown.
[3]Antlerless season held February 19-22, 1970.
[4]Antlerless season held December 16-20, 1970.
[5]Antlerless season held September 1-30 and November 1-30.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX II

Cow moose age structure 1971-72 season, September 1-30 and November 1-30, 1971 - Subunit 15B.

Age	1st Season		2nd Season		Combined	
	Number	Percent	Number	Percent	Number	Percent
Calf	5	10.4	3	11.1	8	10.7
1	13	27.1	5	18.5	18	24.0
2	6	12.5	3	11.1	9	12.0
3	6	12.5	1	3.7	7	9.3
4	1	2.1	5	18.5	6	8.0
5	3	6.3	1	3.7	4	5.3
6	1	2.1	0	0.0	1	1.3
7	2	4.1	2	7.4	4	5.3
8	2	4.1	2	7.4	4	5.3
9	3	6.3	0	0.0	3	4.0
10	2	4.1	0	0.0	2	2.7
11	0	0.0	2	7.4	2	2.7
12	3	6.3	1	3.7	4	5.3
13	1	2.1	1	3.7	2	2.7
14	0	0.0	0	0.0	0	0.0
15	0	0.0	1	3.7	1	1.3
	48	100.0	27	99.9	75	99.9
Mean Age*	4.51		5.46		4.85	

*Mean age does not include calves.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX III

Moose Sex and Age Composition - Subunit 15B

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	N O C O U N T S M A D E													
12/64	337	46	383	690	166	10	866	1249	1	187	0	1437	22	65
1965	N O C O U N T S M A D E													
1966	N O C O U N T S M A D E													
1967	N O T A V A I L A B L E													
1968	N O C O U N T S M A D E													
1969	N O C O U N T S M A D E													
12/2-4/70 & 12/12/70	184	17	201	455	75	2	531	732	0	77	5	817	10.4	78.6
1971	N O C O U N T S M A D E													

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX IV

Moose Sex and Age Ratios - Subunit 15B

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	43.0	6.0	16.2	3.3	32.5	36.9	8.1	20.4	-	1832
1963	N O	C O U N T S	M A D E							
1964	44.2	5.3	13.7	3.2	52.0	21.6	5.7	13.0	65	1437
1965	N O	C O U N T S	M A D E							
1966	N O	C O U N T S	M A D E							
1967	28.8	3.5	13.8	2.4	44.0	15.8	2.0	10.9	-	457
1968	N O	C O U N T S	M A D E							
1969	N O	C O U N T S	M A D E							
1970	37.8	3.2	9.2	2.1	47.2	14.5	2.6	9.4	78.6	817
1971	N O	C O U N T S	M A D E							

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 15(C) - Homer

Seasons and Bag Limits

Unit 15 (C)	Aug. 20 - Sept. 30 Nov. 1 - Nov. 10	One moose; 250 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 ticket returns from 1970 show a harvest of 319 bulls and 69 cows in Subunit 15(C) (Appendix I). The bull harvest was near the average for the preceding five years of 317. Two hundred and fifty permittees harvested 68 cows during the open season August 20 - September 30.

The 1971 bull harvest was 263 as determined by harvest ticket returns. The harvest was 21 percent below the average for the preceding five years.

An antlerless hunt by permit registration was held from September 1-30, 1971; 503 permits were issued and 152 antlerless animals were taken. All of Subunit 15(C) was open except the area west of the Sterling Highway from the Kasilof River Bridge at Mile 162 to the mouth of Twitter Creek; south of Twitter Creek to the Ohlson Mt. Road; then south of Ohlson Mt. Road to the crest of the Homer Bluff then south of the bluff to Fritz Creek. No permits were issued after September to fill the antlerless quota because of a prior agreement not to hold a late hunt for antlerless animals in Subunit 15(C).

The harvest ticket return data for the antlerless kill differ somewhat from the above data which were obtained from permit returns from the registration hunt. Harvest ticket data show 131 females taken. An additional six male calves may have been reported as males. This would make a total of 137 antlerless animals reported--ten percent less than indicated by permit returns.

Composition and Productivity

Sex and age composition counts conducted in 1971 showed 26 bulls/100 cows and 18.7 calves/100 cows (Appendices II, III). The bull/cow ratio increased from 1970 but the calves/100 females ratio decreased. However, interpreting comparisons of these data with past data is complicated because of variations of areas surveyed and timing of surveys.

One hundred and thirty-two cows older than calves were aged by cementum annuli (Appendix IV). Of these, 13 percent were ten years old or older and 31 percent were six years old or older. The mean age of females older than calves dropped from 6.90 in 1970 (n = 52; S.D. = 3.89) to 4.94 in 1971 (n = 121; S.D. = 1.07).

An early accumulation of deep snow that persisted all winter in 1971-72 caused considerable calf mortality. This mortality is being documented and will be included in the 1972 Survey-Inventory Report.

Management Summary and Conclusions

The 1970 and 1971 bull harvests declined as was predicted based on calf production of the preceding years. However, the 1971 November season was ten days shorter than it had been since 1966. If the average harvest for this ten day period for the three years preceding is added, the 1971 harvest would have exceeded 300 animals.

The observed bull/cow ratio increase in 1971 over 1970 was statistically significant ($x^2 = 6.15$, DF = 1; A = 0.05). If indeed the ratio increased it is difficult to ascertain why. The reduced November season probably left an additional 50 bulls in the population at survey time, but this small number could not account for the change. The unaccountable yearly changes in survey data, not borne out by trends over several years, likely occur from differences in distribution and observability of bulls.

The bull/cow ratio outside the Kenai National Moose Range increased from 8.6 bulls/100 cows in 1970 to 15.5 bulls/100 cows in 1971. It is conjectured that the increase is attributable to the shortened November season.

The decreased calf/cow ratios since 1968 are a good indication that there is excessive competition on the winter range. In order to alleviate this heavy pressure on the winter range and to achieve a maximum sustained yield of the moose population, an equal number of males and females at least equal to the annual increment of the population should be taken.

The sharp drop in mean age of hunter harvested females from 1970 to 1971 can be attributed to an insufficient sample size (n = 52; S.D. = 3.89) in 1970. A sample of 122 was required to estimate the population mean with an error risk of 0.10 of the mean at A = 0.05.

Recommendations

The full subunit quota of 250 antlerless moose should be harvested in 1972 during a permit registration hunt coinciding with the regular bull season. A second special antlerless hunt should be held if the full quota is not approached during the regular season.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15C - Homer

APPENDIX I

Moose Harvest and Hunting Pressure - Subunit 15C - Homer

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1965	1st	*	2	0	*		
	2nd	*	2	0	*		
	Combined	248	224	0	472	*	*
1966	1st	156	68	0	224		
	2nd	*	0	0	88		
	Combined	248	68	0	316	*	*
1967	1st	187	0	0	187		
	2nd	81	0	0	81		
	Combined	268	0	0	268	643	42
1968	1st	227	19	0	246		
	2nd	157	0	0	157		
	Combined	404	20	5	429	972	44
1969	1st	*	*	*	*		
	2nd	*	*	*	*		
	Antlerless	19	109	0	128		
	Combined	420	109	0	529	*	*
1970	1st	165	68[1]	4	237	*	*
	2nd	55	*	1	56	*	*
	Combined	319	68	7	394	775	51
1971	1st	136	152[2]	2	290		
	2nd	66	0	2	68		
	Combined	263	152	4	419	836	50

*Data not available.

[1]Antlerless season held August 20 - September 30 (250 antlerless permits issued).

[2]Total known kill of antlerless animals from antlerless permit returns, including six male calves. The season ran Sept. 1-30 (503 antlerless permits issued).

Totals of first and second seasons may be less than for combined seasons because of the inclusion of animals for which date of kill was not given.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15C - Homer

APPENDIX II

Moose Sex and Age Ratios - Subunit 15C

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	48.8	1436

Submitted by: Paul A. LeRoux, Game Biologist III

APPENDIX III

Moose Sex and Age Composition - Subunit 15C

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	
12/11-12/69	83	73	156	826	278	17	1121	1277	1	313	46	1636	30.3	53.6
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	

Submitted by: Paul A. LeRoux, Game Biologist III

APPENDIX IV

Cow Moose Harvest Age Structure 1971-72 Season,
September 1-30, Subunit 15C

Age	Number	Percent
Calves	11	8
1	16	11
2	28	20
3	23	16
4	9	6
5	12	8
6	6	4
7	6	4
8	6	4
9	9	6
10	4	3
11	4	3
12	2	2
13	2	2
14	2	1
15	2	1
16	1	1

n = 143
n - calves - 132
$\bar{x}$ = 4.94 (not including calves)

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 16 - West Side of Cook Inlet

Seasons and Bag Limits

Unit 16 west of Yentna River and north and west of Skwentna River only. Two moose; only one of which may be antlerless; (antlerless moose may not be taken prior to October 1).	Aug. 20 - Dec. 31
Remainder of Unit 16. One moose, provided that antlerless moose may be taken only from November 21 through November 30.	Aug. 20 - Sept. 30 Nov. 1 - Nov. 30

Harvest and Hunting Pressure

Harvest report data for 1970 are presented in Appendix I. Eight hundred and twenty-five moose were harvested in 1970, an increase of 36 moose over 1969, and an increase of 324 moose over the previous five-year average of 501 moose taken in Unit 16. Of the total 825 moose harvested, 598 were males, 212 were females, and 15 were reported as unknown sex.

Harvest report data for 1971 are presented in Appendix I. A total of 835 moose were harvested of which 585 were males, 235 were females, and 15 were reported as unknown sex. The harvest data for 1971 reveal a slight increase in harvest (10) over the 1970 harvest, and an increase of 247 moose over the previous five-year average.

Regulatory changes in 1971 required a breakdown for a two moose area west of the Yentna River. In that area, 111 male moose, 34 female moose, and two of unknown sex were taken for a total of 147. There were 16 hunters who reported taking a second moose in Unit 16.

Although a liberalization of the regulations was in effect in 1971 in that portion of Unit 16 west of the Yentna River, the overall harvest in the entire unit increased by only ten animals. Antlerless moose could have been taken in the Yentna-Skwentna area from October 1 to December 31 but the total harvest was only 34 females. Much of the area is inaccessible and weather creates problems for small aircraft, which are the primary means of transport for hunting in that portion of Unit 16.

Hunters in the Petersville area (the portion of Unit 16 east of the Kahiltna River which contains all of the accessible roads in the unit), harvested 123 males, 87 females, and two moose of unknown sex for a total of 212 in 1971. The Petersville Road area was monitored from an Alaska

Department of Fish and Game check station located at the Susitna River bridge on the eastern border of Unit 16. Weather conditions, which consisted primarily of deep snow and low temperatures, caused hunters to shift emphasis from the relatively inaccessible Peters and Dutch hills to the areas bordering the Susitna River. In 1971, nearly one-fourth of the total harvest in Unit 16 was taken from the Petersville area. Recent Matanuska-Susitna Borough plans call for an enlargement and improvement of the road system in this portion of Unit 16.

During the spring of 1971, a winter kill was recorded in Unit 16 and 161 dead moose were examined by Alaska Department of Fish and Game biologists utilizing a helicopter. The areas concerned included Alexander Creek and the Susitna River from its mouth to Talkeetna. Incisors were collected from the moose, 94 of which were males and 67 of which were females. The data (Appendix II) reveal that a high percentage of the winter killed moose were calves and yearlings (83 percent of the total sample). Of the adult moose (one year and older) in the total sample, nearly twice the number of males succumbed as females.

In April 1971, aerial survival counts were conducted in portions of Unit 16. The calf mortality along the Susitna River from Bell Island to Talkeetna and the Alexander-Sucker Creek area was 88.5 percent. Yearling percentages in the herd in the same areas were reported at 3 percent and 2 percent, respectively. In the Upper Kahiltna and Yentna drainages the yearling percentage of a sample of 291 moose was 11.7 percent. In the Lower Skwentna, Hayes Glacier, Talachulitna River, and Wolverine Creek area a sample of 327 revealed the yearlings in the herd represented 6.1 percent of the sample. Poor weather conditions are presumed to be responsible for most of the losses, which did not diminish the hunter harvest for Unit 16 as a whole.

Composition and Productivity

Aerial moose sex and age composition counts were conducted in portions of Unit 16 during 1971 and the data are presented in Appendices III and IV. During 1971, composition counts were conducted in the Mount Susitna-Mount Beluga area with 1,139 moose tallied. In 1970 the count was hampered by poor weather conditions resulting in 175 animals sampled. The calf/100 cow ratio in the Mount Susitna-Mount Beluga area in 1971 was 31.2 as compared to 31.5 in 1970, but the low sample in 1970 must be noted. The calf/100 cow ratio has increased to 31.2 in 1971 from 18.3 in 1968 when a sample size of 457 moose was obtained. The calf/cow ratio in the Kahiltna area (32.0 calves/100 cows) has exhibited a decrease from the 1970 survey, when a high of 53.8 calves/100 cows was tabulated. In the 1968 survey 37.8 calves/100 cows were seen in that area. Productivity in Unit 16 was considered to be fair in 1971.

The data gathered from the Kahiltna area of Unit 16 reveal a slight increase in the number of bulls/100 cows; from 24.5/100 in 1970 to 25.2/100 in 1971. A comparable area (Peters Hills) flown in 1968 revealed a similar 27.4 bulls/100 cows ratio. The Petersville Road area was flown only in 1968, but indicates a lower bull/cow ratio (19.6 bulls/100 cows) in this relatively accessible and hunted area.

The age structure of moose taken during the 1971 antlerless season in that portion of Game Management Unit 16 which was open from November 21 through November 30 is shown in Appendix V. It is notable that there are no yearling males in the sample. This indicates poor survival of that age class through the winter of 1970-71, presumably due to very poor weather conditions. The small sample of 35 must be taken into consideration when examining the data, however.

The female segment of the age sample reveals large percentages of moose harvested in the 4- and 7-year-old age classes presumably indicating good survival of those particular age classes. The number of moose harvested in 1- and 2-year-old classes is exceeded by the 3 through 8 and the 11-year-old age classes indicating poor survival during the winters of 1969-70 and 1970-71, but again sample sizes are relatively small. The average age of female moose in the sample taken from the Petersville area is 5.9 and the median age is 6.0, if calves (9) are excluded.

Management Summary and Conclusions

Harvest data collected in Unit 16 indicate the moose take has stabilized at approximately 800± moose during the past three years. An attempt to liberalize hunting regulations in portions of Unit 16 did not result in increased harvests of any significance. Lack of road access in Unit 16 limits most of the hunting to aircraft and the harvest is spread throughout the area. One exception is the area from the Kahiltna River to the eastern boundary of Unit 16, which receives relatively intense pressure during the late November antlerless seasons when the limited road system is further diminished by snow accumulation. Recent plans by the Matanuska-Susitna Borough to significantly expand the road system to the south in this portion of Unit 16 prompts a proposal to restrict the numbers of hunters that may participate, from unlimited numbers to a definite number of permit holders. A proposal for a new area description to include the road system is in order.

Recommendations

Unit 16 should be divided into two areas, 16A which contains the road system, and 16B. Subunit 16A will include the area from the Kahiltna and Yentna rivers east to the Susitna River in Unit 16. The remainder of the unit will be known as 16B.

Proposed Seasons and Bag Limits:

Subunit 16A	Aug. 20 - Sept. 30 Nov. 1 - Nov. 30	One moose; 250 antlerless moose may be taken by permit only. Dates and conditions of the hunt will be described by Commissioner's announcement.

Subunit 16B	Aug. 20 - Sept. 30 Nov. 1 - Nov. 30	One moose.

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 16 - West Side of Cook Inlet

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 16 - West Side of Cook Inlet

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1966	First	162	1	3	166		
	Second	210	0	14	224		
	Antlerless	0	134	0	134		
	Unk. Date	21	9	1	31		
	TOTAL	393	144	18	555	826	67.2
1967	First	168	0	1	169		
	Second	97	0	0	97		
	Antlerless	0	0	0	0		
	Unk. Date	16	0	0	16		
	TOTAL	381	0	1	282	505	56.0
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	57.0
1969	First	252	0	5	257	*The antlerless	
	Second	183	0	1	184	season bull harvest	
	Antlerless	0*	123	0	123	unobtainable from	
	Unk. Date	180	44	1	225	present program.	
	TOTAL	615	167	7	789	1366	57.8
1970	First	238	0	3	241		
	Second	228	152	5	385		
	Antlerless	-	-	-	-		
	Unk. Date	132	60	7	199		
	TOTAL	598	212	15	825	1442	57.0
1971	First	174	0	-	174	*All female harvest	
	Yentna Area	9	**	1	10	incorporated into	
	Second	249	**	4	253	antlerless season.	
	Antlerless	-	174	2	176		
	Unk. Date	153	61	8	222		
	TOTAL	585	235	15	835	1648	50.7

Submitted by: Jack C. Didrickson, Game Biologist III

APPENDIX II

Unit 16 Age Structure of Moose Winter Kill, Susitna River - Mouth to Talkeetna and Alexander Creek, Collected April 20, 21, 22, 1971.

Males			Females		
Age	Number	Percent	Age	Number	Percent
Calf	62	66.0	Calf	50	74.6
1	13	13.8	1	8	11.9
2	5	5.3	2	1	1.4
3	3	3.1	3	2	2.9
4	-	-	4	-	-
5	-	-	5	-	-
6	2	2.1	6	-	-
7	2	2.1	7	-	-
8	1	1.0	8	-	-
9	1	1.0	9	-	-
10	2	2.1	10	-	-
11	2	2.1	11	-	-
12	1	1.0	12	1	1.4
			13	2	2.9
			14	2	2.9
			15	-	-
			16	-	-
			17	1	1.4
n = 94			n = 67		

Cementum Ages

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 16 - West Side of Cook Inlet

APPENDIX III

Moose Sex and Age Composition - Unit 16 - West Side of Cook Inlet

Year	Area	Lg. MM	Sm. MM	Tot. MM	FF W/0	FF W/1	FF W/2	Tot. FF	Tot. Ad.	Lone Clv.	Tot. Clv.	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose per Hour
12/4-6 1967	#6 Peters Hills to Kahiltna	121	52	173	443	205	31	679	852	2	269	0	1121	8.9	126.0
	Yentna	34	15	49	41	10	7	58	107	0	24	0	131	1.1	119.1
1967 TOTAL		155	67	222	484	215	38	737	959	2	293	0	1252	10.0	125.2
12/9-20/67	Mt. Susitna-Mt. Beluga	105	19	124	191	64	3	258	382	0	70	5	457	8.5	60
	Peters Hills	55	27	82	198	94	7	299	381	5	113	2	496	6.4	77
	Petersville Rd.	5	5	10	27	21	3	51	61	0	27	3	91	3.7	25
1968 TOTAL		165	51	216	416	179	13	608	824	5	210	10	1044	18.6	56
12/11/1970	Mt. Susitna-Mt. Beluga	49	9	58	64	22	3	89	147	0	28	0	175	2.05	85.4
11/22-23	Kahiltna	39	28	67	142	115	16	273	340	0	147	0	488	7.4	65.9
1970 TOTAL		88	37	125	206	137	19	362	487	0	175	0	663	9.45	70.15
10/29/1971	Mt. Susitna-Mt. Beluga	240	65	305	445	181	8	634	939	1	198	2	1139	18.4	63.0
11/8-9	Kahiltna (A-F)	94	40	134	354	153	5	512	646	1	164	5	815	19.3	42.2
1971 TOTAL		334	105	439	799	334	13	1146	1585	2	362	7	1954	37.7	51.8

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 16 - West Side of Cook Inlet

APPENDIX IV

Moose Sex and Age Ratios - Unit 16 - West Side of Cook Inlet

Year	Area	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
12/4-6 1967	#6 Peters Hill to Kahiltna	25.5	7.7	43.0	4.6	38.7	39.6	13.1	24.0	126	1121
	Yentna	84.5	25.9	44.1	11.5	125.0	41.4	41.2	18.3	119	131
1967 TOTAL		30.1	9.1	43.2	5.4	45.9	39.8	15.0	23.4	125.2	1252
12/9-20 1968	Mt. Susitna-Mt. Beluga	48.1	7.4	18.1	4.2	54.3	18.3	4.5	15.3	60	457
	Peters Hills	27.4	9.0	49.1	5.4	47.8	37.8	6.9	22.8	77	496
	Petersville Rd.	19.6	9.8	100.0	5.5	37.0	52.9	12.5	29.7	25	91
1968 TOTAL		35.5	8.4	30.9	4.9	48.6	34.5	6.8	20.1	56	1044
1970 12/1	Mt. Susitna-Mt. Beluga	65.2	10.1	18.4	5.1	64.3	31.5	12.0	16.0	85.4	175
11/22-23	Kahiltna	24.5	10.3	71.8	5.7	38.0	53.8	12.2	30.1	65.9	488
1970 TOTAL		34.5	10.2	42.0	5.6	42.3	48.3	12.17	26.4	70.15	663
1971 10/29	Mt. Susitna-Mt. Beluga	48.1	10.25	27.1	5.7	65.6	31.2	4.2	17.38	61.9	1139
	Kahiltna (A-F)	26.2	7.8	42.6	4.9	48.8	32.0	3.2	20.1	42.3	815
1971 TOTAL		38.3	9.2	31.4	5.4	58.0	31.6	3.7	18.5	51.8	1954

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE - GMU 16 - West Side of Cook Inlet

APPENDIX V

Ages of Moose Taken by Hunters During the November 21 through November 30 Unit 16 Moose Season, 1971.

Age	No. of Females	No. of Males
Calf	9	11
1+	3	0
2+	3	3
3+	7	8
4+	14	2
5+	6	2
6+	5	6
7+	12	2
8+	5	0
9+	3	0
10+	1	0
11+	4	1
12+	2	0
13+	0	0
14+	0	0
15+	1	0
16+	0	0
17+	0	0
18+	0	0
Total	75 (66 adults)	35 (24 adults)
Incl. Calves Av. Age	5.20	3.11
Incl. Calves Med. Age	5.25	3.44
Excl. Calves Av. Age	5.91	4.55
Excl. Calves Med. Age	6.00	4.54

Submitted by: Jack C. Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 17 - Bristol Bay

Seasons and Bag Limits

Aug. 20 - Dec. 31 One bull

Harvest and Hunting Pressure

The total reported harvest for Unit 17 in 1971 was 37 moose (Appendix I). The harvest was nearly equally divided between residents and non-residents.

Composition and Productivity

Exploratory efforts were initiated in 1971 to locate areas to be surveyed each fall. Areas examined included Togiak River, Wood River system, Nushagak River and the lower Mulchatna River. In 6.4 hours of actual survey flight 17 moose were observed. It was concluded that the areas surveyed had insufficient moose concentrations to warrant establishing permanent trend areas.

Management Summary and Conclusions

Although moose are not abundant in Unit 17, the animals close to the villages appear to be subjected to a heavy hunting pressure. In these areas hunting is primarily on a subsistence basis. Residents report that the major portion of this harvest occurs in the late winter and early spring. At this time of the year snow tends to concentrate the moose in the valley bottoms and along the waterways. Much of the harvest is by trappers that are afield at this time. The magnitude of this unreported harvest is undetermined, but probably remains relatively constant from year to year.

Two surveys made in Sunshine Valley, Aleknagik Lake in late February and early March picked up concentrations of approximately 50 moose on both flights. A similar survey made in late November tallied only seven animals. It appears that this concentration of animals is not available to hunters during the regular hunting season. The area does have ready access from Dillingham and the village of Aleknagik by snowmachine in February and March. The possibility of holding a limited late season permit hunt should be considered for Sunshine Valley. Such a hunt would permit a limited harvest of animals for meat without being detrimental to the population. The hunt would be closely regulated and conducted only if weather concentrated adequate numbers of moose within the valley.

Recommendations

No changes in season or bag limits are recommended. The possibility of holding a late season permit in Sunshine Valley should be evaluated.

Submitted by: James B. Faro, Game Biologist III

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	49.0
1968	45	0	1	46	66	69.7
1969	11	1	3	15	31	48.4
1970	23	0	2	25	35	74.2
1971	36	0	1	37	63	58.3

*No legal cow season has been held.

Submitted by: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 18 - Yukon-Kuskokwim Delta

Seasons and Bag Limits

Unit 18	Aug. 20 - Dec. 31	One bull

Harvest and Hunting Pressure

The reported 1971-72 moose harvest was 12. Actual harvest was probably between 150 and 200 animals. Moose are regularly taken for food when and where they occur. In general this means eastern Unit 18, and along the Yukon River as far west as Mountain Village. Few are taken on the Delta proper. Most moose hunters from Kuskokwim River villages in Unit 18 travel to Unit 21 or 19 by air or boat.

Composition and Productivity

No surveys were made in Unit 18.

Management Summary and Recommendations

No regulatory changes are recommended. Moose harvest patterns vary with abundance and distribution of moose, and are not considered detrimental to moose populations.

Submitted by: Richard Bishop, Game Biologist IV

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Mangement Unit 19 - McGrath

Seasons and Bag Limits

Unit 19	Aug. 20 - Feb. 28	Two moose; only one of which may be antlerless; (antlerless moose may not be taken prior to October 1).

Harvest and Hunting Pressure

The reported 1971-72 moose harvest was 152 bulls, 33 cows and four unreported sex, a total of 189. Moose harvest tickets have been in use since 1963. During this time reported harvests have ranged from 129 to the current high of 189. Harvest tickets, or reports, are still not widely used except in major population centers. Therefore, the reported harvest does not reflect actual harvest, which is probably 500 to 700 annually.

Composition and Productivity

Aerial sex and age composition counts were done in the Takotna River drainage and along the Kuskokwim River near McGrath by Peter E. K. Shepherd in December, 1971. Due to inclement weather the counts were done later than was desirable, and some bulls had already shed their antlers. Observed bull:cow ratios were 34 M per 100 F, but the bull:cow ratio is the same as in 1970 when the count was done prior to antler loss. If the count data are representative, then it appears that hunting has affected bull:cow ratios near McGrath.

Productivity in the Takotna samples was good (34 calves per 100 cows), while in the Kuskokwim sample it was fair (22 calves per 100 cows). Productivity in the combined sample was 29 calves per 100 cows, which I consider slightly above "maintenance" level under conditions of low harvests and other losses. Yearlings, however, are poorly represented, as expected following the long period of deep snow in 1970-71.

Ages were determined for most of 59 moose shot in the McGrath area during the 1970-71 hunting season but data were not reported last year. A summary of these data is given in Appendix I. Ages of moose taken at miscellaneous locations in Unit 19 by hunters or wolves was also determined (Appendix II). Age composition of males killed tends to be young, with yearlings through 3-year-olds constituting over half the harvest. Because the sample was drawn from the area traditionally hunted by most McGrath residents, one could reasonably expect an age distribution skewed to the younger ages.

Chronology of moose harvested in the immediate McGrath area (Appendix III) for 1970-71 is interesting when considered in light of local hunter attitudes and weather conditions for that year. Hunting moose in August and early September is of the highest interest, and a substantial proportion of residents spend much of their free time traveling the rivers in hopes of seeing a bull. These early hunts tend to be relaxed, recreational outings. Moose are mostly taken opportunistically, with little serious hunting involved. As rut approaches along with cold weather and freeze-up, hunting becomes a more serious matter. More effort is spent actually hunting as opposed to riding. People are well aware that chances of taking a moose are much greater at this time. In addition, nearly all families in McGrath rely on moose for the bulk of their meat supply, and as freeze-up approaches it is an important practical consideration to have a moose on hand, because there may be a period of several weeks when the rivers cannot be traveled at all. In 1970, freeze-up began the first few days in October; most of the eight bulls shown for October 1 through 15 were taken during the first week of October.

Little hunting is done in late October and early November in most years because of the transition from fall to winter. In 1970, consistently poor weather contributed to a lull in hunting throughout much of November. When weather conditions finally settled down in early December, two feet of snow had accumulated rapidly and moose had begun moving to riparian willow stands in numbers. Moose were quite accessible to hunters with snowmachines, and the kill again rose. Here it is interesting to note that few bulls were taken. Although cows were more numerous, there was also a strong selection for cows because of their superior condition. Few residents will take a bull in winter if a reasonable chance of finding a cow exists.

Because deep snow persisted through March numbers of moose persisted along the Kuskokwim and Takotna rivers well past the season's end. As the chronology shows, a flurry of hunting occurred during the longer, warmer days of February that accounted for 15 moose, mostly cows. The estimated harvest of 65 to 75 moose in 1970-71 from the McGrath area was about twice the 1969-70 harvest.

In contrast to 1970-71, during 1969-70 snowfall was moderate, moose moved to riparian willow stands late in January and moved away again by mid-February. Few were taken during January and February of 1970. During 1971-72, winter conditions almost duplicated those of 1970-71. Even greater snow depths commenced in November and persisted through early April. Essentially the same pattern of moose movements and hunting prevailed. Data on snow depths, moose movements and harvest for 1971-72 will be presented in the 1972 report. Winter-related natural mortality, which was apparently much more extensive in 1971-72 than in 1970-71, will also be reported in the 1972 report.

Mangement Summary and Recommendations

Moose hunting success is materially affected by moose behavior

patterns, weather, and snow conditions. In years of deep snow increased harvests can be expected, along with higher natural winter mortality and probably increased predation, assuming wolves are present. Hunting in the McGrath area seems to have depressed bull:cow ratios, but it cannot have depressed the moose population. In combination with winter mortality and predation, hunting probably contributes to a depressed population in years of deep snow, but it seems unlikely that reduction of hunting in such years would substantially speed population recovery. Therefore, no changes in hunting regulations are recommended.

Submitted by: Richard Bishop, Game Biologist IV

MOOSE - GMU 19 - McGrath

APPENDIX I

Age Composition of Moose Harvest, 1970-71

Age	Male		Female		Sex Unknown		Total	
	N	%	N	%	N	%	N	%
Calf	3	10	1	4	3	60	7	12
1	6	21	1	4	0	0	7	12
2	2	7	3	12	0	0	5	8
3	7	24	5	25	0	0	12	20
4	4	14	0	0	0	0	4	7
5	0	0	2	8	1	20	3	5
6	1	4	1	4	0	0	2	3
7	2	7	2	8	0	0	4	7
8	1	4	1	4	0	0	2	3
9	0	0	2	8	1	20	3	5
10	0	0	2	8	0	0	2	3
11	1	4	0	0	0	0	1	2
12	0	0	0	0	0	0	0	0
13	1	4	2	8	0	0	3	5
Unk.	1	4	3	12	0	0	4	7
Total	29	49	25	42	5	8	59	100

Submitted by: Richard Bishop, Game Biologist IV

MOOSE - GMU 19 - McGrath

APPENDIX II

Ages of Moose Taken by Hunters or Wolves

Acc. No.	Location	Collector	Date	Sex	Age (Yr.)	Cause of Death
Mc197-70	Farewell	Howard Bowman	Aug. 28, 1970	M	1.5	Hunter
Mc198-70	Farewell	Howard Bowman	Sept. 5, 1970	M	12.5	Hunter
Mc199-70	Farewell	Howard Bowman	Winter 69-70	M	14.5	Wolves
Mc202-70	Nowitna River (U.21)	Jack Allen	Sept. 23, 1970	M	10.5	Hunter
Mc203-70	Nowitna River (U.21)	Jack Allen	Sept. 23, 1970	M	6.5	Hunter
Mc240-70	Yukon River (U.21)	R. Baxter	1969-70	?	?	Hunter
Mc241-70	S. Fork, Kuskokwim River	A. Gregory	Nov. 1969	F	9.5	Hunter
Mc301-70	Farewell area	Howard Bowman	Aug.-Sept. 1970	M	13.5	Hunter
Mc302-70	Farewell area	Howard Bowman	Aug.-Sept. 1970	M	1.5	Hunter
Mc303-70	Farewell area	Howard Bowman	Aug.-Sept. 1970	M	8.5	Hunter
Mc316-70	Lower Big River	Bud O'Donnell	January 1971	M	?	Wolves
Mc317-70	Innoko River, 2 mi. above Dishna River (Unit 21)	Richard Bishop	Jan.-Feb. 1971	?	Calf(?)	Wolves
Mc322-70	Holitna River	Moses Kinegak	Sept. 19, 1970	F(?)	?	Hunter

Submitted by: Richard Bishop, Game Biologist IV

MOOSE - GMU 19 - McGrath

APPENDIX III

Moose Harvest Chronology, 1970-71

	Aug.	Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		Total
	20-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-28	
Male	4	4	8	8	1	0	0	1	0	0	1	2	0	29
Female		CLOSED		1	2	1	0	7	0	1	3	7 (3 additional in February; period unknown)	1	26
Sex Unknown				1				1					2	4
Total	4	4	8	10	3	1	0	9	0	1	4	9 (+3, February date unknown)	3	59

Submitted by: Richard Bishop, Game Biologist IV

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

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

Seasons and Bag Limits

August 20 - November 30	One moose; bull moose may not be taken from Oct. 1 - Oct. 31

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported kill of moose in Unit 20A for the 1970 season was 298 animals, an increase of 43 moose over the 1969 harvest of 255. The 1970 harvest consisted of 197 bulls, 96 cows, and 5 unknown corresponding to the increasing total kill in this unit over the past five years, (which has risen since 1966 when 145 moose were taken). The percent of bulls in the 1970 harvest (66%) approximates the five-year average bull composition in the harvest of 68 percent. In addition, 19 moose were taken by military personnel on military reservations (where harvest tickets are not required) during the 1970 season, consisting of seven bulls and 12 unknown sex.

Appendix I lists those areas contributing substantial numbers of moose in the 1970 harvest. These nine areas furnished 214 moose, or 72 percent of the subunit harvest. Selective hunting for bulls in the foothills of the Alaska Range is reflected in the harvest from Wood River (where 54 [73%] of the 74 moose harvested were bulls) and Gold King (where 16 [73%] of 22 moose were bulls).

Kill chronology data for the 1970 season indicate that 76 percent of the harvest of both sexes of known date kills occurred from August 20 - September 30, while only 17 percent of the moose were taken from November 1 - November 30. Eighty percent of the known kill date bull harvest occurred from August 20 - September 30, and 16 percent from November 1 - November 30, while the early and late season cow harvests for the same periods were 70 percent and 20 percent, respectively.

Although hunting pressure and harvest are greater during the first six weeks of the season, relatively limited access to most of the unit during this period limits hunting effort to airstrips established by guides in the foothills of the Alaska Range, two military airstrips, and several rivers and sloughs on the Tanana Flats.

The 1971 moose harvest of 347 animals (239[, 104] and four unknown), was an increase over 1970 when 298 moose were taken. Unit 20A was the only subunit in Game Management Unit 20 showing an increased harvest from the previous year. In addition, military personnel harvested four bulls and four cows in 1971 while hunting on military reservations. The

known number of illegally-killed moose in Unit 20A during 1971 was 15 (1 male, 12 females and 2 calves).

Appendix II lists those areas contributing substantial numbers of moose in the 1971 harvest. These eight areas furnished 235 moose, or 68 percent of the subunit harvest. Hunting pressure for bulls in the Alaska Range is again reflected in the harvest from Wood River and Gold King where 53 (78%) of 68, and 26 (81%) of 32, respectively, were bulls compared to the total harvest from these two areas. The large harvest from Blair Lakes the past two seasons is the result of the establishment of a large military airstrip in the area.

Kill chronology data for known date kills for the 1971 season indicate that 71 percent of the harvest of both sexes occurred from August 20-September 30, while 26 percent of the moose were taken from November 1 - November 30. Seventy-seven percent of the known kill date bull harvest occurred from August 20 - September 30, and 22 percent from November 1 - November 30, while the early and late season cow harvests for the same periods were 55 percent and 38 percent, respectively.

Composition and Productivity

Age composition data for the 1971 season in Unit 20 are listed in Appendix III. Although the small sample (n=46) may preclude adequate interpretation, it is interesting to note that 15 percent of the sample were yearlings despite severe winter mortality to the 1970 calf crop. The 2-year-old cohort comprises 24 percent of the sample, and represents calves born in the spring of 1969 when calf production and survival were excellent. Nevertheless, the high percentage of animals in the older age classes (10 + years) indicates the low rate of exploitation to be expected in a relatively lightly hunted population.

Parturition counts in the latter part of May, 1971 on the Tanana Flats were made to assess winter mortality and survival following the extreme winter of 1970-71. The 4 percent yearlings in the herd was a marked reduction from a fall 1970 calf composition of 20 percent. Based on the large number of dead calves picked up by Department personnel during the 1970-71 winter, the 4 percent yearling composition of the herd probably represents better survival than one would expect when compared with the resident population in the immediate Fairbanks vicinity. A corresponding decrease in survival is indicated by yearling:100 female ratios, which decreased from 34:100 in spring 1970 to 6:100 in 1971. In any case, there was at least an 80 percent loss to the 1970 calf crop.

Extensive fall composition counts were conducted in portions of the Tanana Flats, Alaska Range foothills and upper Wood River in 1971. Surveys conducted on the Flats revealed 31 calves:100 cows (compared to 32:100 in 1970) and 18 percent calves in the herd (compared to 20 percent in 1970). Consequently, production was adequate despite the stress resulting from the winter of 1970-71. These data combined with poor calf survival in 1970 indicate the moose "herd" on the Flats has stabilized. The bull:cow ratio of 42 males per 100 females increased from 1970 surveys

which indicated 29 males per 100 females on the Tanana Flats. However, bull:cow ratios have declined steadily since 1967 when 51 males/100 females were found.

Composition data from the foothills of the Alaska Range and upper Wood River indicate lower bull:cow ratios than those found on the Flats. The foothills and upper Wood showed 30:100 and 38:100, respectively, reflecting the disproportionate utilization of the bull segment of the herd.

Loss of the yearling age class through winter mortality in 1970-71 is further indicated by the yearling bull percent in the herd, which decreased to an average of 1.6 percent on the Flats, foothills and Wood River, from 1970 when 4.5 percent of the herd was yearling bulls.

Management Summary and Recommendations

Despite increasing harvest and hunting pressure, the moose herd in 20A remains underharvested and is weighted heavily with older age animals. Herd productivity appears to be leveling off as herd numbers adjust to the carrying capacity of the range. Utilization of the bull segment of the herd at the present level of harvest will continue to depress bull: cow ratios, at least in some areas. As the moose harvest continues to increase and we approach the maximum kill of bulls, increased utilization of the antlerless segment would further the sustained yield principle in portions of 20A (Tanana Flats). However, because lack of hunter access will probably continue to prevent a harvest commensurate with the annual increment, and the current bull:cow ratio has not reached a critical level, no changes in seasons or bag limits are recommended for most of the subunit.

In order to maintain the trophy status of the population in the foothills of the Alaska Range where bull:cow ratios may already be approaching a critical level for maximum trophy production due to increasing hunting activity in the area, it is recommended that a shorter bull season be initiated, while allowing for continued utilization of the harvestable surplus of cow moose.

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20A - Tanana Flats, North Slope of the Alaska Range

APPENDIX I

Areas Contributing to the Majority of 1970-71 Moose Harvest

Area	M	F	?	Total	Percent of Harvest
Tatlanika Creek	8	3	1	12	4.0
Tanana River	8	8		16	5.4
Tanana Flats	4	4	1	9	3.0
Blair Lakes	23	7		30	10.1
Wood River	54	20		74	24.8
Clear Creek	10	8		18	6.0
Delta River	7	5		12	4.0
Dry Creek	16	5		21	7.0
Gold King	16	5	1	22	7.4
				214 out of 298, or 72 percent of the harvest in 20A.	

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20A - Tanana Flats, North Slope of the Alaska Range

APPENDIX II

Areas Contributing to the Majority of 1971-72 Moose Harvest

Area	M	F	?	Total	Percent of Harvest
Tanana River	4	9		13	3.7
Blair Lakes	24	24		48	13.8
Salchaket Slough	5	6		11	3.2
Wood River	53	14	1	68	19.6
Clear Creek	19	8		27	7.8
Dry Creek	14	3		17	4.9
Gold King	26	6		32	9.2
Tanana Flats	9	10		19	5.5
				235 out of 347, or 68 percent of the harvest in 20A.	

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20 - Fairbanks - Central Tanana

APPENDIX LII

Age Composition of 1971-72 Moose Harvest (Legal Sport Kill Only)

Age Class	GMU 20A				GMU 20B				GMU 20C			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	1	-	1	2.2	-	-	-	-	-	-	-	-
1	4	3	7	15.2	11	-	11	34.4	8	-	8	25.8
2	4	7	11	23.9	12	-	12	37.5	2	1	3	9.7
3	-	-	-	-	1	-	1	3.1	3	-	3	9.7
4	4	1	5	10.9	2	-	2	6.2	2	-	2	6.4
5	2	2	4	8.7	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	4	-	4	12.9
7	2	-	2	4.3	1	-	1	3.1	-	-	-	-
8	2	1	3	6.5	2	-	2	6.2	4	-	4	12.9
9	1	-	1	2.2	1	-	1	3.1	2	1	3	9.7
10+	6	6	12	26.1	2	-	2	6.2	3	1	4	12.9
Sub-total	26	20	46		32	-	32		28	3	31	

Total Jaws Collected		
	20A	46
	20B	32
	20C	31
		109

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 20B - Fairbanks, Central Tanana

Seasons and Bag Limits

Aug. 20 - Sept. 30	One bull
Nov. 1 - Nov. 30	

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported sport kill of moose in Unit 20B for the 1970 season was 217 animals, consisting of 197 bulls, 15 cows, and 5 unknown sex. This compares to a harvest of 144 in 1969, and is well above the five-year (1966-1970) average harvest of 143.

Appendix I lists those areas supporting the majority of moose harvested in Unit 20B, and reflects the concentrated hunting effort along the road systems in this unit. A total of 139 moose, or 70 percent of the bull harvest, were taken from the road network, and only two off-road areas, the Chena and Chatanika rivers, contributed any significant numbers of moose to the harvest.

In addition, 8 bulls were reported taken by military personnel hunting on Ft. Wainwright, where harvest tickets were not required.

Harvest chronology data indicate that 108 bulls, or 65 percent of the total reported male harvest of known date kills, occurred from August 20 - September 30, while 52 bulls, or 32 percent, were taken from November 1 - November 30.

The 1971 harvest totaled 184 moose, consisting of 167 bulls, 14 cows, and 3 unknown sex. This expected reduction in harvest from 1970 followed a severe winter which removed most of the 1970 calf crop, eliminating the yearling cohort which traditionally comprises much of the harvest in this unit.

Appendix II lists those areas supporting the majority of moose harvested in Unit 20B in 1971, and again reflects hunting pressure along road systems in the area, which contributed 60 percent of the bull harvest in the unit. Harvest along the Chena Hot Springs Road and Steese Highway decreased from 1970, while the off-road areas of Minto, Chena River and Chatanika River undoubtedly received increased hunting pressure in contributing 36 moose to the harvest. In addition, the known illegal moose kill, which is increasing in the Fairbanks area, consisted of one bull, seven cows, and one calf in 1971.

Harvest chronology data for the 1971 season indicate that 120 bulls, or 84 percent of the total reported harvest of known date kills, occurred

from August 20 - September 30, while only 20 bulls, or 15 percent, were taken from November 1 - November 30.

Age composition data for the 1971 season are listed in Appendix III. Although the small sample (n=32) from Unit 20B may preclude adequate interpretation, it is interesting to note that 34 percent of the sample were yearlings despite severe winter mortality to the 1970 calf crop, reflecting the high level of exploitation the small portion of the moose herd receives in accessible hunting areas. The 2-year-old cohort comprises 38 percent of the sample, and represents calves born in the spring of 1969 when calf production and survival was excellent in adjacent subunit 20A.

Composition and Productivity

Composition counts conducted in portions of the Chena, Chatanika, and Goldstream drainages from November 26 - November 30 revealed the difficulty of obtaining reliable composition data during a relatively "mild" winter. Drainages which had supported large concentrations of moose during the severe winter of 1970-71 were devoid of moose, and adequate sample sizes were obtained only in previously burned areas. Nevertheless, a large enough sample (559 moose) was obtained to provide an index to production, survival and sex ratios. Poor survival of the 1970 calf crop is indicated by a 3 percent yearling bull segement in the herd, and a ratio of five small M per 100 F. Production was adequate, despite the stress of the previous winter, with a 17 percent calf crop and 28 calves per 100 females. Bull:cow ratios varied from 22:100 in the Goldstream drainage to 40:100 in the Chena drainage, with an overall average of 34:100, which does not reflect the disproportionate sex ratio which exists in the less accessible portions of the unit.

Accurate comparison of sex ratios between readily accessible and the less accessible areas could not be made due to changes in moose distribution compared to 1970 when both sexes appeared to be randomly distributed in drainages at lower elevations. Helicopter surveys conducted in April, 1972 in portions of the Chena drainage by moose research personnel indicated some elevational segregation by sex and age, apparently influenced by snow conditions. Moderate snow depths segregated lone cows and cows with calves at lower elevations, while bulls remained at higher elevations. These surveys indicated a bull:cow ratio of 30:100, reflecting a decrease over the fall ratio of 40:100 in the Chena drainage. Winter calf mortality in this drainage (which probably reflects conditions for most of the subunit) may again be approaching a critical level, as indicated by calf:cow ratios which decreased from 30:100 in fall 1971 to 17:100 in April, 1972, and by calf percent which declined from 17 percent to 11 percent for the same periods.

Management Summary and Recommendations

The bull-only season in this unit has failed to further the sustained yield principle. The harvest of bulls is taken from only 15 to 20 percent of the population by an increasing number of hunters in the Fairbanks

area, while sacrificing the remainder of the herd to periodic winter mortality. Increasing hunting pressure and harvest will continue to depress bull:cow ratios. If the population remains relatively static this will eventually result in decreased calf production and survival.

Limited access has prevented utilization of the large, productive moose herd inhabiting the major portion of 20B. Recent action by the Board anthorizing the taking of 100 antlerless moose in this unit will allow for utilization of the female segment of the population. Herd composition and harvest data indicate this unit can sustain a larger antlerless harvest.

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20B - Fairbanks, Central Tanana

APPENDIX I

Areas Contributing to the Majority of 1970-71 Moose Harvest

Area	M	Percent of Harvest
Chena Hot Springs Road (mile 0-28)	12	6.1
Chena Hot Springs Road (mile 29-50+)	12	6.1
Chena Hot Springs Road (unspecified)	15	7.6
Steese Highway (mile 30-66)	24	12.2
Steese Highway (mile 67-85)	12	6.1
Steese Highway (unspecified)	8	4.1
Eielson	11	5.6
Fairbanks & Vicinity	21	10.6
Elliott Highway (mile 0-54)	6	3.0
Nenana Highway	3	1.5
Goldstream Valley	8	4.1
Ft. Wainwright	7	3.6
	139 out of 197, or 70 percent of the bull harvest, taken from road system.	
Chena River	8	4.1
Chatanika River	5	2.5
	152 out of 197, or 77 percent of the bull harvest.	

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20B - Fairbanks, Central Tanana

APPENDIX II

Areas Contributing to the Majority of 1971-72 Moose Harvest

Area	M	Percent of Harvest
Chena Hot Springs Road (mile 0-28)	8	4.8
Chena Hot Springs Road (mile 29-50+)	13	7.8
Chena Hot Springs Road (unspecified)	9	5.4
Steese Highway (mile 30-66)	7	4.2
Steese Highway (unspecified)	6	3.6
Elliott Highway (mile 0-14)	3	1.8
Elliott Highway (mile 15-54)	6	3.6
Eielson	3	1.8
Fairbanks & Vicinity	5	3.0
Murphy Dome	4	2.4
Goldstream Valley	9	5.4
Johnson Road	3	1.8
Ft. Wainwright	25	15.0
	101 out of 167, or 60% of the bull harvest, taken from road system.	
Minto	12	7.2
Chena River	16	9.6
Chatanika River	8	4.8
	137 out of 167, or 82% of the bull harvest.	

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE - GMU 20 - Fairbanks, Central Tanana

APPENDIX III

Age Composition of 1971-72 Moose Harvest (Legal Sport Kill Only)

Age Class	GMU 20A				GMU 20B				GMU 20C			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	1	-	1	2.2	-	-	-	-	-	-	-	-
1	4	3	7	15.2	11	-	11	34.4	8	-	8	25.8
2	4	7	11	23.9	12	-	12	37.5	2	1	3	9.7
3	-	-	-	-	1	-	1	3.1	3	-	3	9.7
4	4	1	5	10.9	2	-	2	6.2	2	-	2	6.4
5	2	2	4	8.7	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	4	-	4	12.9
7	2	-	2	4.3	1	-	1	3.1	-	-	-	-
8	2	1	3	6.5	2	-	2	6.2	4	-	4	12.9
9	1	-	1	2.2	1	-	1	3.1	2	1	3	9.7
10+	6	6	12	26.1	2	-	2	6.2	3	1	4	12.9
Sub-total	26	20	46		32	-	32		28	3	31	

Total Jaws Collected		
	20A	46
	20B	32
	20C	31
		109

Submitted by: Mel Buchholtz, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 20C - Tok - Central - Kantishna

Seasons and Bag Limits

August 20 - October 7 November 1 - November 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

Based on harvest ticket returns, the legally reported sport kill of moose in Unit 20C for the 1970 season was 605 animals, consisting of 478 bulls, 112 cows and 15 unknown sex. This compares to a harvest of 692 in 1969, and reflects a slight increase over the five-year (1966-1970) average harvest of 592. The percent of bulls in the 1970 harvest (79%) corresponds exactly to the five-year average harvest of bulls.

Appendix I lists those areas contributing substantial numbers of moose in the 1970 harvest from northern, central, western and southwestern portions of the unit, and reflects the hunting effort in river, off-road and aircraft-access areas. One hundred and nine moose were harvested from the road network, while 231 were taken from remote areas, for a total of 340 animals, or 56 percent of the total reported harvest in the unit.

The 1971 harvest consisted of 496 moose (408 males, 79 females and 9 unknown sex), representing a decrease of 109 animals from the 1970 harvest. The bull composition of the harvest showed a 3 percent increase (82%) compared to 1970 when 79 percent of the kill were males.

Appendix II lists those areas supporting the majority of moose harvested in selected portions of Game Management Unit 20C, and again reflects hunting pressure along river systems and off-road areas. Although the road system contributed a similar percent to the total harvest the past two years (18% in 1970, 16% in 1971), off-road areas furnished 282 moose, or 57 percent of the unit harvest in 1971, compared to 231 moose, or 38 percent of the harvest in 1970. Despite the lower kill for Unit 20C as a whole, the 19 percent increase in harvest from the areas listed probably represents the increasing pressure exerted by a greater number of hunters in the Fairbanks vicinity.

Composition and Productivity

Age composition data for the 1971 harvest are listed in Appendices III and IV. Despite the small sample it appears the population is

weighted heavily with old animals indicating a low rate of exploitation. For the areas outside of the Taylor Highway the yearling cohort comprised 26 percent of the sample despite the low rate of recruitment following loss of most of the 1970 calf crop. This may be an indication of sampling error which fails to reflect the excellent production and survival of the 1969 calf crop which comprised only 10 percent of the sample.

Fall composition counts were conducted during mid-November in the vicinity of Rex Dome and the Totatlanika drainage in the southwestern portion of the unit. These surveys revealed a bull:cow ratio of 30:100 reflecting a slight increase over fall 1970 counts which indicated a ratio of 26:100 for the same area. Calf production was adequate, despite the stress of the previous winter, with a 20 percent calf crop and 32 calves per 100 females, compared to 16 percent and 23:100, respectively, for 1970. The expected poor survival of the 1970 calf crop is indicated by a ratio of 5 small males per 100 females (compared to 9:100 in 1970), and a 3 percent yearling bull segment in the herd (compared to 6 percent in 1970). Herd numbers appear to have adjusted to range carrying capacity in the southwestern portion of the unit, as in adjacent Unit 20A, resulting in stabilization of the herd.

Only limited composition data are available from central and northern portions of the unit; however, surveys conducted in the Goodpaster River drainage probably reflect herd status for central 20C. December, 1970 counts (which may be biased due to lateness of the survey) indicated a bull:cow ratio of 26:100, 12 calves per 100 females and a 9 percent calf crop. Poor yearling survival is evidenced by 11 small males per 100 females, and an 8 percent yearling bull segment in the herd.

Composition data from the Taylor Highway since 1968 are summarized in Appendix V. While the average age of moose harvested in the Taylor Highway area has decreased slightly, the overall change in age structure is not significant and is masked by dominate year classes within the population. Essentially the average moose harvested on the Taylor Highway is a prime, mature animal and until 1970 age classes 1 and 2 were not well represented. It is quite possible that the strong showing of age classes 1 and 2 in the harvest is the result of good survival and these age classes represent dominate year classes which may continue to be well represented in the harvest during the next several years.

Management Summary and Recommendations

The short antlerless season has maintained adequate bull:cow ratios in the southwestern portions of this unit, where increased hunting pressure will likely occur, while allowing for utilization of the harvestable surplus of the female segment of the herd. Limited age composition data, combined with survey data, indicate a population composed of old-age animals with fair to good production, low survival and sex ratios adequate to assure maximum conception. Despite the increasing harvest throughout much of the unit, the cow segment has not been affected by hunting; consequently, antlerless hunts should be continued to further the sustained yield principle. If the herd has stabilized, more liberal

antlerless seasons to stimulate production and survival would only aggravate the present situation.

Composition data from northern and central portions of the unit are badly needed. If low production and survival found in the Goodpaster drainage is indicative of this portion of the unit, a decrease in herd size may be occurring. If this is so, an increase in the harvest of females is needed to improve production, while maintaining the current bull harvest.

The majority of the Taylor Highway harvest occurs during the last half of September, coinciding with increased moose movements resulting from rutting activity. Thus the Taylor Highway harvest is dependent primarily upon moose from outlying areas (rather than roadside animals) becoming available through normal movements during the early rut.

Although the Taylor Highway moose harvest is not dependent on local or roadside populations, in certain areas (Mount Fairplay, Taylor Mountain, nine-mile trail for example) local animals appear to be an important part of the harvest. Some of these trails are showing symptoms of heavy use (decreased bull:cow ratios). No bulls were sighted on Mount Fairplay during the November, 1971 composition surveys. Future composition surveys will show whether moose from lightly hunted adjacent areas will fill these available niches.

The Department should initiate development projects aimed at permitting off-the-road access to under utilized moose herds. An example might be construction of boat landings or airstrips. Another aspect would be publication of a booklet describing existing trails permitting ATV or four-wheel drive access. A surprising number of such trails already exist in Unit 20C along the Taylor Highway.

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

Submitted by: Mel Buchholtz, Game Biologist II and
Larry Jennings, Game Biologist III

MOOSE - GMU 20C - Tok - Central - Kantishna

APPENDIX I

Areas Contributing to the Majority of 1970-71 Moose Harvest (excluding Taylor Highway, Eastern 20C).

Area	M	F	?	TOTAL	
Road system areas					
Elliott Highway	28	4	1	33	
Steese Highway	12	3		15	
Nenana Highway	6	2		8	
Ferry, Healy	37	14	2	53	
				109 of 605, or 18% of the harvest in 20C.	
River, off-road, aircraft areas					
Central 20C					
Shaw Creek	7	1		8	
Salcha River	22	9		31	
Goodpaster River	11	3	1	15	
Northern 20C					
Yukon River	6	4		10	
Birch Creek	8	1		9	
Nome Creek	6			6	
Beaver Creek	13		1	14	
Western 20C					
Minto Flats	14		1	15	
Kantishna River	7			7	
Minchumina	5			5	
Southwestern 20C					
Nenana River	8	3		11	
Ferry, Healy, Yanert	77	18	5	100	
				231 out of 605, or 38% of the harvest in 20C.	

Submitted by: Mel Buchholtz, Game Biologist II and
Larry Jennings, Game Biologist III

MOOSE - GMU 20C - Tok - Central - Kantishna

APPENDIX II

Areas Contributing to the Majority of 1971-72 Moose Harvest (Excluding Taylor Highway, Eastern 20C)

Area	M	F	?	TOTAL
Road system areas				
Elliott Highway	14	4		18
Steese Highway	11	3		14
Nenana Highway	8	4		12
Ferry, Healy	31	3		34
				78 out of 496, or 16% of the harvest in 20C.
River, off-road, aircraft areas				
Central 20C				
Shaw Creek	15	3		18
Salcha River	25	17	1	43
Goodpaster River	14	2		16
Northern 20C				
Yukon River	4			4
Birch Creek	11			11
Nome Creek	3			3
Beaver Creek	6			6
Western 20C				
Minto Flats	40	3	1	44
Kantishna River	11	1		12
Minchumina	9			9
Southwestern 20C				
Nenana River	4			4
Ferry, Healy, Yanert	98	13	1	112
				282 out of 496, or 57% of the harvest in 20C.

Submitted by: Mel Buchholtz, Game Biologist II and
Larry Jennings, Game Biologist III

MOOSE - GMU 20

APPENDIX III

Age Composition of 1971-72 Moose Harvest (Legal Sport Kill Only)

Age Class	GMU 20A				GMU 20B				GMU 20C*			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	1	-	1	2.2	-	-	-	-	-	-	-	-
1	4	3	7	15.2	11	-	11	34.4	8	-	8	25.8
2	4	7	11	23.9	12	-	12	37.5	2	1	3	9.7
3	-	-	-	-	1	-	1	3.1	3	-	3	9.7
4	4	1	5	10.9	2	-	2	6.2	2	-	2	6.4
5	2	2	4	8.7	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	4	-	4	12.9
7	2	-	2	4.3	1	-	1	3.1	-	-	-	-
8	2	1	3	6.5	2	-	2	6.2	4	-	4	12.9
9	1	-	1	2.2	1	-	1	3.1	2	1	3	9.7
10+	6	6	12	26.1	2	-	2	6.2	3	1	4	12.9
Sub-total	26	20	46		32	-	32		28	3	31	

Total Jaws Collected		
	20A	46
	20B	32
	20C	31
		109

*Does not include age data from the Taylor Highway (Appendix IV).

Submitted by: Mel Buchholtz, Game Biologist II and
Larry Jennings, Game Biologist III

MOOSE - GMU 20C - Tok - Central - Kantishna

APPENDIX IV

Taylor Highway Moose Ages

Age	1965			1966			1967			1968			1969			1970			1971		
	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%	M	F	%
C	0	0	-	0	0	-	1	0	2.3	0	1	2.6	1	2	5.1	1	4.0		-	4	10.8
1	1	1	5.0	0	0	-	3	0	6.8	0	0	-	2	0	3.4	5	20.0		-	1	2.7
2	6	0	15.0	1	0	4.0	1	0	2.3	3	1	10.5	2	1	5.1	3	12.0		2	0	5.4
3	13	0	32.5	4	0	16.0	4	0	9.1	2	0	5.3	7	0	11.9	1	4.0		6	0	16.2
4	6	0	15.0	5	0	20.0	4	0	9.1	5	1	15.8	2	0	3.4	1	4.0		2	0	5.4
5	7	0	17.5	7	0	28.0	6	0	13.6	3	3	15.8	6	0	10.2	4	16.0		4	0	10.8
6	2	0	5.0	2	0	8.0	9	1	22.7	4	0	10.5	5	2	11.9	1	4.0		1	0	2.7
7	1	0	2.5	3	0	12.0	6	0	13.6	5	1	15.8	5	1	10.2	1	4.0		2	0	5.4
8	1	0	2.5	1	0	4.0	4	1	11.4	1	0	2.6	6	1	11.9	1	4.0		2	0	5.4
9	1	0	2.5	0	0	-	0	0	-	1	0	2.6	4	0	6.8	2	8.0		1	1	5.4
10	0	0	-	0	0	-	1	0	2.3	1	1	5.3	5	0	8.5	1	4.0		2	2	10.8
11	0	0	-	0	1	4.0	1	0	2.3	1	1	5.3	2	1	5.1	2	8.0		1	0	2.7
12	1	0	2.5	1	0	4.0	1	0	2.3	0	0	-	2	0	3.4	1	4.0		1	2	8.1
13	0	0	-	0	0	-	0	1	2.3	1	0	2.6	2	0	3.4	1	4.0		1	0	2.7
14	0	0	-	0	0	-	0	0	-	0	1	2.6	0	0	-	0	-		1	1	5.4
15	0	0	-	0	0	-	0	0	-	1	0	2.6	0	0	-	0	-		0	0	-
TOTAL	40			25			44			38			59			25			37		

Submitted by: Mel Buchholtz, Game Biologist II and Larry Jennings, Game Biologist III

MOOSE - GMU 20C - Tok - Central - Kantishna

APPENDIX V. Herd Composition along Taylor Highway, 1968-1971

Year	Bulls/ 100 Cows	Calves/ 100 Cows	Calf %	Moose/ Hour	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
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
7 Mile Hill					
1968	39	14	9	39	57
1969	37	20	12	50	25
1970	8	25	23	19	17
1971	25	25	17	38	30
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
Dry Tok					
1968	34	12	8	114	151
1969	16	20	12	70	105
1970	3	26	18	85	78
1971	3	20	15	137	103
Tok River					
1968	29	29	17	54	110
1969	42	20	12	70	105
1970	10	45	29	90	45
1971	10	9	6	110	55

Submitted by: Mel Buchholtz, Game Biologist II and
Larry Jennings, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 20D - Delta Junction

Seasons and Bag Limits

November 1 - November 30 One Bull

The moose season was closed before opening day by Commissioner's announcement. There was no open hunting in 1971.

Harvest and Hunting Pressure

Game Management Unit 20D was not designated separately from Game Management Unit 20C until July, 1971. There has been a 70- to 72-day bull season and a 1- to 8-day antlerless season in this area from 1962 through 1970. The antlerless moose season was seven days long from 1967 through 1970. In 1971 the moose season was closed entirely by Board action and Commissioner's announcement. The annual moose harvests since 1964 and the percentages of the harvests which were bulls for the area now designated Game Management Unit 20D are given below.

	1964	1966	1967	1968	1969	1970
Moose harvested:	171	131	115	104	108	83
Percent Bulls in Harvest:	64	54	67	70	61	67

These data illustrate a declining annual moose harvest, although the percentage of bulls in each harvest has remained fairly constant. Harvest data for 1965 and for four subunits of Game Management Unit 20D were not available for comparison, but the missing data are not likely to substantially alter these results.

Examination of the harvest data on a subunit basis reveals three areas within Game Management Unit 20D which can be usefully compared.

GMU 20D Areas	1964	1966	1967	1968	1969	1970
20D West, Delta Junction - Clearwater Area:	32 (54)*	25 (33)	31 (36)	32 (33)	18 (20)	19 (16)
Ft. Greely - Donnelly Area:	66 (113)	72 (94)	64 (73)	61 (64)	76 (82)	65 (54)

*The figures in parentheses show the number of moose harvested.

	1964	1966	1967	1968	1969	1970
20D East	2 (4)	3 (4)	5 (6)	7 (7)	6 (6)	16 (13)

The Delta Junction - Clearwater area, the Fort Greely - Donnelly area, and 20D East are illustrated in Fig. 1. Generally, 20D West has more human activity, more access roads and trails, and better visibility because of farm clearings and extensive subalpine areas in comparison to 20D East. In terms of area, 20D West constitutes approximately 45 percent of the total subalpine and timbered area in Game Management Unit 20D. The preceding table shows that the combined areas within 20D West have contributed from 98 percent (in 1964) to 84 percent (in 1970) of the total moose harvested from Game Management Unit 20D. The decline in numbers of moose harvested from Game Management Unit 20D is due solely to a decline within 20D West, especially to a decline in the Delta Junction - Clearwater area.

Hunter success for the 1968 moose harvest was programmed so that Game Management Unit 20D subunit data could be extracted from the Game Management Unit 20C computer print-out. The percentage of hunters within each Game Management Unit 20D area and their success during 1968 are illustrated below.

GMU 20D Areas	Percent of GMU 20D Hunters Within Area	Percent of Successful Hunters Within Area
20D West, Delta Junction - Clearwater Area	45	28
Ft. Greely - Donnelly Area	46	46
20D East	9	44

The relatively extensive network of access roads and trails in 20D West probably accounts for the fact that 91 percent of the moose hunters in Game Management Unit 20D in 1968 hunted in either the Delta Junction - Clearwater area or the Fort Greely - Donnelly area. However, data from the 1970 harvest ticket returns indicated that only 29 percent of the hunters within Game Management Unit 20 depended solely on highway vehicles as a transportation means. Hunter success was much higher in 20D East and the Fort Greely - Donnelly area than in the Delta Junction - Clearwater area.

Although there was no legal moose season in Game Management Unit 20D in 1971, harvest ticket returns indicated that approximately 45 hunters killed 12 bulls, 8 cows and 1 moose of unspecified sex in Game Management Unit 20D. Based on these data, 47 percent of the hunters were successful.

Composition and Productivity

Classification surveys of moose have been made in Game Management Unit 20D in 1960, 1970 and 1971. Proportions of bulls and calves to cows found during each survey are given below.

	1960	1970	1971
Large bulls per 100 cows,			
20D West	8	2	9
20D East	44	9	14
Calves per 100 cows,			
20D West	56	42	12
20D East	51	20	13

Selective hunting pressure and a relatively long bull season have resulted in a low ratio of bulls to cows. Closure of the moose season in 1971 or the correction of some bias in the surveys evidently improved the bull:cow ratio in both 20D East and 20D West. The low calf survival evident in 1971 may have resulted from effects of the preceding severe winter (deep, long-lasting snow cover) on moose cows. Surveys in 1960 and 1970 followed years with mild winters. The preceding table illustrates that calf:cow ratios were higher in 1960 than in 1970. During 1970, calf:cow ratios were higher in 20D West. Although the sample size was small (10 cows and 8 calves) and may not be representative, a ratio of 80 calves per 100 cows was found for the Delta Junction - Clearwater area during the 1970 survey.

The November, 1971 survey was made by one biologist. The survey effort was mainly confined to old burns and subalpine drainages where moose density was highest; extensive areas of coniferous trees had a low moose density and were not surveyed. An index of moose density within the areas surveyed is provided by comparing the number of moose seen per hour.

GMU 20D Areas	Moose Per Hour	Percent of Moose Habitat in GMU 20D
20D West,		
Delta Junction - Clearwater Area	11	8
Ft. Greely - Donnelly Area	33	37
20D East	36	55

Density indices combined with area estimates may provide an assessment of relative moose abundance. During the time of the survey, moose apparently were not abundant in the Delta Junction - Clearwater area as compared to the remainder of GMU 20D. Considering that the northern

portion of 20D East is composed of coniferous forest, the Fort Greely - Donnelly area and 20D East may have had roughly similar numbers of moose.

Management Summary and Recommendations

Game Management Unit 20D can be usefully divided into three major areas for management purposes; i.e., the Delta Junction - Clearwater area, the Fort Greely - Donnelly area, and 20D East.

Area 20D East contains approximately 55 percent of the moose habitat but has a poorer road and trail system for hunter access. Consequently, this area has sustained only 9 percent of the hunting pressure (in 1968) and 2 to 16 percent of each annual moose harvest. Hunter success was high, and moose were relatively abundant in 20D East. The low calf:cow ratio indicates that these moose were at or above the carrying capacity of their range. Since 71 percent of the Game Management Unit 20 moose hunters during 1970 used transportation means that were not dependent on highway systems, an increase in hunting pressure in 20D East appears to be a practical possibility.

The Fort Greely - Donnelly area contains approximately 37 percent of the moose habitat and has a good road and trail system for hunter access. Although this area has been heavily hunted and the moose harvest has declined since 1964, moose were still relatively abundant and hunter success was high. A large portion of this area is composed of old burns and clearings that are of decreasing usefulness for browse. Harvesting has apparently kept these moose in balance with their decreasing forage, thereby maintaining a relatively high calf:cow ratio.

The Delta Junction - Clearwater area composes 8 percent of Game Management Unit 20D. This area is chiefly composed of: 1) an old burn that retains little forage value, 2) large and confluent farm clearings, and 3) large areas of black spruce muskeg. Visibility of moose from the ground is good, the road system is extensive, and many homes are scattered throughout the area. It is the rapidly diminishing moose habitat and high vulnerability of moose to hunting that has been responsible for the declining annual moose harvest in this area. Hunter success and moose abundance were relatively low. The ratio of 80 calves per 100 cows found for this area may indicate excessive harvesting.

It was noted earlier that the percentages of bulls in the annual harvests were high (approximately 65 percent) and constant, whereas the proportions of bulls in the herd in 20D West were low in 1960 and 1970. This indicates that a high proportion of cows are dying of natural mortality and suggests that an increase in the antlerless moose harvest is warranted. The sex ratio of the moose population should be maintained at its present value by harvesting equal numbers of both bulls and cows. Closure of the hunting season may protect those moose that reside in visible areas of marginal habitat such as the Delta Junction - Clearwater farming area, but overall moose numbers are not expected to substantially increase because the habitat is very limited.

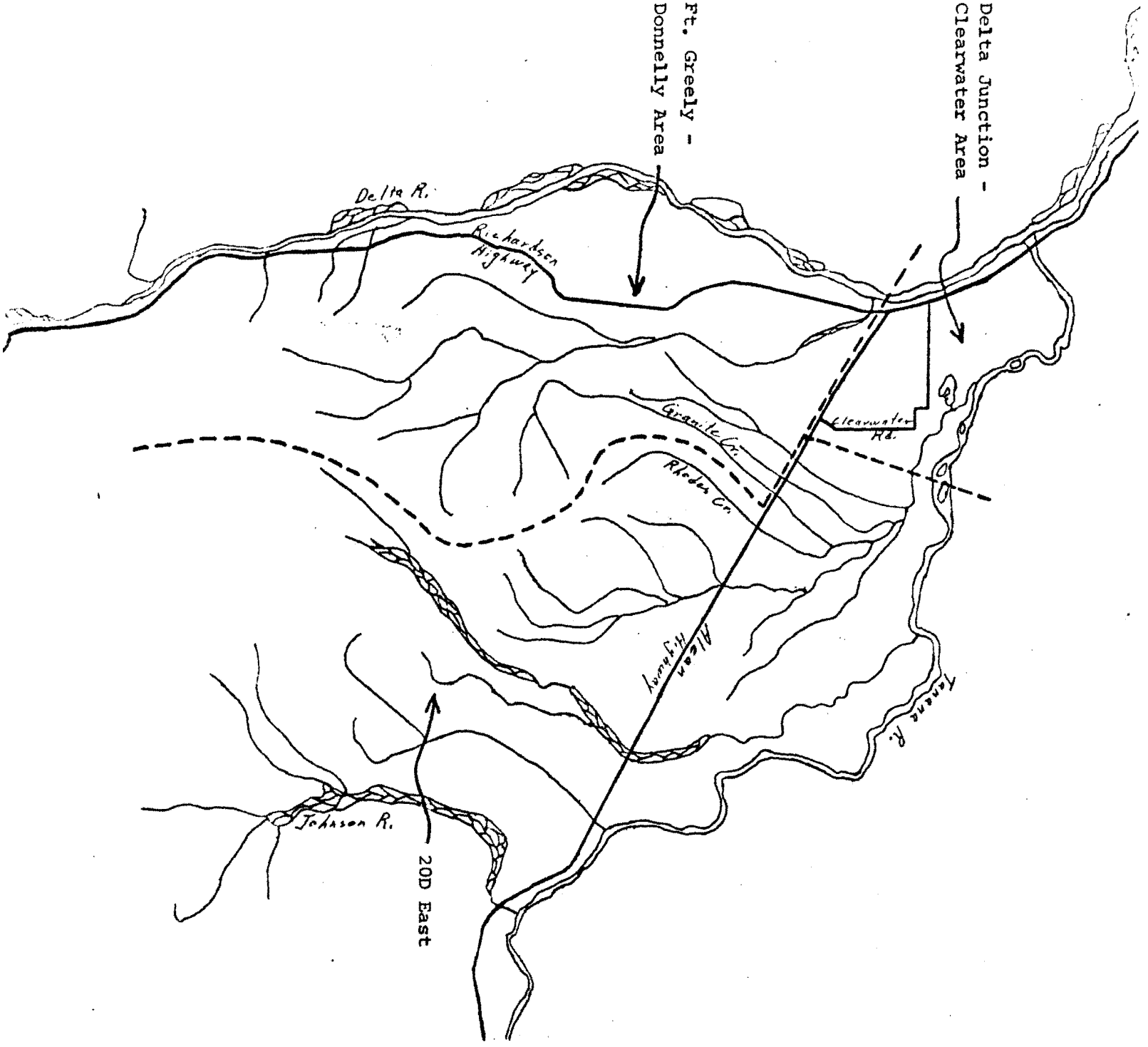
Management Summary and Recommendations

Poorly distributed hunting pressure and moose harvest has justifiably resulted in public concern that the overall hunting pressure in Game Management Unit 20D is excessive. Uneven hunter distribution has also resulted in a lightly-hunted moose herd in 20D East. A permit system would provide for directing hunting pressure to lightly-hunted areas, protecting moose in highly visible but marginal habitat to allay public concern, managing the harvest of each sex for maximum sustained yield, and increasing public confidence by providing an objective harvest plan.

It is recommended that 100 moose be harvested by permit only. It is also recommended that the hunting season occur in November. In November conditions for off-road vehicular travel would be better, and hunters could be distributed into areas of known moose abundance.

Submitted by: Carl McIlroy, Game Biologist II

Fig. 1. Game Management Unit 20D Subdivisions.



MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 21 - Middle Yukon

Seasons and Bag Limits

Unit 12	Aug. 20 - Feb. 28	Two moose; only one of which may be antlerless

Harvest and Hunting Pressure

Reported moose harvests have ranged from 128 to 247 since 1963, when harvest tickets were first required. Reported harvest in 1971-72 was 184 moose, in 1970-71, 137 moose. Cows represented about 25 percent of the harvest in these recent years.

Unit 21 is extremely large, with relatively few villages well dispersed along major rivers. Moose populations are known to fluctuate dramatically apparently in response to variations in winter severity - primarily snow depth. Except for very localized areas around villages and in a few other areas, hunting pressure is negligible throughout the unit. Hunting activity has increased in the Holy Cross and Nowitna River areas, largely as a result of increased sport hunting by hunters from other areas.

Composition and Productivity

Winter surveys on the Yukon and Koyukuk rivers will be summarized in the next progress report.

Management Summary and Recommendations

No changes are recommended.

Submitted by: Richard Bishop, Game Biologist IV

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 22 - Seward Peninsula

Seasons and Bag Limits

That portion consisting of the drainages of the Kuzitrin, Pilgrim rivers and all the area between the Sinuk and Nome rivers	Aug. 20 - Sept. 14	One Bull
Remainder of Unit 22	Aug. 1 - Nov. 30	One Bull

Harvest and Hunting Pressure

The harvest ticket program is still not functioning effectively in Units 22 and 23. The total unit harvest is estimated to be between 160-180 from information obtained during periodic visits to the villages. The harvest in the Kuzitrin, Pilgrim area was low (20) this year, however, the hunting pressure along the road system remained high. Fly-in hunts on the Koyuk River gained popularity this year and over 12 bull moose were taken.

Composition and Productivity

Snowfall was relatively heavy in 1970-71 and moose in Unit 22 appeared to have concentrated on the major river system. Aerial counts in March and April should indicate minimum population sizes. Sex and age composition counts were conducted in the fall. The counts in the Kuzitrin and Pilgrim area showed a minimum population of 142 moose with a bull:cow ratio of 38:100 with 87 calves per 100 cows. Yearling bulls comprised 85 percent of the harvest.

Counts on the Koyuk River indicated a minimum population of 109 moose with a bull:cow ratio of 44:100 with 64 calves per 100 cows. The average age of the bulls harvested was 4 years and they ranged from 2 to 9 years old.

Management Summary and Recommendation

Those herds examined appear to be in good condition and on the Kuzitrin and Pilgrim River drainage the heavy hunting pressure on yearling bulls has not adversely affected calf production. It is recommended that the bag limit and seasons remain unchanged.

Submitted by: Robert E. Pegau, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 23 - Kotzebue Sound

Seasons and Bag Limits

August 1 - November 30	One moose (antlerless moose may not be taken prior to September 1)

Harvest and Hunting Pressure

Visits to the villages in Unit 23 indicate that the harvest this year was comparable with previous years. Low water in the rivers limited access in the early part of the season.

Composition and Productivity

Only limited composition counts have been made in Unit 23. On the Buckland and Kiwalik rivers, surveys showed a bull to cow ratio of 57:100 with 40 calves per 100 cows.

Management Summary and Recommendations

Moose appear to be abundant and expanding into new areas in Unit 23. The earlier open season on bulls was not very effective this year because of very low water in the rivers which limited access. It is recommended that the season and bag limit remain unchanged.

Submitted by: Robert E. Pegau, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 24 - Koyukuk

Seasons and Bag Limits

Unit 24	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, 1970 and 1971. The actual harvest in Unit 24 is probably several times greater than the harvest indicated by the return of harvest tickets. It is even questionable if the reported harvest can be used to indicate harvest trends.

	Males	Females	Unknown	Total
1969	59	12		71
1970	46	7	4	57
1971	62	15	2	79

Composition and Productivity

No composition or productivity data are available for the moose population in Game Management Unit 24.

Management Summary and Recommendations

The limited information available from Unit 24 does not indicate any alarming trends in either the moose population or hunting pressure. It is highly likely that any new trends in the moose harvest in Unit 24 would result primarily from pressure generated from outside of the immediate Unit 24 area. Therefore, it would be more readily detectable by the harvest ticket returns for that area. No changes in season or bag limit are recommended.

Submitted by: Oliver E. Burris., Game Biologist IV

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 25 - Fort Yukon

Seasons and Bag Limits

Unit 25	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, 1970 and 1971. The actual harvest in Unit 25 is probably several times larger than the harvest indicated by the return of harvest tickets. It is even questionable if the reported harvest can be used to indicate harvest trends.

	Males	Females	Unknown	Total
1969	77	31	0	108
1970	42	15	1	58
1971	53	21	0	74

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 either the moose population or hunting pressure. It is highly likely that any new trends in the moose harvest in Unit 25 would result primarily from pressure generated from outside of the immediate Unit 25 area. Therefore, it would be more readily detectable by the harvest ticket returns for that area. No changes in season or bag limit are recommended.

Submitted by: Oliver E. Burris, Game Biologist IV

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Units 1A and 1B - Southeast Mainland, south from Cape Fanshaw

Seasons and Bag Limits

Aug. 1 - Nov. 30	Three deer; provided that antlerless deer may be taken only from Oct. 1 - Oct. 31.

Harvest and Hunting Pressure

Hunter and harvest information were obtained from a random personal hunter survey of 9.4 percent of the license holders in Ketchikan, Wrangell and Petersburg. Ketchikan hunters contributed 95 percent of the hunting effort expended in Units 1A and 1B and they accounted for 90 percent of the deer taken in these units.

Of the 200 Ketchikan license holders contacted, 74 percent had hunted deer and 39 percent of those who hunted were successful. The harvest by Ketchikan hunters was calculated to be 1150 deer, 75 percent of which were taken in Units 1A and 1B. The number of deer taken per hunter was 0.7.

Distribution of the harvest by month shows 13 percent occurred in August, 7 percent in September, 44 percent in October, 23 percent in November, 8 percent in December and 5 percent occurred in unknown months.

Sex ratio of the harvest was 72 percent bucks and 28 percent does.

Composition and Productivity

Ten mortality transects were walked in April and May of 1971 in Units 1A and 1B and seven dead deer were found. Bone marrow from six indicated four in good condition and two in poor condition.

Management Summary and Recommendations

The winter of 1970-71 was severe, resulting in a substantial loss to an already reduced deer population. The 10 mortality transects indicated a loss of 0.7 deer per mile of beach.

Hunter success was down from 1970. Part of the reduction is probably due to a reduced population caused by the 1970-71 winter, but much of the loss in success can be attributed to the change in the seasons and bag limit. These changes restricted the doe harvest and also eliminated December hunting which generally produces high success due to snow cover which forces deer to the beaches.

Submitted by: Robert E. Wood, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 2 - Prince of Wales Island

Seasons and Bag Limits

Aug. 1 - Dec. 31	Four deer; provided that antlerless deer may be taken only from Oct. 1 - Dec. 31.

Harvest and Hunting Pressure

Very little data are obtained from Unit 2 because of the small number of widely separated people living there. Hunters from Ketchikan probably supply most of the hunting pressure in Unit 2. Twenty-one percent of the deer taken by Ketchikan hunters came from Unit 2. The calculated harvest by Ketchikan hunters in Unit 2 was 228 deer, 24 percent of which were does. The actual kill in Unit 2 was much higher than this because none of the scattered villages and logging camps were surveyed. The difference in seasons and bag limits between Units 1A, 1B and 2 probably caused an increase in hunting pressure in Unit 2 over the past year. Thirty-eight percent of the deer taken in Unit 2 were shot in December when Units 1A and 1B (Ketchikan area) were closed.

Composition and Productivity

Five dead deer were located on 15 mortality transects walked in Unit 2 in April and May, 1971.

Only a visual examination of browse use was made but utilization was much less in Unit 2 than in Units 1A and 1B. Generally, less deer sign was also noted in Unit 2 than in the other units.

Management Summary and Recommendations

Unit 2 probably receives light hunting pressure compared to Unit 1A but an attempt to survey the villages and logging camps should be made periodically to give some idea of the actual deer harvest occurring.

Deer populations are probably below carrying capacity as browse conditions are improving and the past severe winters have held deer numbers down. Predation by wolves is almost certainly a factor in slowing down the recovery of deer numbers.

It is recommended that Units 1A, 1B and 2 have the same seasons and bag limits to aid enforcement of these regulations.

Submitted by: Robert E. Wood, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 3 - Petersburg, Wrangell area

Seasons and Bag Limits

Mitkof, Wrangell, Etolin and Woronkofski islands	Aug. 1 - Nov. 30	Two antlered deer
Remainder of Unit 3	Aug. 1 - Nov. 30	Three deer; provided that antlerless deer may be taken only from Oct. 1 - Oct. 31.

Harvest and Hunting Pressure

Deer populations in Unit 3 are at a very low level and consequently hunting pressure has been light. Most of the harvest by Wrangell and Petersburg hunters was taken outside of Unit 3.

Sixty Wrangell license holders and 80 Petersburg license holders were contacted concerning hunting activities. In Wrangell, only 55 percent of those contacted had hunted deer and of these only 33 percent were successful. The successful hunters averaged 1.1 deer per person while the average deer per hunter who hunted was 0.4. In Petersburg, 75 percent of those contacted had hunted deer and 38 percent of these killed one or more deer. The average number of deer taken for all hunters was 0.85, while the average for the successful hunter was 2.2. The notably higher success for Petersburg hunters can be attributed to the number of hunters who traveled to Unit 4 to hunt. Unit 4 currently has a comparatively high deer population and a much more liberal season than does Unit 3. Fifty-one percent of the harvest by Petersburg hunters came from Unit 4 while only 29 percent came from Unit 3.

Expanded figures show 326 deer hunters in Wrangell killed 118 deer, while 596 Petersburg deer hunters took 506 deer. Of the 624 deer, only 255 came from Unit 3.

Composition and Productivity

Nine dead deer were found on 14 mortality transects in Unit 3. Condition of the animals as shown by bone marrow was obtained on three of the carcasses; two were in apparent good condition and one in poor condition.

Management Summary and Recommendations

The deer population in Unit 3 remains at a low level due to continuing severe winters. Three of the last four winters have been severe

enough to reduce and hold the deer to one of the lowest levels on record. Wolves are found throughout Unit 3 and will probably slow recovery of the herd, should a series of mild winters occur.

Hunting has never been a controlling factor of deer numbers in Unit 3, although many residents blame both hunting and wolves for the low population.

While it is recognized that more liberal seasons and bag limits would not be detrimental to the deer population, it is recommended that the present season be retained to help maintain communication with the local hunters.

Submitted by: Robert E. Wood, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 4 - Admiralty, Baranof, Chichagof and adjacent islands

Seasons and Bag Limits

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

Harvest and Hunting Pressure

The total calculated deer kill in Unit 4 during the 1971 season was 3040 animals. The reported kill by hunter residence was Juneau - 1350, Ketchikan - 60, Petersburg - 200, Wrangell - 20 and Sitka - 1410. The deer kill in Unit 4 was about half of the total taken in Units 1-4.

The Unit 4 kill by residents of Hoonah, Pelican, Angoon, Tenakee, Elfin Cove and Port Alexander is unknown; however, the estimated take was about 500 deer.

Sitka hunters expended 4,656 days to take 1,410 deer in Unit 4, or an average of 3.3 days per deer. Hunters from other parts of Southeastern who hunted in Unit 4 did not necessarily hunt there exclusively, so their hunting effort in this unit is not known. However, if their hunting effort was proportional, then hunters expended approximately 10,030 days hunting in Unit 4.

Of those hunters queried at Sitka during the annual hunter survey, 61 percent were successful in taking at least one deer. This is considerably lower than the 78 percent success ratio of 1970; I believe that the primary reason for the drop was that windy weather prevailed during most of the season, with winter losses during 1970-71 playing only a minor part. Examination of past winter records and success ratios shows a close relationship between hunter success (as measured by a composite figure derived from percent success, days per deer and deer per hunter) and December snowfall. There was less snow in December of 1971 than there was the previous year.

Composition of the Harvest

Approximately 50 percent of the deer taken in Unit 4 during 1971 were bucks. Of the 127 deer jaws collected from deer taken by Sitka hunters, 12 percent were fawns, 9 percent yearlings, 30 percent two-year-olds and 50 percent three-year-olds and older. Comparing jaws from areas readily accessible to hunters with those from less accessible areas

showed that three years or older deer comprised 46 percent of the kill in the former and 66 percent in the latter. In the readily accessible areas does, three years old or older, comprised 55 percent of the does taken, while the proportion of older bucks was only 41 percent of the bucks taken from this area. In contrast, in the less accessible areas three-plus doe and buck proportions were nearly even, at 67 percent and 65 percent, respectively.

Natural Mortality

In the spring of 1971 an average of 1.6 dead deer were found per mile of beach checked in Unit 4. This was the highest mortality of any unit in Southeastern Alaska. The average for all units was 0.8 dead deer per mile. This is probably an indication of a higher deer population in Unit 4, which is borne out by the comparative harvest statistics.

Fifty-nine percent of the winter mortality in Unit 4 consisted of deer less than one year old.

Management Summary and Conclusions

Deer populations in Unit 4 probably declined slightly in 1971 compared to the previous year as a result of winter mortality exceeding 1.6 deer per mile of beach. (1.0 is generally considered the break-even point, though this of course depends greatly on the initial size of the population.) Nevertheless, deer currently appear to be far more numerous in this unit than elsewhere in Alaska, and the range is showing little sign of recovery from the excessively high populations which existed prior to the winter of 1968-69. Preliminary indications are that the 1971-72 winter may trim populations further; thus, there is some prospect for improvement of the range situation, mainly in those areas most accessible to hunters.

Inclement weather (mainly wind) during the 1971 deer season kept hunters even closer to home than usual, and 91 percent of the harvest was taken from areas easily accessible by small boat in contrast to 76 percent in 1970. This demonstrates once again the desirability of attempting to find some means of promoting a greater harvest in outlying areas. I believe that a September 1 doe opening would help somewhat, for hunting in these areas declines drastically after Labor Day, when the weather starts to deteriorate and younger hunters are back in school. A poll of 151 Sitka hunters revealed that more hunters (34%) are in favor of such an earlier doe season than are opposed to it (24%). An additional 34 percent expresses a willingness to leave the opening date to the discretion of the Department (9% had no opinion).

Submitted by: Alan Courtright, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 6 - Prince William Sound

Seasons and Bag Limits

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

Harvest and Hunting Pressure

The 1971 IBM harvest data revealed a total harvest of 252 deer (58 percent males) by 423 reporting hunters. According to harvest ticket data from 1969-1971 (Appendix I) the 1969 and 1971 harvests were nearly identical. Both hunting seasons were preceded by a severe winter. The winter of 1969-70 was mild and this was reflected by the larger harvest during the 1970 season.

General harvest information obtained by interviewing 100 Cordova hunters indicated an estimated harvest of 450 deer (for Cordova hunters) which is considerably higher than the statewide IBM harvest figure of 252. The reason for this large discrepancy is unknown. Comparison of Cordova hunter harvest information from 1965-1971 (Appendix II) indicates that the 1971 season is the poorest on record.

Deer hunter harvest interviews conducted in Tatitlek revealed very little hunting pressure being exerted by the villagers.

Composition and Productivity

Age data were collected from 40 deer harvested by local hunters. Although the sample is small, it indicates the younger age classes contribute heavily to the annual harvest (Appendix III).

Alpine deer surveys were flown over Hawkins and Hinchinbrook islands. These data compared with prior surveys (Appendix IV) are of questionable value. Survey data for Hinchinbrook indicated a very small deer herd which was the case; but the Hawkins Island data indicated a fairly high deer population when realistically it was fairly low.

Winter browse utilization transects were not read during 1971. Browse utilization was probably fairly light since most of the browse was covered by deep snow for a considerable portion of the winter.

Management Summary and Conclusions

The winter of 1970-71 was severe and undoubtedly a large number of deer died from starvation. The 1971 harvest reflects the effects of a severe winter. Hunting has little or no effect upon the population, thus the present liberal hunting season and bag limits should be retained.

Recommendations

Retain the present hunting season and bag limits.

Submitted by : Julius Reynolds, Game Biologist III

APPENDIX I

1969-1971 Deer Harvest - Harvest Ticket Data

Year	Males	Females	Unk.	Total
1969	150	109	0	259
1970	418	204	9	631
1971	145	104	3	252

Submitted by: Julius Reynolds, Game Biologist III

DEER - GMU 6 - Prince William Sound

APPENDIX II

Cordova Hunter Harvest Data

	1971	1970	1969	1968	1967	1966	1965
No. of hunters interviewed*	100	100	Z	100	100	100	100
No. of license buyers	600	600		600	600	600	600
Estimated deer taken*	450	744	E	1,062	678	858	882
% males harvested	52%	59%		57%	59%	62%	66%
Days hunted*	1,320	1,836	R	2,124	2,196	1,962	1,818
Deer per hunter	0.8	1.2		1.8	1.1	1.4	1.5
Days per deer	2.9	2.5	O	2.0	3.2	2.3	2.1
% license buyers who did not hunt	41%	26%		24%	23%	17%	19%
% unsuccessful hunters	26%	20%		13%	31%	26%	20%
Hunter success	56%	73%		83%	60%	69%	75%
% successful licensees	33%	54%		63%	46%	57%	61%
% licensees taking one deer	13%	17%		12%	13%	16%	21%
% licensees taking two deer	7%	16%		15%	12%	11%	9%
% licensees taking three deer	3%	9%		9%	8%	15%	16%
% licensees taking four deer	10%	12%		27%**	13%	15%	15%
% harvested from mainland	3%	8%	D	6%	10%	9%	4%
% harvested from Hawkins Island	77%	31%		36%	35%	48%	53%
% harvested from Hinchinbrook Island	15%	28%	A	37%	39%	38%	27%
% harvested from Montague Island	0%	26%		19%	13%	1%	12%
% harvested from other islands	5%	7%	T	2%	3%	4%	4%
% harvested in August	5%	4%		5%	9%	6%	12%
% harvested in September	12%	21%	A	7%	12%	11%	8%
% harvested in October	24%	40%		26%	12%	38%	22%
% harvested in November	8%	29%		24%	17%	21%	23%
% harvested in December	51%	6%		38%	50%	24%	35%

* Sample projected by 6.
**Sixteen percent of hunters interviewed admitted taking more than the legal limit of four deer.

Submitted by: Julius Reynolds, Game Biologist III

APPENDIX III

1971 Sex and Age Composition of Hunter Harvested Deer

Age	Males		Females	
	Number	Percent	Number	Percent
Fawn	5	18.5	1	7.7
1	12	44.4	7	53.8
2	3	11.1	3	23.1
3	3	11.1	0	0
4	3	11.1	2	15.4
5+	1	3.7	0	0
TOTAL	27	99.9	13	100.0

Submitted by: Julius Reynolds, Game Biologist III

DEER - GMU 6 - Prince William Sound

APPENDIX IV

Aerial Alpine Deer Surveys

Year	Hawkins	Hinchinbrook
1965	46*	216*
1966	65	170*
1967	18*	92*
1968	100	200
1969	38	126
1970	Zero data	Zero data
1971	88*	25*

*Average of two flights.

Submitted by: Julius Reynolds, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 8 - Kodiak and Adjacent Islands

Seasons and Bag Limits

Unit 8, drainages of Chiniak Bay and from Cape Chiniak to Sequel Point	Aug. 1 - Nov. 1	One deer, provided that antlerless deer may be taken only from Oct. 1 - Nov. 1
Remainder of Unit 8	Aug. 1 - Dec. 31	Four deer; provided that antlerless deer may be taken only from Sept. 15 - Dec. 31

Harvest and Hunting Pressure

Deer harvest data were obtained by personal interviews with 14 percent of the 1554 1971 Kodiak resident license holders. The total projected deer harvest from Unit 8 was 915. Hunters averaged 1.0 deer during 4.5 days of hunting. Of those going afield, 45 percent were successful in killing at least one deer. Males comprised 74 percent of the harvested deer (Appendix I). Fifty-four percent of the harvest came from the Kodiak road system or areas accessible from it. Uganik Island provided only eight percent of the total harvest, compared to 34 percent in 1970.

Composition and Productivity

Beach areas totaling 15.5 miles were searched in attempts to locate winter-killed deer. The 1971 winter loss averaged 1.7 deer per mile of beach. Considering the severity of the winter this loss is less than expected. It may be that deer populations have not fully recovered from the relatively high losses during the 1968-69 winter and are near carrying capacity.

Sex and age data were collected and recorded from an examination of deer remains located on the beach. Of the 25 deer located 48 percent were males, 32 percent females and 20 percent were unidentified as to sex. When classified as to age, adults, yearlings and fawns comprised 32, 24 and 36 percent, respectively, of the total deer. Age could not be determined in eight percent of the deer examined.

Management Summary and Conclusions

The deer population in Unit 8 is relatively low, the result of severe winters two of the past three years. Future increase in deer numbers will likely depend on the number of mild winters occurring in succession.

Despite relatively low deer density, harvest statistics have not varied significantly from those of previous years (Appendix V).

Recommendations

Though deer populations are low, limited harvest makes more restrictive regulations unwarranted.

Submitted by: Jack E. Alexander, Game Biologist III

DEER - GMU 8 - Kodiak and Adjacent Islands

APPENDIX I

Deer Harvest Data, Game Management Unit 8 - 1971

	Number	Percent
Number of license buyers	1554	
Number of hunters interviewed	215	14
Number of license buyers who did not hunt deer	629	40
Number of deer hunters	925	60
Hunter success	412	45
Number of males taken	679	74
Number of females taken	236	26
Total deer taken	915	
Days per deer	4.5	
Total number of days hunting effort	4178	
Deer per hunter	1.0	
Successful hunters taking one deer	144	35
Successful hunters taking two deer	103	25
Successful hunters taking three deer	95	23
Successful hunters taking four deer	70	17

Submitted by: Jack E. Alexander, Game Biologist III

DEER - GMU 8 - Kodiak and Adjacent Islands

APPENDIX II

Distribution of Deer Harvest, Game Management Unit 8 - 1971

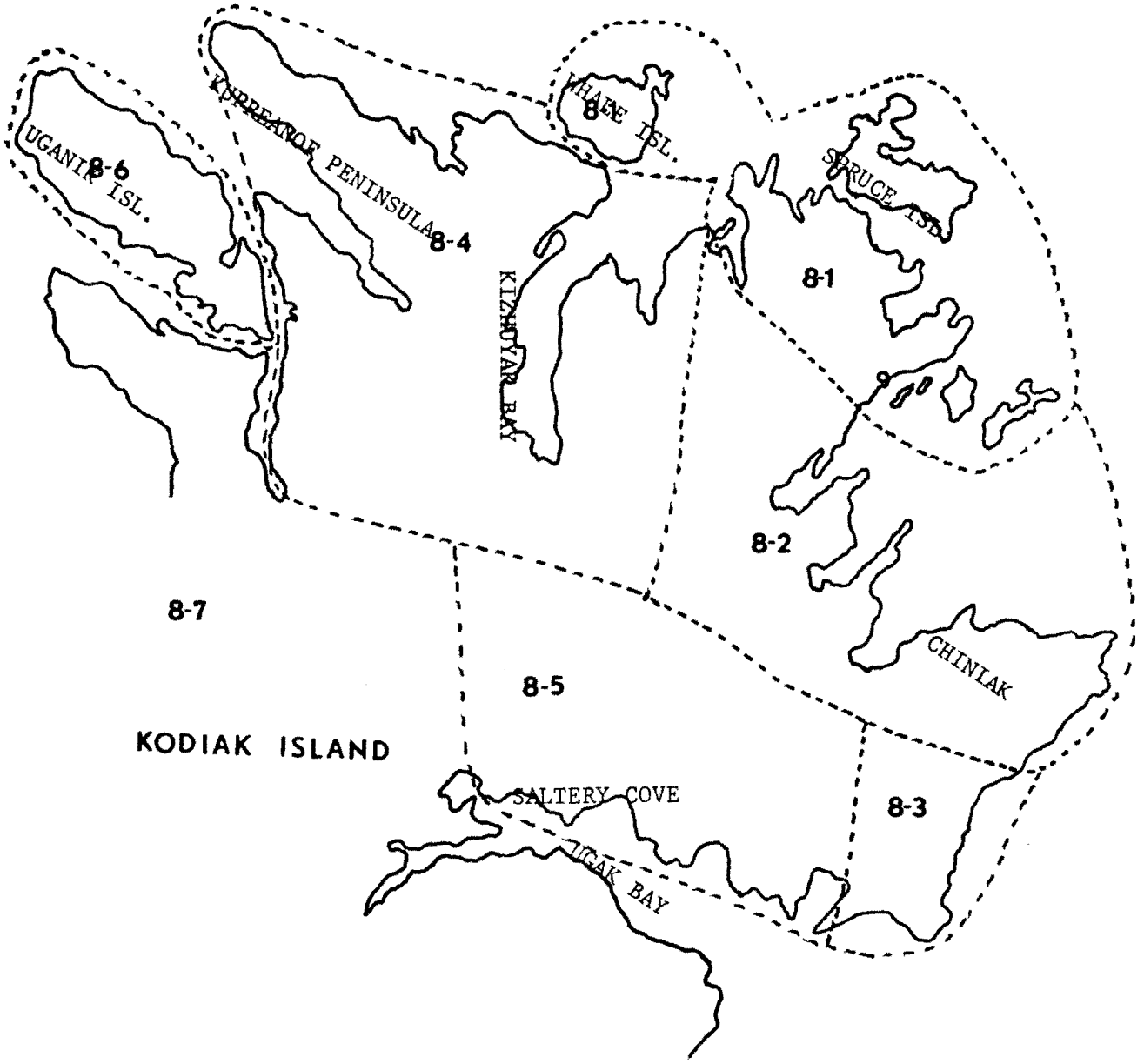
Subunit Number	Area	Number Killed	Percent
1	Spruce Island Anton Larson Bay Monashka Bay Whale Island	108	12.0
2	Sequel Point Kalsin Bay Middle Bay	43	4.5
3	Sacramento Valley Narrow Cape	50	5.5
4	Kizhuyak Bay Viekoda Bay Kupreanof Peninsula	166	18.0
5	Ugak Bay Saltery Cove	282	30.0
6	Uganik Island	72	8.0
7	Remainder of Kodiak Island	94	11.0
8	Afognak Island	50	5.5
8A	Raspberry Island	50	5.5
TOTALS		915	100

Submitted by: Jack E. Alexander, Game Biologist III

DEER - GMU 8 - Kodiak and Adjacent Islands

APPENDIX III

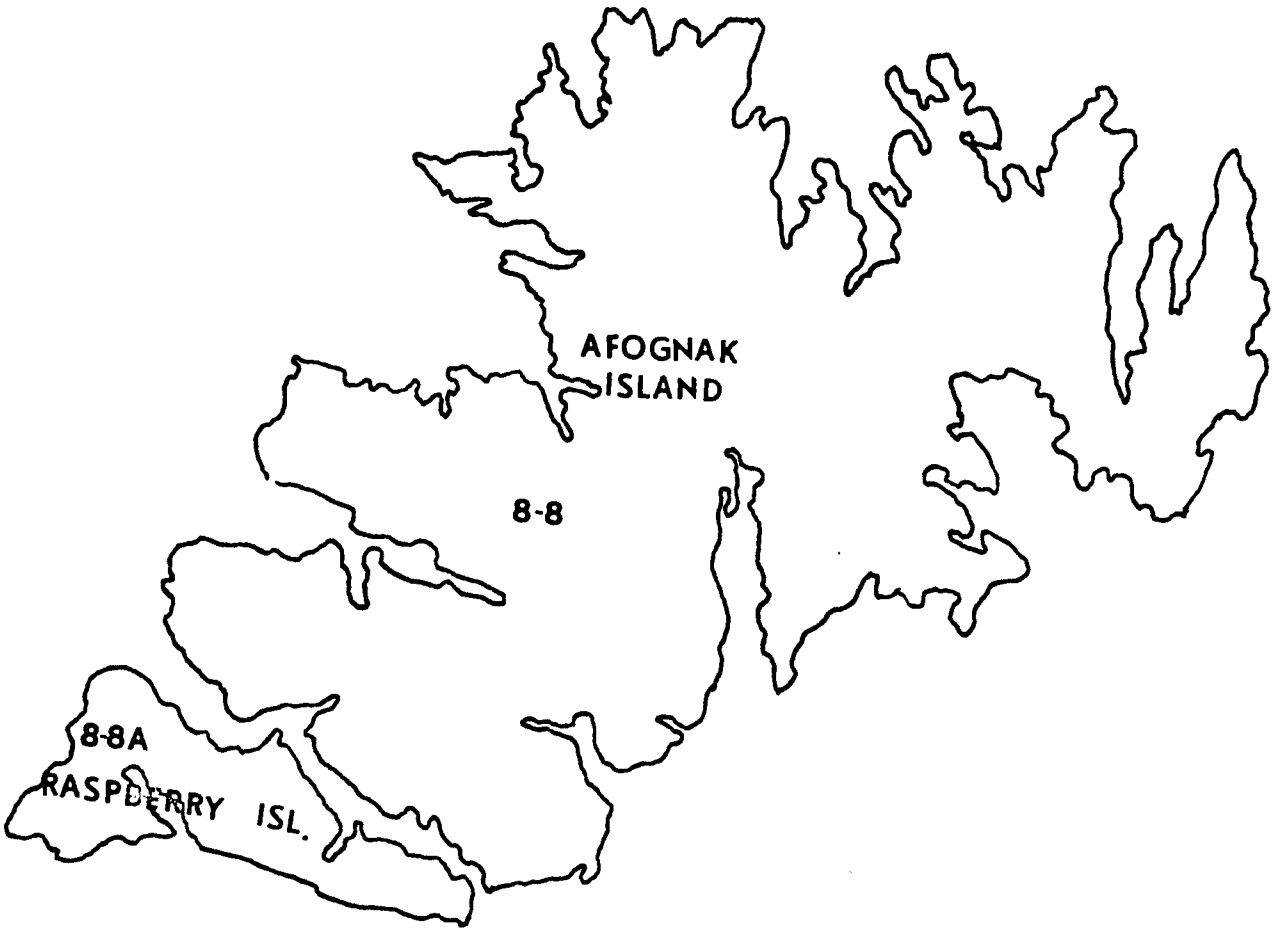
Map of Subunits in Game Management Unit 8



Submitted by: Jack Alexander, Game Biologist III

APPENDIX III (Continued)

Map of Subunits in Game Management Unit 8



Submitted by: Jack Alexander, Game Biologist III

APPENDIX IV

Chronological Distribution of Deer Harvest, Game Management Unit 8 - 1971

Month	Number of Deer	Percent of Harvest
August	66	7
September	50	5
October	152	17
November	402	44
December	245	27
TOTALS	915	100

APPENDIX V

Deer Harvest Data, Game Management Unit 8 - 1966-71

	1966	1967	1968	1969	1970	1971
Number of Hunters	1,180	1,800	2,300	1,441	658	925
Number of Deer Harvested	720	1,500	2,100	1,420	870	915
% of Hunter Success	42	48	74	43	55	45
Number of Deer per Hunter	.6	.8	.9	1.0	1.3	1.0
Number of Days per Deer	9.3	5.7	5.0	6.3	2.4	4.5

Submitted by: Jack E. Alexander, Game Biologist III

ELK

SURVEY-INVENTORY PROGRESS REPORT - 1971

Game Management Unit 8 - Kodiak and Adjacent Islands

Seasons and Bag Limits

Unit 8, Raspberry Island and that portion of Afognak Island west of a straight line between the head of Malina Bay and the head of Muskomee Bay		No open season
Remainder of Unit 8	Aug. 1 - Dec. 31	One elk, by permit only

Harvest and Hunting Pressure

Harvest statistics were obtained through an 84 percent return of 940 elk harvest permits issued to hunters during the 1971 season. Permits returned indicated a harvest of 15 males and 12 females. The reported number of hunters going afield (190) did not change appreciably from last year. The reported kill of 27 elk was the lowest since general open seasons were declared. Hunter success was 15 percent with an average of 3.2 days effort being expended per elk harvested. Seventy-six percent of the reporting permit holders did not hunt.

Composition and Productivity

Elk composition counts indicate an average decrease of nearly 50 percent in all major elk herds since 1970. No differential mortality between sexes could be established. The increase in bull percentages (Appendix I) is the probable result of two factors: 1) increased precision in distinguishing sexes when counting from a helicopter, and 2) the loss of a majority of the 1970 calf crop resulted in adults making up a larger percentage of the elk observed.

The relative breeding female percentages increased from 59 percent in 1970 to 63 percent in 1971. This increase is again attributed to adults comprising a larger percentage of the total number of elk observed. The age classes most noticeably affected by extreme weather were yearlings and calves. Survival of calves to yearlings, as determined by August composition counts, was low with yearlings making up only 3 percent of the 1971 total. Calf:cow ratios (31:100) were considerably lower than the previous year (50:100). The probable cause was the poor condition of females surviving the winter. Of 30 dead elk found in late April, seven adult females were in suitable condition for complete necropsy. Of the seven, six contained nearly full-term fetuses.

Management Summary and Conclusions

Trend counts indicate a 50 percent reduction in elk numbers from 1970. The probable cause of this decrease was nutritional deficiencies occurring during one of the most severe winters on record. No differential mortality between sexes was noted; however, yearlings and new calves were the age groups sustaining the most severe loss. The loss of elk in the Malina Lake area appears severe; few tracks were noted in March, 1972. Elk numbers on Raspberry Island were also reduced. Two-year-olds resulting from the 1969 near peak in elk numbers probably comprised the largest single age class. This cohort will be producing offspring for the first time in the spring of 1972. This expected increase in productivity should do much to recoup losses sustained in 1970. The total harvest of 27 is inconsequential to the total population. The 1971 harvest was well distributed with no extreme kill occurring from any one herd.

Recommendations

Raspberry Island and the Malina Lakes area should remain closed to elk hunting.

Hunting pressure on Afognak Island is not a significant factor in the population fluctuations that have occurred; therefore, further reductions in limits or seasons are unwarranted at this time.

Submitted by: Jack E. Alexander, Game Biologist III

ELK - GMU 8 - Kodiak and Adjacent Islands

APPENDIX I

Elk Composition Counts Afognak Island, 1971

Herd	Mature Males No.	%	Yearlings Male No.	%	Total Females No.	%	Breeding Females* No.	%	Total Yearl./ 100 Breeding Females	Calves No.	%	Calves/ 100 Breeding Females	Total Elk
Raspberry I.	12	41	0	0	14	48	14	48	0	3	10	21	29
Raspberry St.	13	16	1	1	50	62	49	60	4	17	21	35	81
Malina Lake	0	0	0	0	0	0	0	0	-	0	0	-	0
Duck Mt.	6	11	1	2	37	66	36	64	6	12	21	33	56
Paramanof Pen.	10	28	-	-	20	55	20	56	-	6	17	30	36
Paramanof Mt.	3	13	-	-	13	57	13	57	-	7	30	54	23
Kitoi Lake	2	12	-	-	12	71	12	71	-	3	18	25	17
Waterfall Lake	16	15	1	1	73	66	72	65	3	20	18	28	110
Tonki Cape	3	4	3	4	58	73	55	69	11	16	20	29	80
Herd Totals	65	15.0	6	1.3	277	64	271	63	4.5	84	19.4	31	432

*Female yearlings equal to the number of observed bull yearlings are subtracted from the females to obtain the breeding females. (Assumed 1:1 sex ratio in yearlings.)

Submitted by: Jack E. Alexander, Game Biologist III