

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 II. MOOSE, CARIBOU, MARINE MAMMALS AND GOAT

Edited and compiled by
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(Printed April 1974)

MEMORANDUM OF TRANSMITTAL

April 1974

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

Surveys and inventories include all routine data collections directed toward assessment of the status of game populations and the determination of allowable annual game harvests. These reports, which are written primarily by Area Management Biologists, provide information on the current status of Alaska's game populations and include, when applicable, recommended hunting regulation changes. Reported harvest data for most species are obtained from computerized analyses of harvest tickets (Job 22.0), and continuing aerial surveys provide the basis for assessment of population trends for most populations.

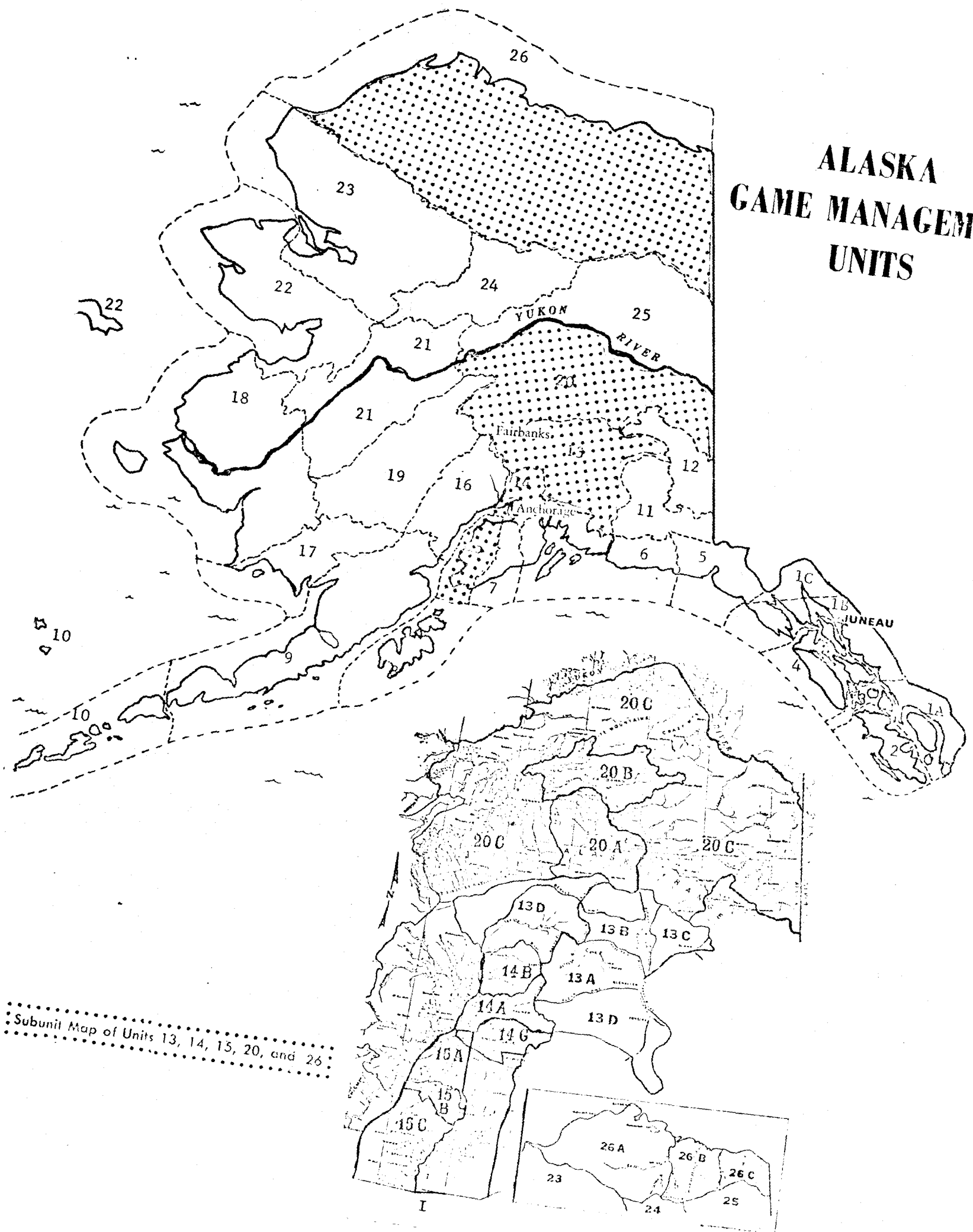
Information in these reports is presented by game species and management units in most instances. A brief summary of statewide harvests and population trends is provided. A map showing Alaska Game Management Unit boundaries has been included for those unfamiliar with these units.

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ALASKA GAME MANAGEMENT UNITS



STATEWIDE HARVESTS AND POPULATION STATUS

Moose

Data derived from the harvest ticket program showed that 5,739 moose were reported as legally harvested in Alaska during 1972. This reported harvest, consisting of 4,294 males, 1,361 females and 84 moose of unknown sex, was the lowest since 1963 when the harvest ticket program was initiated. Reductions in several major moose herds resulting from the severe 1970-71 and 1971-72 winters combined with restrictive regulations designed to allow these herds to recover from their losses are probable reasons for this low total harvest. In Game Management Unit 13 (Nelchina Basin) for example, the 1972 harvest of 712 animals followed a 1971 harvest of 1,758 moose. Game Management Unit 14 (Matanuska Valley) produced a harvest of 1,511 moose in 1971 and only 473 in 1972 and the GMU 15 (Western Kenai Peninsula) harvest was 1,419 in 1971 but only 715 in 1972. On the other hand Game Management Unit 20 (Upper Tanana) produced the largest reported harvest of the 26 management units (1,165 moose) and sustained its highest reported harvest since 1965.

It appears that Interior Alaska moose herds that suffered major losses during the severe 1970-71 winter had recovered substantially by 1972. However, herds in Southcentral Alaska, particularly those on the Kenai Peninsula and in the Nelchina Basin, are still down after suffering losses for two successive winters (1970-71 and 1971-72). Because of the extensive reductions in these important moose areas it must be considered that overall Alaska moose populations were somewhat lower in 1972 than in years past.

Caribou

During the 1972-73 hunting season caribou harvest tickets were required only in Game Management Units 11, 12, 13, 14 and 20. A total of 5,441 hunters reported the harvest of 2,325 caribou from these units. The Fortymile and Delta herds in Game Management Unit 20 sustained reported harvests of 1,028 and 517 animals, respectively; fully 66 percent of the statewide reported harvest. Statewide harvests by sport and subsistence hunters were estimated to be 25-30,000 caribou during this reporting period.

Severe reductions in several easily accessible caribou herds in Southcentral Alaska (particularly the Nelchina herd) necessitated cutbacks in hunting seasons, bag limits and subsequent harvests. The Alaska Peninsula herd continued to grow in size during this period, however, and several transplanted herds (Adak and Kenai Peninsula) showed great increases in numbers. In 1972, 21 permittees harvested 6 bull caribou in the first caribou season on the Kenai Peninsula since the early 1900's.

Other Species

Statewide goat populations remained stable or showed only slight declines during 1972. Transplanted herds on Baranof Island (Unit 4) and Kodiak Island (Unit 8) received minimal harvests and the Kodiak herd is still increasing in size.

During 1972 the management of Alaska's marine mammal populations reverted to the Federal Government with passage of the Marine Mammals Protection Act. Perhaps as a result of anticipation of restrictions imposed by this act, seal harvests in Southcentral and Southeastern Alaska increased slightly over those of 1971.

DEM

MOOSE

SURVEY - INVENTORY PROGRESS REPORT - 1972

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

Seasons and Bag Limits

Unit 1B except the Stikine River drainage	Sept. 15 - Oct. 15	One bull
Unit 1B Stikine River	Sept. 15 - Sept. 30	One antlerless moose by permit only; 30 permits will be issued
	Oct. 10 - Oct. 25	One bull

Harvest and Hunting Pressure

The Stikine River drainage supports most of the moose and receives most of the moose hunting effort expended in Subunit 1B. The Thomas Bay area supports a small herd and approximately five bulls were taken in this area in 1972. In 1972 the Board of Fish and Game approved a proposal for limited cow hunting in the Stikine drainage and 30 antlerless permits were issued for a September 15-30 season. A two-week bull season was retained from October 10-25. Antlerless permit applications were available from the Ketchikan Alaska Department of Fish and Game office from July 12 through August 15. The 30 permits were drawn in Wrangell from 441 applications on August 21. Appendix I lists sources of applications by town.

Of the 30 permittees, 27 hunted at some time during the season killing 18 cows. Many other people accompanied the permittees and some probably assisted in the hunt. Alaska Department of Fish and Game personnel who monitored the hunt accounted for about 75 people on the river during the cow season. Sixteen reproductive tracts and 15 jaws were collected.

The bull season was open from October 10 to October 25 and eight bulls were taken by approximately 100 hunters. Hunting effort was less than in previous years, and during the last week of the season only a few people remained on the river. Jaws were collected from five bulls.

Preliminary harvest ticket returns indicated 15 cows, 7 bulls, and 1 sex unknown were taken in Subunit 1B.

Composition and Productivity

Results of four surveys of the Stikine River, made between August 2, 1972 and February 28, 1973, are summarized in Appendix II. Total

moose observed on the four counts was 252 and the calf:adult ratio based on this total was 49:100. Bull:cow ratios have always been low and do not appear to have improved.

Fish and Game personnel collected jaws from 5 of the 8 bulls taken and from 15 of the 18 cows. Age data are presented in Appendix III. Reproductive tracts were collected from 16 of the 18 cows and the results of the ovarian analysis are listed in Appendix IV. One cow killed on September 30 had ovulated (corpora lutea present) and all other cows had developing follicles present, indicating the rut had at least started by the last week in September.

Management Summary

Historically the Stikine moose herd has had a bulls-only season from September 15 through October 15 with an average kill of 27 bulls a year. Data from surveys indicate an intensive harvest of bulls and low calf:cow ratios. In 1971, the bull season was shortened to two weeks and opened late in the breeding season on the premise that a shortage of bulls could have been the cause for poor production. Calf:cow ratios improved somewhat in 1972. Fish and Game personnel monitored both the cow and bull seasons and contacted approximately 75 percent of hunters who were on the river during these seasons. General comments indicated calves were plentiful compared to prior years. Although only 30 antlerless permits were issued and 27 permittees actually hunted, there were an estimated 75 people on the river during the antlerless season. Many of these people probably assisted the permit holders in obtaining a moose.

The bull harvest was the lowest on record probably because of reduced hunter effort and lowered availability of bulls following the rut, rather than a lack of animals. Very little hunting occurred during the late portion of the bull season, even through weather conditions were favorable.

Recommendations

Herd manipulation appears to have resulted in increased productivity. Continued antlerless hunts are recommended.

Submitted by: Dave Zimmerman, Game Biologist II

APPENDIX I

G.M.U. 1B Stikine River Antlerless Moose Permit Drawing Results - 1972. Southeastern Alaska.

Address	No. of Applications	Percent	Number Drawn	Percent
Wrangell	292	66.2	17	56.7
Petersburg	89	20.2	10	33.3
Ketchikan	46	10.4	2	6.7
Thorne Bay	4	0.9	1	3.3
Juneau	3	0.7		
Kake	3	0.7		
Meyers Chuck	2	0.5		
Sitka	1	0.2		
Out of State	1	0.2		
Qualified Applications	441	100.0	30	100.0

Submitted by: Dave Zimmerman, Game Biologist II

APPENDIX II

Moose, sex and age composition count summaries for the regulatory year 1972-73, Stikine River, GMU 1B, Southeastern Alaska.

DATE	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
2 Aug. 72	5	11	7	2	20	25	0	11	0	36	2:15
9 Aug. 72	0	14	6	1	21	21	1	9	0	31	2:40
8 Dec. 72	1		8	7	15	58		22	42*	80	2:25
28 Feb. 73			15	10		70		35	45*	105	2:05

*Used as unknown sex adults

1972-73 Sex and Age Ratios - Stikine River, Unit 1B

DATE	TOTAL MM PER 100 FF	CALVES PER 100 ADULTS	CALVES PER 100 FF	TWIN PER 100 FF W/CALF	CALF % in HERD	TOTAL SAMPLE
2 Aug. 72	25.0		55.0	22.2	30.6	36
9 Aug. 72	00.00		47.6	14.3	32.2	31
8 Dec. 72		37.9		46.7	27.5	80
28 Feb. 73		50.0		40.0	33.3	105

Submitted by: Dave Zimmerman, Game Biologist II

APPENDIX III

1972 Cementum Age Data from Harvested Moose, Stikine River
Drainage G.M.U. 1B, Southeastern Alaska.

Age	<u>MALE</u>		<u>FEMALE</u>	
	No.	%	No.	%
Calf	0		0	
1	3	60.0	3	20.0
2	1	20.0	3	20.0
3	1	20.0	1*	6.7
4				
5			2	13.3
6			1	6.7
7			1	6.7
8			1	6.7
9				
10			1	6.7
11				
12			1	6.6
13				
14				
15			1	6.6
TOTAL	5	100.0	15	100.0
Mean Age	1.6		5.3	

*Estimated by tooth wear and replacement method.

Submitted by: Dave Zimmerman, Game Biologist II

APPENDIX IV

Ovarian Analysis of Moose from Stikine River, G.M.U. 1B -
September 15-30, 1972.

Accession #	Date of Kill	Age	Ovary	CL	CA	DF	Remarks
81,901-72	9-15-72	12	#1	0	11	1	
			#2	0	13	2	
81,902-72	9-15-72	3	#1	0	6	2	One ovary
81,903-72	9-15-72	1	#1	0	0	0	One ovary
81,904-72	9-15-72	UNK	#1	0	7	0	One ovary
81,905-72	9-16-73	2	#1	0	0	1	Poor fixation
			#2	0	0	0	
81,906-72	9-17-72	10					Ovaries not collected
81,907-72	9-17-72	5	L	0	6	1	Broken specimen
			R	0	1	0	
81,908-72	9-19-72	5	#1	0	4	0	One ovary
81,909-72	9-19-72	6	L	0	4	1	
			R	0	9	2	
81,910-72	9-23-72	1	#1	0	0	0	One ovary
81,911-72	9-23-72	2	#1	0	1	1	
			#2	0	0	0	
81,912-72	9-26-72	1	#1	0	0	0	
			#2	0	0	1	
81,913-72	9-26-72	2	#1	0	2	1	
			#2	0	1	0	
81,914-72	9-30-72	7	#1	0	3	0	
			#2	2	3	0	
81,915-72	9-15/30-72	UNK	#1	0	9	1	
			#2	0	6	0	
81,916-72	9-15/30-72	15	#1	0	4	1	
			#2	0	7	2	

CL = Corpora lutea, CA = Corpora albicantia, DF = Developing follicle.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 1C - Juneau

Seasons and Bag Limits

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

Harvest and Hunting Pressures

Harvest data since 1963 are summarized in Appendix I. The 1972 harvest of 49 moose is the highest on record. This includes 26 bulls from the Taku River drainage, 5 bulls and 17 cows from Berners Bay and one additional bull from an unspecified area within Unit 1C. Accurate hunter success data were only available for Berners Bay where 62.9 percent of the 35 hunters were successful compared to 82.1 percent hunter success in 1971.

The Berners Bay moose permit hunt in 1972 had 416 qualified applicants compared to 280 applicants in 1971. On August 21, 1972 a drawing of 50 permits from the 416 applicants was held in Juneau. Only 35 of the 50 permittees actually entered the area. The reason most commonly given for not being able to hunt Berners Bay was inclement weather which prevented boats and airplanes from entering this area.

Composition and Productivity

Sex and age composition surveys were conducted within the Taku and Berners Bay drainages in November and December (Appendices II, III, IV). A total of 183 moose were observed, 92 in the Taku drainage and 91 in Berners Bay. The Taku moose herd's sex ratio of 6.8 bulls/100 cows was low, but similar to ratios recorded for this herd for the last 10 years. That for Berners Bay was 20 bulls/100 cows, showing improvement as a result of the change in management from a bull-only season to an either-sex permit hunt initiated in 1971. Production was high for both the Taku and Berners Bay moose herds. The Taku herd production was 50.9 calves/100 cows and Berners Bay had 45.5 calves/100 cows. Survival was high in the Berners Bay herd with 88.0 small males/100 calves but survival was quite low for the Taku herd showing only 13.3 small males/100 calves.

No age data are available for the Taku herd, but the Berners Bay herd was hunted under a permit system and permittees were required to turn moose jaws in to the Juneau office. As a result, ages of 17 of the 22 moose harvested at Berners Bay were determined by counting annual cementum layers (Appendix V). Ages of harvested cows ranged from one to four years with the majority being in the three-year-old age class. The mean age for cows (2.4 years) has dropped from a 4.0 year mean age in 1971, which should be expected from a newly exploited segment of a moose population. The mean

age for bulls was very low at 1.0 years. Historically the Berners Bay herd was regulated by a bull-only season from 1963 until the fall of 1971 which brought the number of bulls so low that reproduction was probably affected (Appendix IV).

Management Summary and Recommendations

The Berners Bay herd originated from transplants of 21 calves in 1958 and 1960. The potential moose habitat was, and remains, limited. The population increased rapidly and bull hunting was first allowed in 1963. By 1969, it was apparent that the sex ratio was becoming distorted, with not enough bulls to assure good reproduction. In 1971 either-sex hunting was allowed by permit.

The Taku River herd has been regulated by a one-month hunting season for bulls with annual harvests ranging from 20 to 30 animals. The ratio of bulls to cows has always been low and this low sex ratio is acceptable only because of an intermingling with unhunted Canadian moose above the border.

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

More moose were counted in the Taku area during the late 1972 surveys than ever before; productivity was high, but survival was low as was the bull:cow ratio. The Taku herd can be more fully utilized if cows are harvested and attention is being given to initiating a limited antlerless hunt there in the near future.

Moose - GMU 1C - Juneau

APPENDIX I

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

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

*Harvest as reported by permittees.

Moose Harvest-Unit 1C-Taku River

Year	Total Male
1963	15
1964	35
1965	25
1966	29
1967	30
1968	14
1969	17
1970	14
1971	19
1972	26

Submitted by: David A. Johnson, Game Biologist III

Moose - GRS 1C - Juneau

APPENDIX II

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

Date	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs)
4/1/64	-	-	-	-	-	-	-	-	-	5	54	59	2.5
1965-68*													
11/24/69	4	0	4	26	11	3	40	44	5	22	1	67	1.6
11/20/70	2	0	2	19	10	3	32	34	0	16	0	50	2.5
1971*													
11/14-15-72	3	2	5	33	19	5	57	62	1	30	0	92	3.07

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

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1961	-	-	-	-	-	-	-	-	-	38
1962	2.9	-	-	-	-	17.1	-	14.3	-	42
1963	-	-	-	-	-	-	-	8.5	23.6	59
1964-68*										
1969	10.0	0.0	0.0	0.0	0.0	55.0	21.4	32.8	42.0	67
1970	6.3	0.0	0.0	0.0	0.0	50.0	23.1	32.0	20.3	50**
1971*										
1972	6.8	3.5	66.6	2.2	13.3	50.9	20.8	32.6	30.0	92

* Not sufficient data.

**1/3 of area not surveyed.

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 1C - Juneau

APPENDIX III

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

Date	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time-Hrs.
2/4/64*	-	-	-	-	2	3	5	-	0	8	12	25	1.3
1/28/66*	-	-	-	-	6	3	9	-	1	13	15	37	1.0
12/11/68	1	7	8	16	11	7	34	42	0	25	0	67	2.6
11/22/69	5	0	5	43	8	1	52	57	0	10	0	67	.8
11/19/70	2	1	3	57	5	2	64	67	0	9	0	76	3.1
11/22/71	2	1	3	22	19	1	42	45	1	22	0	67	2.5
12/6-7-72	3	8	11	37	13	5	55	66	1	25	0	91	2.7

*No sex differentiation made.

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 1C - Juneau

APPENDIX IV

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

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Animals per Hour	Total Sample
1960	-	-	-	-	-	-	-	50.0	-	8
1961	-	-	-	-	-	-	-	6.3	-	17
1962	200.0	-	-	-	-	33.3	-	10.0	-	20
1963	-	-	-	-	-	-	60.0	32.0	-	25
1964*	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	-	35.1	38.5	37
1966*	-	-	-	-	-	-	-	-	-	-
1967*	-	-	-	-	-	-	-	-	-	-
1968	23.5	20.6	700.0	10.4	56.0	73.5	20.6	37.3	25.5	67
1969	9.6	0.0	0.0	0.0	0.0	19.2	11.1	14.9	83.8	67
1970	4.7	1.6	50.0	1.3	22.2	14.1	28.6	11.8	24.8	76
1971	7.1	2.4	50.0	1.5	9.1	50.0	5.0	32.8	27.3	67
1972	20.0	14.5	266.6	8.8	88.0	45.5	28.0	27.5	34.3	91

*Not sufficient data.

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 1C - Juneau

APPENDIX V

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

Age Structure Given in Percentages
Calves Not Included in Mean Ages

Age	Males		Age	Females	
	1971	1972		1971	1972
C	33.3	-	C	-	-
1	33.3	100.0	1	13.3	33.3
2	33.3	-	2	33.3	8.3
3	-	-	3	13.3	41.7
4	-	-	4	6.7	16.7
5	-	-	5	6.7	-
6	-	-	6	6.7	-
7	-	-	7	6.7	-
8	-	-	8	6.7	-
9	-	-	9	-	-
10	-	-	10	-	-
11	-	-	11	-	-
12	-	-	12	6.7	-
Mean	1.5	1.0		4.0	2.4
Sample Size	3	5		15	12

Submitted by: David A. Johnson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

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

Harvest data since 1960 are summarized in Appendix I. The 1972 harvest of 92 moose was similar to the total harvest for the past 4 years, but 32 percent lower than the average harvest for the years from 1964 to 1968 when the average take was 136 moose. Hunters had 30.5 percent success in 1971, and 28.3 percent success in 1972 indicating moderate hunter success. No data on hunting pressure or success prior to 1971 are available.

Composition and Productivity

Sex and age composition surveys were conducted within all established count areas in November and December 1972 (Appendices II and III). The total of 267 moose counted was similar to the total count for 1971 but 19 percent less than the 329 moose count average for surveys made from 1965 through 1968. The bull:cow ratio (18.5:100) was low but similar to ratios recorded for the last four years. This could be the result of a disproportionate harvest of bulls over the last twelve years. Production and survival continue to be poor; ratio of small males/100 cows was the lowest ever while the ratio of calves/100 cows (31.5/100) was low, but similar to ratios recorded for the last four years.

The winter of 1972-1973 was severe with snow accumulations being recorded at 40 inches or more for several months. Precise weather data are not available for Haines because of the absence of a U.S. Weather Bureau station. Moose predation by wolves was observed more frequently the winter of 1972-73 than previously. Two aerial surveys were conducted during the spring of 1973 which revealed a total of 51 moose on March 3, and 44 moose April 6, 1973. Similar surveys in 1970 and 1971 indicated a different herd size, on April 14, 1970 the total count was 158 moose and on February 5, 1971 the count was 159 moose. There is some reason to believe that many moose were in heavy timber, and hence not subject to being observed from the air during the 1973 counts. This could account for the great difference between the 1970 and 1971 and 1973 totals.

The age structure was determined from 49 percent of the cows and 17 percent of the bulls harvested in 1972 (Appendix IV). The female age structure was quite young with the majority of the cows killed being in the 1-to-3-year-old age classes.

Management Summary and Recommendations

Based on harvest statistics, no significant changes have occurred in the Haines moose herd during the past 4 years. Approximately 100 moose have been taken each year. Data on composition and productivity have also been similar. The only noteworthy change in the Haines moose herd is the lowering of the cow age structure which probably indicates a young and well utilized moose herd. The winter of 1972-73 has not shown its effect on the moose herd yet.

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 A. Johnson, Game Biologist III

Moose - GMU 1D - Haines

APPENDIX I

Moose Harvest

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

***Reported to Haines Check Station**

Moose - GMU 1D - Haines

APPENDIX II

Moose Sex and Age Composition - Haines - Unit 1D

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

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 1D - Haines

APPENDIX III

Moose Sex and Age Ratios - Haines - Unit 1D

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

*Not sufficient data

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 1D - Haines

APPENDIX IV

1970, 1971 & 1972 Cementum Age Data, Unit 1D-Haines

Age Structure Given in Percentages

Calves Not Included in Mean Ages

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

Submitted by: David A. Johnson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 5 - Yakutat

Seasons and Bag Limits

Aug. 10 - Nov. 30

One moose.

Harvest and Hunting Pressure

Harvest data since 1962 are summarized in Appendix I. The 1972 moose harvest of 161 is the lowest on record. The harvest trend has been downward since 1969. Bull moose made up 48 percent (76 moose) of the total harvest. A kill of 84 cow moose was reported. The cow harvest was 32 percent less than in 1971 (124 cow moose) and 37 percent less than the average cow harvest for the past five years (133 cow moose).

Over two-thirds (69.4 percent) of the harvest occurred during the last 2 months of open season. The first 21 days of the open season produced 11.2 percent of the harvest with the months of September producing 19.4 percent, October 47.0 percent, and November 22.4 percent of the harvest.

Only 19.3 percent (31 moose) of the moose harvested were taken from the Malaspina forelands (the area lying west of Yakutat Bay and Hubbard Glacier) and the remaining 80.7 percent (130 moose) were harvested on the Yakutat forelands.

Of the 388 hunters reporting, 41.5 percent were successful. The numbers of individuals using the U.S. Forest Service cabins on the Yakutat forelands decreased from 542 in 1971 to 489 in 1972.

Composition and Productivity

Sex and age composition surveys were conducted within established count areas in November, December and January (Appendices II and III). These counts (382 moose) are the lowest ever recorded for a complete survey on the Yakutat forelands while the counts on the Malaspina forelands (333 moose) are the highest ever recorded. The Yakutat forelands ratio of bulls/100 cows (14.7:100) is the lowest on record. The Malaspina forelands ratio of bulls/100 cows (54.0:100) also shows a downward trend. These lower ratios could be partially due to the earlier disproportionate harvest of bulls. Production and survival continue to be poor for both areas; ratios of calves and small males per 100 cows are the lowest on record.

The winter of 1972-73 was severe and the winter of 1971-72 was the severest ever recorded on the Yakutat forelands. Accumulated snow depths were over 40 inches for 2 months (Jan 23 - Mar. 18) during the 1972-73 winter and for nearly 5 months (Dec. 22 - May 7) for the 1971-72 winter. The visible effect of the 1971-72 snow accumulation was very low calf and yearling survival as revealed by the 1972 fall sex and age composition survey.

Age analysis of the Unit 5 herd shows a high proportion of young animals of both sexes indicating the herd is being harvested near maximum (Appendix V). The age analysis represents mostly moose from the Yakutat forelands portion of Unit 5. The winter of 1971-72 affected the age distribution by removing most of the calves, yearlings and the very old animals.

Management Summary and Conclusions

Moose first appeared on the Yakutat forelands during the late 1930's and early 40's. The population grew slowly at first and then increased rapidly until it peaked in the early 1960's. The population has been making a downward adjustment toward the actual carrying capacity of the range since the mid-1960's. Fall sex and age composition surveys indicate that poor reproductive success is one of the responsible factors. The severe winters of 1971-72 and 1972-73 have also had an impact on the herd. The Yakutat forelands moose herd is now at or below the carrying capacity of the range. Moose browse photo-repeat stations were checked in June 1973 on the Yakutat forelands revealing that most browse plant species have recovered from the over-utilization as recorded during a similar survey in 1970.

The Malaspina forelands moose population is relatively recent with the first moose being reported in this area in the late 1950's. The population grew rapidly and appears now to have reached or surpassed the carrying capacity of its range. During the 1971-72 winter essentially all of the calf crop of the Malaspina herd was lost.

Hunter harvest for the Yakutat forelands in 1972 was 130 moose while a total of 382 moose were counted during the fall sex and age composition survey. On the Malaspina forelands, only 31 moose were harvested and 333 moose were counted during a similar survey.

The Unit 5 moose herd has a healthy age distribution with the exception of the loss of the calf age class in 1972.

The Yakutat forelands moose herd is now below the carrying capacity of its range and has lost one age class. This area should have a shortened hunting season for the fall of 1973 which would help the recruitment of new animals into this herd. Closing the Yakutat forelands to hunting for the months of October and November when two-thirds of the harvest occurs would give the Yakutat forelands moose herd a chance to recoup its losses from the severe winters of 1971-72 and 1972-73. The Malaspina forelands moose population is presently high and a substantial harvest is needed to prevent over utilization of its habitat.

MOOSE-GMU 5-Yakutat

APPENDIX I

Moose Harvest and Hunting Pressure-Unit 5

Year	Bulls	Cows	Unid	Total	Hunters	% Success
1962	175	75	-	250	263	95.0
1963	189	111	2	302	-	-
1964	154	111	-	265	409	64.8
1965	153	125	4	282	-	-
1966	116	90	6	212	-	-
1967	154	108	1	263	426	61.7
1968	177	133	3	313	-	-
1969	163	161	-	324	514	63.0
1970	141	140	7	288	476	60.5
1971	104	124	2	230	472	48.7
1972	76	84	1	161	388	41.5

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 5 - Yakutat Forelands

APPENDIX II

Moose Sex and Age Composition - Yakutat Forelands - Unit 5

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

* Only half of the area surveyed.

**No sex differentiation made.

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 5 - Yakutat

APPENDIX III

Moose Sex and Age Ratios - Yakutat Forelands - Unit 5

Year	Total MM per 100 FF	Small MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Animals per Hour	Total Sample
1959*	111.0	-	-	-	-	32.9	-	13.5	-	178
1960*	79.8	9.1	-	4.4	-	28.2	16.7	13.6	-	206
1961-64*	-	-	-	-	-	-	-	-	-	-
1965	52.5	10.3	24.4	5.8	91.2	25.9	5.4	14.5	-	537
1966	42.0	6.2	17.1	3.9	75.0	17.0	8.0	10.4	-	924
1967	30.9	8.0	35.0	5.2	76.9	21.7	9.4	14.2	-	667
1968	52.6	13.0	32.8	5.3	66.1	39.3	6.2	15.4	88	784
1969	21.3	3.2	17.5	2.4	49.1	12.9	9.6	9.6	38	593
1970	31.3	9.2	41.7	5.2	41.7	44.2	20.7	24.8	27	290**
1971	19.3	6.3	48.3	4.2	41.2	30.5	20.4	20.4	43	334**
1972	14.7	.7	5.3	.6	15.4	9.6	8.3	7.7	30	169**
1/1973***	-	-	-	-	-	-	-	7.6	30	382

*Insufficient Data.

** Only half of area surveyed.

*** No sex differentiation made.

Submitted by: David A. Johnson, Game Biologist III

Moose. - GMU 5 - Malaspina Forelands

APPENDIX IV

Moose Sex and Age Composition - Malaspina Forelands - Unit 5

Year	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time-Hrs
12/10-11/69	55	2	57	46	14	0	60	117	0	14	0	131*	4.1
12/5-6/70	59	39	98	82	24	15	121	219	1	55	2	276*	7.3
11/27-28/71	73	13	86	81	22	8	111	197	1	39	0	236	3.7
11/7-8-9/72	53	1	54	96	4	0	100	154	0	3	0	157	6.6
1/5/73**	-	-	-	-	-	-	-	-	-	11	322	333	2.7

Moose Sex and Age Ratios - Malaspina Forelands - Unit 5

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
1969	90.5	3.3	3.6	1.5	28.6	23.3	0.0	10.7	32	131
1970	81.0	32.2	66.1	14.2	141.8	45.5	38.5	20.1	38	276
1971	77.5	11.7	17.8	5.5	66.7	34.2	26.7	16.1	64	236
1972	54.0	1.0	1.8	.6	66.7	3.0	0.0	1.9	24	157
1/1973 **							0.0	3.3	124	333

* Area was not completely surveyed.

**No sex differentiation made.

Submitted by: David A. Johnson, Game Biologist III

Moose - GMU 5 - Yakutat

APPENDIX V

1969, 1970, 1971 & 1972 Cementum Age Data, Unit 5

Age Structure Given in Percentages
Calves Not Included in Mean Ages

Age	Males				Age	Females			
	1969	1970	1971	1972		1969	1970	1971	1972
Calf	5.7	2.9	5.7	-	Calf	6.5	.8	12.5	-
1	10.2	6.6	11.4	30.0	1	5.4	8.0	14.6	12.9
2	23.9	8.0	31.8	30.0	2	10.9	5.1	20.8	16.1
3	13.6	10.2	11.4	25.0	3	10.9	6.6	8.3	25.8
4	8.0	5.1	11.4	5.0	4	7.6	2.2	12.5	16.1
5	4.5	1.5	5.7	5.0	5	5.4	4.4	8.3	12.9
6	6.8	1.5	11.4	-	6	5.4	2.2	2.1	3.2
7	9.1	2.9	-	-	7	5.4	5.1	6.3	-
8	8.0	2.9	2.9	-	8	5.4	2.9	2.1	3.2
9	2.3	1.5	8.6	5.0	9	7.6	1.5	2.1	-
10	4.5	.7	-	-	10	13.1	4.4	4.2	3.2
11	2.3	1.5	-	-	11	6.5	5.1	-	3.2
12	-	.7	-	-	12	4.4	3.7	2.1	-
13	-	.7	-	-	13	2.2	-	2.1	3.2
14	-	-	-	-	14	2.2	-	-	-
15	1.1	-	-	-	15	-	.7	2.1	-
16	-	-	-	-	16	1.1	.7	-	-
Mode	2	3	2	1-2		2-3	1	2	3
Mean	4.6	4.3	3.7	2.6		6.7	6.1	4.5	4.1
Sample Size	88	64	35	20		92	73	48	31

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

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

Seasons and Bag Limits

August 20 - November 30*

One moose by permit only; conditions and number of permits will be described by Commissioner's announcement.

* Season subject to closure by field announcement.

The conditions of this permit hunt were: (1) any person could obtain a permit at the Cordova Fish and Game office from July 14, 1972 throughout the season, (2) successful hunters were required to report their kill to the Cordova Fish and Game office within 5 days.

Harvest and Hunting Pressure

A total of 66 moose, 34 males and 32 females, were taken east of the Copper River during the 1972 season. No moose were taken south of Bering Lake this year (three were taken in 1971). This season's harvest was smaller than the 1971 harvest (Appendix I) even though the season was one month longer. The chronology of the harvest (Appendix I) indicates the majority of the harvest occurred in August and September. Weather is the major factor limiting the harvest during October and November.

Permits to hunt east of the Copper River were issued to 258 hunters and 8 persons who did not have permits reported taking an animal. Thus, the success ratio was 24.8 percent.

Composition and Productivity

A productivity and survival count and a parturition and survival count were flown in the spring of 1972. Data analysis from each sample did not indicate specific winter mortality (Appendix II).

A sex and age survey was flown over the Martin River count area in December, 1972. Overall survey conditions were good, but only 120 moose were observed (Appendix III). Since a considerably higher count had been anticipated, the area was re-surveyed in March of 1973 under ideal counting conditions. Only 135 moose were observed (Appendix III). With the March survey verifying the December count, it may be assumed that extensive mortality occurred over the previous year, mostly as a result of the severe winter of 1971-72.

A poor calf crop in the spring of 1972 may also account in part for the smaller than anticipated counted population.

Cementum age data were obtained from 48 of the 66 harvested moose. Comparison of the 1972 age data with prior age data (Appendix IV) revealed two interesting facts: (1) calves were harvested for the first time, and (2) the percent of yearling bulls harvested was down. Both facts probably reflect a scarcity of moose available to the hunter.

Management Summary and Conclusions

Analysis of sex and age and harvest data indicates an extensive population reduction in the Martin River herd. Also, the past two calf crops (Appendix III) appear to be smaller than in previous years.

Recommendations

The coming hunting season should be limited to achieve a reduced harvest in order to allow the herd to recoup from the effects of the 1971-72 winter.

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX I

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

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

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

** Estimated harvest.

Moose Harvest - Chronology by Month by Sex

Month	Males	Females	Total
August	17	12	29
September	14	10	24
October	2	2	4
November	1	8	9
Total	34	32	66

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX II

Productivity and Survival Composition Count

Date	Bulls	Cows w/0 Ylgs.	Cows w/1 Ylgs.	Cows w/2 Ylgs.	Total Cows	Unid. Adults	Total Adults	Lone Ylgs.	Total Ylgs.	Unid. Sex & Age	Count Time Hrs.	Total Sample
5/17/72	14	35	8	0	43	0	57	0	8	0	.8	65

Date	Bulls per 100 Cows	Yearlings Per 100 Cows	Calves per 100 Cows in Fall	Yrlg. % of Herd	Calf % of Fall Herd	% Calf Winter Mortality	Total Sample
5/17/72	32.6	18.6	15.9*	12.3	10.3*	0	65

Summary of Moose Parturition and Survival Counts

Date	Newborn Calves				Yearlings				Total FF	Total Calves	Total Yrlgs.	Calves: Yearlings		Males	Total Moose	Winter Calf = Mortality
	F/0	F/1	F/2	F/?	Lone	F/1	F/2	Tagged				100 F	100F			
6/12/72	33	8	1	0	8	4	0	NA	46	10	12	21.7	26.1	26	94	0.0%

* Fall 1971 Count

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX III

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

<u>Year</u>	<u>Total MM per 100 FF</u>	<u>Sm. MM per 100 FF</u>	<u>Sm. MM per 100 Lg. MM</u>	<u>Sm. MM % in Herd</u>	<u>Sm. MM per 100 MM Calves</u>	<u>Calves per 100 FF</u>	<u>Twins per 100 FF w/calf</u>	<u>Calf % in Herd</u>	<u>Survey Conditions</u>	<u>Total Sample</u>
1964-65							36.4	26.0	UNK	52
1965-66							20.8	31.0	UNK	93
1966-67	Z E R O	D A T A								
1967-68	76.1	37.0	93.9	15.0	103.3	70.2	25.5	28.5	UNK	207
1968-69							25.0	21.4	UNK	201
1969-70							17.4	20.3	POOR	138
1970-71	41.2	14.5	54.3	8.1	76.0	38.2	6.4	21.3	GOOD	235
1971-72	37.6	14.1	60.0	9.2	177.8	15.9	13.6	10.3	EXCELLENT	261
1972-73	50.7	17.4	52.2	10.2	171.4	20.3	0.0	11.9	GOOD	120
1972-73							0.0	14.8	EXCELLENT	135

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX III continued

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

<u>Date</u>	<u>Lg. MM</u>	<u>Sm. MM</u>	<u>Total MM</u>	<u>FF W/O</u>	<u>FF W/I</u>	<u>FF W/2</u>	<u>Total FF</u>	<u>Total Adults</u>	<u>Lone Calves</u>	<u>Total Calves</u>	<u>Unid. Sex & Age</u>	<u>Total Sample</u>	<u>Count Time (hrs.)</u>	<u>Moose per Hour</u>
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
12/2/71	40	24	64	148	19	3	170	234	2	27	0	261	3.1	NA
12/21/72	23	12	35	56	13	0	69	104	1	14	2	120	3.6	NA
3/16/73					19	0		115	1	20	96	135	3.7	NA

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX IV

1969 - 1972 Cementum Age Data, Unit 6 - East of Copper River

MALES

FEMALES

Age	1969		1970		1971		1972		Age	1969		1970		1971		1972	
	No.	%	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	No.	%
Calf	0	0	0	0	0	0	4	16.7	Calf	0	0	0	0	0	0	4	16.7
1	4	44.4	5	50.0	6	28.6	4	16.7	1	1	25.0	2	16.7	7	26.9	4	16.7
2	2	22.2	1	10.0	5	23.8	2	8.3	2	0	0	1	8.3	1	3.8	3	12.5
3	2	22.2	1	10.0	6	28.6	4	16.7	3	0	0	6	50.0	3	11.5	2	8.3
4	0	0	1	10.0	3	14.3	4	16.7	4	0	0	0	0	5	19.2	2	8.3
5	1	11.1	0	0	1	4.8	3	12.5	5	0	0	1	8.3	3	11.5	3	12.5
6			2	20.0			2	8.3	6	1	25.0	0	0	3	11.5	2	8.3
7							1	4.2	7	1	25.0	1	8.3	1	3.8	2	8.3
8									8	1	25.0	0	0	1	3.8	1	4.2
9									9			1	8.3	1	3.8	0	0
10									10					0	0	1	4.2
11									11					0	0		
12									12					1	3.8		
TOTAL	9	99.9	10	100.0	21	100.1	24	100.1	TOTAL	4	100.0	12	99.9	26	99.6	24	100.0

Submitted by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 6 - West of the Copper River

Seasons and Bag Limits

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

The conditions of this permit hunt were: (1) any person could apply for a permit at the Cordova Fish and Game office from July 14, to August 14, 1972; (2) a drawing for 60 permits was held August 15, 1972; (3) successful hunters were required to report their kill and present the incisiform teeth to the Cordova Fish and Game office within 48 hours.

In addition, all persons under the age of 18 who had their name drawn for a permit were required to pass a firearm safety and shooting test prior to receiving a permit. Three of nine persons did not pass the test and their permits were issued to alternates.

Harvest and Hunting Pressure

The 1972 moose harvest west of the Copper River was 47 animals: 24 males and 23 females. This is the greatest harvest recorded from this area but is only slightly higher than previous harvests (Appendix I).

Four hundred and twelve applications were received for the 60 permits. Of the 60 permittees, 7 did not hunt, 4 hunted unsuccessfully and 2 could not be contacted to determine if they hunted. During this six-day hunt, 92 percent of the persons that hunted were successful. The permittee success ratio was 78 percent. Extensive use of aircraft and/or airboats is the primary reason for high hunter success.

The weather during the season was both good and bad. Wind and rain prevailed about half of the season.

Composition and Productivity

Winter mortality was first indicated May 16, 1972 when a sample of 43 moose revealed a 22 percent over-winter calf mortality (Appendix V). A moose parturition and survival survey conducted June 6, 1972 indicated a comparable calf mortality of 17 percent from a sample of 101 moose (Appendix V). Thus, the reduced number of moose observed during a sex and age survey conducted 12/22/72 was expected. The primary effect of the preceding winter appears to have been on the 1972 calf production as indicated by the greatly reduced twinning rate (5.6 percent) and the lowered calf/cow ratio (20.4 percent) (Appendix II).

Analysis of the age data obtained from 46 of the 47 harvested moose

revealed a high percent of yearling bulls in the harvest. Yearling bulls appear to be very susceptible to hunting as evidenced by the 1969-72 cementum age data (Appendix III). The percent of yearlings in the harvest also indicates fairly good calf survival through the severe winter.

Management Summary and Conclusions

The winter of 1971-72 was the worst for snowfall in 20 years on the Copper River Highway. A total snowfall of 21-3/4 feet was recorded (Appendix IV).

Analysis of the available data lends one to believe that the major effect upon this moose herd by the severe winter was the loss of twin calves to the herd.

Basically the number of adults located in fall composition counts (1971 versus 1972) is similar; in addition a similar ratio of cows with single calves was recorded. A very high spring and/or summer mortality rate on one or both of this year's twin calves was indicated by (1) comparison of twins observed during spring calving to twins in the fall and (2) twinning rates in the previous fall counts to this year's twinning.

It is interesting to note that a 93 percent increase of bulls (+ 13) were counted in the fall count even though the 1972 harvest of bulls was double the 1971 bull harvest. With a similar cow harvest an 18 percent decrease of cows (-20) was recorded this fall compared to last fall.

With the apparent increase in bulls west of the Copper River one would suspect a possible influx of moose from the herd east of the Copper River, possibly triggered by the severe winter. But, a sex and age survey conducted east of the Copper River (12/72) does not support this theory.

The effects of the previous winter did not appear to be severe on this moose herd. If true, this fact might indicate a desirable level at which to maintain the herd. During the past 3 fall counts (1969-71) approximately 200 moose have been observed annually; each year there were excellent calf crops. Judging by the effects of the 1971-72 severe winter upon this herd, a countable population of 200 moose appears to be nearly in balance with its winter range. Until increased knowledge dictates otherwise, the management goal for this herd will be to hold it at approximately 200 (countable) moose. Of these, desirable ratios appear to be 15-20 bulls per 100 cows and 40 calves per 100 cows.

In order to achieve this management goal it will be essential to assess winter mortality and calf production in the spring prior to establishing the basics of the permit harvest.

Recommendations

No changes in the regulations are necessary. The present regulations allow sufficient flexibility to manipulate the harvest through the number of permits and the conditions of the permit hunt to obtain the desired management goal.

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX I

Moose harvest, Unit 6 - West of the Copper River

Year	Bulls	Cows	Unid.	Total
1960*	25	0	0	25
1961	NO OPEN SEASON			
1962	25	0	0	25
1963	15	2	0	17
1964	15	0	0	15
1965	20	0	0	20
1966	20	1	0	21
1967	23	0	0	23
1968	28	8	0	36
1969	30**	12	0	42**
1970	14	32	0	46
1971	12	27	0	39
1972	24	23	0	47

* First harvest since introduction of moose to Unit 6.

** Estimated.

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX II

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

Year	Total MM per 100 FF	Sm. MM per 100 FF	Sm. MM per 100 Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/calf	Calf % in Herd	Survey Conditions	Total Sample
1962-63							10.0	32.8	Unknown	67
1963-64	Z E R O	D A T A								
1964-65							18.8	31.0	Unknown	121
1965-66	Z E R O	D A T A								
1966-67	Z E R O	D A T A								
1967-68	13.5	6.8	100.0	4.5	33.3	39.0	7.1	25.6	Excellent	117
1968-69							21.9	26.3	Excellent	156
1969-70							26.3	24.9	Good	193
1970-71	11.4	3.0	36.4	2.0	15.4	39.4	31.6	26.1	Good	199
1971-72	13.3	8.0	150.0	5.1	38.3	41.6	38.7	26.9	Fair	175
1972-73	30.1	7.5	33.3	5.0	73.7	20.4	5.6	13.6	Good	140

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX II continued

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

Date	Lg. MM	Sm. MM	Total MM	FF W/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
3/15/53	1	0	1	0	18	2	20	21	0	22	24	67	2.3	NA
1963-64	Z E R O		D A T A											
12/9-10 1964	5	6	11	9	26	6	41	52	0	38	31	121	4.7	NA
1965-66	Z E R O		D A T A											
1966-67	Z E R O		D A T A											
12/7/67	5	5	10	49	26	2	77	87	0	30	0	117	4.8	NA
1/15-16 1969	2	2	4	0	25	7*	33	37	1	43	76	156	Unk.	NA
1/17/70	4	5	9	0	28	10	38	47	1	49	97	193	3.1	NA
11/27/70	11	4	15	94	26	12	132	147	1	51	0	198	3.4	NA
11/2/71	6	9	15	82	19	12	113	128	4	47	0	175	3.5	NA
12/22/72	21	7	28	75	17	1	93	121	0	19	0	140	3.0	NA

* Plus 1 female with 3.

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX III

1969, 1970, 1971 & 1972 Cementum age data, Unit 6 - West of the Copper River

Males									Females								
Age	1969		1970		1971		1972		Age	1969		1970		1971		1972	
	No.	%	No.	%	No.	%	No.	%		No.	%	No.	%	No.	%	No.	%
Calf	0	0	1	10.0	0	0	0	0	Calf	0	0	0	0	2	8.3	1	4.5
1	19	86.4	7	70.0	5	50.0	14	58.3	1	2	18.2	5	21.8	5	20.8	4	18.2
2	1	4.5	1	10.0	1	10.0	0	0	2	2	18.2	2	8.7	2	8.3	1	4.5
3	2	9.1	1	10.0	3	30.0	6	25.0	3	0	0	4	17.4	3	12.5	2	9.1
4					0	0	2	8.3	4	1	9.1	2	8.7	3	12.5	4	18.2
5					0	0	0	0	5	1	9.1	1	4.3	3	12.5	1	4.5
6					1	10.0	0	0	6	1	9.1	3	13.1	2	8.3	2	9.1
7							2	8.3	7	1	9.1	0	0	2	8.3	0	0
8									8	1	9.1	1	4.3	0	0	3	13.6
9									9	1	9.1	3	13.1	0	0	2	9.1
10									10	0	0	1	4.3	1	4.2	1	4.5
11									11	0	0	1	4.3	0	0	0	0
12									12	1	9.1			0	0	1	4.5
13									13		0			1	4.2		
Total	22	100.0	10	100.0	10	100.0	24	99.9	Total	11	100.0	23	100.0	24	99.9	22	99.8

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX IV

Snow data - Cordova FAA Airport

Month	Total	Max. Depth
September 1971	0	0
October	6.2	4
November	27.4	13
December	37.7	21
January 1972	34.8	39
February	27.5	65
March	89.3	99 (8-1/4')
April	36.9	77
May	1.2	40
June	0	0
	261.0 Inches	
	21.75 Feet	

Submitted by: Julius Reynolds, Game Biologist III

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

APPENDIX V

Productivity and survival composition count

Date	Bulls	Cows W/0 Yrlgs.	Cows W/1 Yrlgs.	Cows W/2 Yrlgs.	Total Cows	Unid. Adults	Total Adults	Lone Yrlgs.	Total Yrlgs.	Unid. Sex & Age	Count Time Hrs.	Total Sample
5/17/72	6	22	5	1	28	0	34	2	9	0	1.9	43

Date	Bulls per 100 Cows	Yearlings per 100 Cows	Calves per 100 Cows in Fall	Yrlg. % of Herd	Calf % of Fall Herd	% Calf Winter Mortality	Total Sample
5/17/72	21.4	32.1	41.6	20.9	26.9	22.3	43

Summary of moose parturition and survival counts

Date	Newborn Calves				Yearlings			Total Tagged	Total FF	Total Calves	Total Yrlgs.	Calves: 100 F	Yrlgs.:		Total Moose	Winter Calf Mortality
	F/0	F/1	F/2	F/?	W/OF	F/1	F/2						100 F	Males		
6/6/72	35	4	6	0	7	3	4	NA	52	16	18	30.8	34.6	15	101	16.8%

Submitted by: Julius Reynolds, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 7 - Seward

Seasons and Bag Limits

Unit 7, that portion which includes the drainages of Resurrection, Little Indian, Big Indian, Jumeau 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 moose

Harvest and Hunting Pressure

Harvest report returns show that hunters harvested 176 moose in 1972 (Appendix I). Bulls comprised 87.5 percent (n=154) and cows comprised 12.5 percent (n=22) of the harvest. Hunters afield increased 38.5 percent from 563 in 1971 to 780 in 1972. Hunter success decreased during the same period from 30.0 percent in 1971 to 22.6 percent in 1972. The large increase in the number of hunters cannot be explained by the antlerless hunt which was held September 1-30. Sixty permits were issued for the antlerless hunt on a first-come, first-served basis. Twenty-two of these permittees harvested antlerless moose for a 36.7 percent success rate contrasted to a 21.4 percent success rate for those hunting bulls only. Over 75 percent of the antlerless harvest for both 1971 and 1972 came from the Jumeau Creek drainage. Also for both years less than 25 percent of the successful antlerless hunters were residents of the Kenai Peninsula.

Although the percent of successful bull hunters (21.4%) was 33.5 percent below the preceding 5-year average (32.2%) the number of bulls killed (154) was practically the same as the preceding 5-year average (152.6).

Composition and Productivity

Composition counts were conducted only in that portion of the unit where they were conducted in 1970 and 1971 (Appendices II, III, IV, V). Twentymile River (Count Area 6) is the only count area where a significant decrease in the proportion of bulls from 1970 and 1971 did not occur. The 1972 bull:cow ratio for all aggregated count areas decreased 43 percent from the 1970-71 average of 21.2 bulls: 100 cows. Calves/100 cows increased 29.1 percent during the same period from an average of 22.7 to 29.3 in 1972. However, the 1972 ratio is somewhat inflated because of fewer than average yearling cows in the sample as a result of the substantial 1971-72 winter loss of calves. This calf mortality was largely documented in Unit 15A where probably over 80 percent calf mortality occurred and 15C where probably over 95 percent calf mortality occurred. Calf mortality in Unit 7 was believed to have corresponded to that of 15A since a sizeable percentage of Unit 7 moose winter in 15A and severe weather conditions occurred in both units.

More meaningful insight into population composition changes in this Unit can be gained by referring to individual count unit changes (Appendix V). Composition

changes are not consistent between the various count units because of varied moose populations, habitats and hunting intensities.

As in 1970 and 1971, Twentymile River (Count Unit 6) and Placer River (Count Unit 5) yielded the highest calf:cow ratios in the Unit; 43.4/100 and 70.5/100, respectively. These two areas have consistently yielded the highest calf:cow ratios in the unit since 1962. Juneau Creek (Count Unit 12) also followed the pattern of the past two years. It yielded 27.5 calves/100 cows which is intermediate to the higher ratios of Count Units 5 and 6 and the lower ratios of Resurrection Creek (Count Unit 10), 21.6 calves/100 cows, and the Chickaloon River drainages (Count Units 8, 9, 20, 21), 16.8 calves/100 cows.

During the past 3 years, the bull:cow ratio patterns for the count areas have demonstrated inverse relationships to the calf:cow ratios. The Chickaloon River drainages and Resurrection Creek have consistently yielded the highest, Placer River and Twentymile River the lowest, and Juneau Creek the intermediate ratios.

Age data were obtained from 18 antlerless animals taken this year. As in the preceding two years, the small sample size has not yielded meaningful average ages (Appendix VI).

Management Summary and Conclusions

Although the bull harvest remained equal to the preceding 5-year average, the lowered percent of successful hunters and the unit-wide lowered bull:cow ratios suggest that a lesser number of bulls were present in the unit this year. The principal factor in the decreased bull:cow ratio is no doubt the low yearling recruitment to the population. As stated above, this was largely attributable to last winter's severe calf mortality. Supporting evidence of this is that the percent of yearling bulls in the total bull count averaged 37.5 percent during the preceding 5 years compared to this year's 18.5 percent. Also the low calf production in 1971 of 21.2 calves/100 females was 31 percent below the 1966-1970 average of 31.5 calves/100 cows. To summarize, there were fewer than average calves starting into the winter and much heavier than average winter mortality of these calves. This, coupled with increased harvest of the males older than yearlings, was responsible for the substantial decrease in the bull:cow ratio. From permit returns it appears that the majority of the antlerless kill will be made in the Juneau Creek drainage unless we concentrate pressure elsewhere by means of permit restrictions.

Recommendations

It is recommended that the hunting season be shortened or other measures taken to decrease the bull harvest in order to help increase the number of bulls in the population. It is further recommended that the number of antlerless animals to be taken be increased in that portion of Unit 7 which includes the drainages of Resurrection, Little Indian, Big Indian, Juneau Creek and all Chickaloon River drainages. No more than 50 percent of this antlerless harvest should come from Juneau Creek drainage.

Submitted by: Paul 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	*	*	0	*		
	Comb.	112	1	0	113	445	25.4
1967	1st	*	*	*	*		
	2nd	*	*	*	*		
	Comb.	123	1	1	125	414	30.0
1968	1st	140	1	0	141		
	2nd	19	0	0	19		
	Comb.	160 ²	1	3	164 ²	481	34.0
1969	Comb.	174	4	1	179	557	32.1
1970	1st	104	0	1	105		
	2nd	23	0	1	24		
	Ant. ¹	0	14 ³	0	14		
	Comb.	152 ²	14 ³	2	168 ²	520	32.3
1971	1st	110	14	2	126		
	2nd	25	0	0	25		
	Comb.	153 ²	14	2	169 ²	563	30.0
1972	1st	111	19	0	130		
	2nd	16	0	0	16		
	Comb.	154 ²	22 ²	0	176 ²	780	22.6

* Data not available

¹ Antlerless season held December 2-6

² Total exceeds summation of various seasons because of kills for which data were not given

³ Data from 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/O	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	12.4	88
1971														
11/1-4	132	84	216	782	163	17**	962	1178	6	204	11	1392	15.7	88.5
1972														
11/29-12/2	66	15	81	487	165	14	666	747	2	195	0	942	14.8	63.6

* Data not available

** Includes one set of triplets

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - SEWARD

APPENDIX III

Moose Sex & Age Ratios - Unit 7

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

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 7 - Seward

APPENDIX IV

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

Trend Area	Year	Lg. MM	Sm. MM	Tot. MM	FF W/O	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
5	12/1/72	0	2	2	25	29	7	61	63	0	43	0	106	3.33	76.3
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
6	12/1/72	3	3	6	61	33	5	99	105	0	43	0	148	3.33	76.3
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
10	11/29/72	19	2	21	129	32	1	162	183	1	35	0	218	4.0	54.5
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
12	11/29/72	5	6	11	112	40	1	153	164	0	42	0	206	3.08	66.9
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	540	5.2	103.8
8,9															
20,21	11/29-12/2/72	39	2	41	160	31	0	191	232	1	32	0	264	4.41	59.9

* Small bulls not properly identified

** Includes one set of triplets

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU - Seward

APPENDIX V

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

Year	Total MM per 100 FF	Sm. MM per 100 FF	Sm. MM per Lg. MM	Sm. MM % in Herd	Sm. MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF w/Calf	Calf % in Herd	Count Area	Animals per Hour	Total Sample
1970	7.1	1.2	20.0	0.8	6.7	36.9	19.2	25.6	5	100.0	121
1971	5.7	*	*	*	*	54.5	17.1	34.0	5	70.5	141
1972	3.3	3.3	--	1.9	9.3	70.5	19.4	40.6	5	76.3***	106
1970	2.1	1.05	100.0	0.8	6.7	32.3	6.9	24.0	6	129.0	129
1971	11.1	*	*	*	*	33.3	35.3**	23.1	6	62.3	104
1972	6.1	3.03	100.0	2.0	14.0	43.4	13.2	29.1	6	76.3***	148
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
1972	13.0	1.2	10.5	0.9	11.4	21.6	3.0	16.1	10	54.5	218
1970	15.2	8.6	128.0	6.1	66.7	25.7	1.9	18.2	12	85.0	296
1971	10.2	3.8	60.0	2.7	24.5	31.2	4.5	22.1	12	106.7	222
1972	7.2	3.9	120.0	2.9	28.6	27.5	2.4	20.4	12	66.9	206
1970	31.3	9.2	41.1	6.2	109.1	16.8	4.8	11.3	8,9,20,21	65.0	194
1971	23.9	3.3	16.0	2.5	59.0	11.2	2.6	8.3	8,9,20,21	103.7	538
1972	21.5	1.1	5.1	0.8	12.5	16.8	0.0	12.1	8,9,20,21	59.9	264

*Small bulls not properly identified

**Includes one ste of triplets

***Count areas 5 and 6 combined and totals divided by total count time.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU - 7 - SEWARD

Appendix VI

Age Structure of Antlerless Harvest 1970-1972

<u>Age</u>	<u>Number</u>		
	<u>1970</u>	<u>1971</u>	<u>1972</u>
Calf	--	2	--
1	--	--	1
2	--	3	5
3	--	1	2
4	--	1	2
5	3	1	--
6	--	1	--
7	--	--	1
8	1	--	--
9	2	--	--
10	2	--	2
11	1	1	2
12	--	--	1
13	2	--	1
14	1	--	--
15	--	--	--
16	1	--	--
17	--	--	--
18	1	--	1
<u>n=</u>	14	10	18
<u>(x=</u>	10.43	4.38	4.96
(Excluding calves)			

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 9 - Alaska Peninsula

Season and Bag Limits

August 20 - December 31

Two moose; provided that only one moose may be an antlered bull.

Harvest and Hunting Pressure

The reported 1972 moose harvest in Unit 9 was 556 animals (Appendix I). Males comprised 82 percent of the harvest. Non-resident hunters killed 282 moose (51 percent of the total). This is the largest total kill and the largest harvest of males in the unit's history. The harvest of 91 females was exceeded only in 1971.

Approximately 70 percent of the bull harvest occurred during the months of September and October. This coincides with the period of peak trophy hunting in the unit. By contrast, only 40 percent of the female harvest occurred during these two months.

A sample of 14 moose taken by trophy hunters averaged 208 points by the Boone and Crockett scoring system. The moose varied from five to nine years of age, and the largest trophy scores in this limited sample occurred at age six.

Composition and Productivity

Because of adverse weather during early June, only two calving surveys were attempted. Data from those flights are presented in Appendix II. Conditions during the surveys were not ideal, and sightings may have been biased due to turbulence and an inability to cover all areas. The data seem to indicate another year of poor calf production on the Alaska Peninsula, however, calf ratios obtained during the fall sex and age surveys (Appendices III and IV) support the spring data.

During the late fall, five trend areas were surveyed and a sample size of 954 moose recorded. One new trend area, the Pacific, was established in the lightly hunted drainages of Amber Bay, Yantarni Bay and Long Beach. Sex ratios from this area were similar to those obtained from the unhunted Katmai trend area. The bull/cow ratio for all areas of 51 bulls per 100 cows (Appendix V), is a slight increase over previous years and occurred in part because of the inclusion of the Pacific trend area. Without the Pacific trend area data, the bull/cow ratio is 48 bulls per 100 cows.

Calf production varied from a high of 11.5 calves per 100 cows in the Mother Goose trend area to a low of 3.2 calves per 100 cows in the Pacific trend area. The more heavily hunted areas displayed higher calf/cow ratios

than the lightly hunted or unhunted areas. A summary of overall fall sex and age ratios for the Alaska Peninsula since 1968 is presented in Appendix V. For the third consecutive year, fall calf/cow ratios have been below 15 calves per 100 cows.

Management Summary and Conclusions

The Alaska Peninsula moose population appears to be having a period of poor reproductive success. Although trophy hunting has altered the bull/cow ratio in some areas, this change cannot be considered a factor in the reduced calf production. The poor reproductive success appears to be a response to an over-population of animals that peaked during the mid-1960's. Restrictions in the existing seasons and bag limits would not reverse this trend.

During the fall of 1972 the Alaska Peninsula had the greatest recorded number of hunters afield in the unit's history. There were several reasons for this influx of hunters. With the removal of the closed period on bull moose in October, it became possible for hunters to make multi-species hunts (moose, caribou and brown bear) during this period. Liberalization in the brown bear hunting regulations encouraged more hunters to travel to the Peninsula. Finally, restrictions in both the moose and caribou seasons and bag limits in the roadside units more accessible to the Anchorage area residents encouraged some persons to hunt Unit 9. The record harvest in 1972 is a direct result of this increased hunting pressure. The increasing trend in both hunters and harvest will probably continue. The present level of harvest is conservative so no restrictions in season or bag limits are considered necessary.

Recommendations

No changes in season or bag limits are recommended.

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	74.3
1968	366	72	5	443	583	76.0
1969	317	70	6	393	527	74.6
1970	266	84	2	352	457	77.0
1971	317	116	7	440	591	74.5
1972	454	91	11	556	773	71.9

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

Mother Goose to Dog Salmon

APPENDIX II

Moose Productivity, Unit 9 - Alaska Peninsula 1972

Date	Calves per 100 FF	Calves per 100 FF and Yearlings	Percent FF with Calves	Percent FF with Twins	Total Sample
June 7	--	22.3	--	35.7	322
June 12	23.1	19.3	16.3	41.2	233

	Total Calves	Total Cows & Yearlings	Total Cows	Total Cows W/Twins
June 7	38	170	--	10
June 12	24	124	104	7

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX III

Moose Sex and Age Ratios, 1972 - 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
Katmai	79.0	15.5	24.3	8.0	215.4	14.4	8.3	7.4	134.6	350
Mother Goose	29.9	10.2	51.4	6.8	118.8	17.1	6.9	11.5	79.4	278
Patch	24.7	6.2	33.3	4.4	83.3	14.8	-	10.6	282.5	113
Meshik	42.1	14.0	50.0	9.2	266.7	10.5	-	6.9	49.7	87
Pacific	71.8	11.3	18.6	6.3	400.0	5.6	33.3	3.2	57.3	126
TOTALS	51.0	11.8	30.1	7.1	170.0	13.9	6.8	8.4	91.3	954

Submitted by: James B. Faro, Game Biologist III

MOOSE - GMU 9 - Alaska Peninsula

APPENDIX IV

Moose Sex and Age Composition - Unit 9 - 1972

Area	Date	Lg. MM	Sm. MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Total Calves	Unid. Sex & Age	Total Sample
Katmai	Nov. 12	115	28	143	157	22	2	181	324	26	0	350
Mother Goose	Nov. 30	37	19	56	158	27	2	187	243	32	3	278
Patch	Nov. 30	15	5	20	69	12	0	81	101	12	0	113
Meshik	Dec. 1	16	8	24	52	5	0	57	81	6	0	87
Pacific	Dec. 1	43	8	51	68	2	1	71	122	4	0	126
TOTALS		226	68	294	504	68	5	577	871	80	3	954

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
Nov. & Dec., 1972	51.0	11.8	30.1	7.1	170.0	13.9	6.8	8.4	91.3	954

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

Submitted by: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 11 - Wrangell Mountains - Chitina River

Seasons and Bag Limits

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

Harvest and Hunting Pressure

Harvest report data for Unit 11 are summarized in Appendix I. Total harvests have fluctuated without obvious trend since 1963. Numbers of hunters since 1966 have generally increased, and hunter success has declined. That portion of Unit 11 comprising the Nabesna Road vicinity has contributed 56 to 67 percent of the total harvest since 1969 (Appendix II). An even greater proportion of the Unit 11 cow harvests has come from the Nabesna Road vicinity. The Nabesna Road was not kept open during the late season prior to 1970-71, and this may be the reason for the higher 1970 harvest as compared to the harvest during 1969. The reduced cow harvest from the Nabesna Road vicinity during 1972 may have been due to a reduced antlerless moose season during 1972 as compared to prior years. Hunter success dropped 5 percent from 1971 to 1972 following the trend of the last 7 years.

Composition and Productivity

Composition data from the Mt. Drum count area are summarized in Appendix III. Access to moose on Mt. Drum is limited to aircraft, and this area has been lightly hunted. Composition data show large males per 100 females and moose per hour values have fluctuated at a high level. Small bulls have fluctuated at a moderate level, and calves per 100 cows have declined since 1960. For comparison to the Mt. Drum vicinity, moose composition data from the Nabesna Road vicinity are tabulated in Appendix IV. Large males per 100 females and moose per hour values are much lower than data from the Mt. Drum vicinity.

Management Summary and Conclusions

Harvest and composition data for Unit 11, with the exception of the Nabesna Road vicinity, indicate that moose are lightly hunted. No changes in seasons and bag limits are recommended.

Moose harvests from Unit 11 have come mainly from the easily accessible Nabesna Road vicinity. Composition data from the Nabesna Road vicinity reveal low proportions of large bulls, low moose per hour, low proportions of small bulls, and low calf survival. Calf survival and small bulls have not increased in compensation for the relatively heavy harvesting of bulls and cows. Consequently, continued antlerless moose seasons for the Nabesna Road vicinity are not recommended. Seasons for those portions of both Units 11 and 12 that include the Nabesna Road should continue to conform.

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX I

Moose Harvest and Hunting Pressure - Unit 11

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

APPENDIX II

Comparison of Harvest Data from the Nabesna Road Vicinity and Total Unit 11

	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
Total Unit 11 Harvest:	162	242	181	146
Harvest from Nabesna Road Vicinity:	93	161	105	82
Percent of Total Harvest from Nabesna Road:	57%	67%	58%	56%
Total Unit 11 Cow Harvest:	59	115	89	55
Cow Harvest from Nabesna Road Vicinity:	43	96	63	33
Percent of Total Cow Harvest from Nabesna Road Vicinity:	73%	83%	71%	60%

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX III

Comparison of Moose Sex and Age Composition Data, Mt. Drum 1955 - 1972

<u>Year</u>	<u>Large Males per 100 Females</u>	<u>Small Males per 100 Females</u>	<u>Calves per 100 Females</u>	<u>Moose per Hour</u>	<u>Sample Size</u>
1955*	116	29	36	75	300
1956*	130	15	30	54	55
1957*	64	7	39	92	92
1958*	128	12	34	94	291
1960*	64	16	36	48	110
1965*	55	25	19	81	269
1967	62	10	29	117	456
1969	54	11	28	85	299
1970*	46	15	14	59	199
1972	46	5	10	69	250

* Area boundary change.

APPENDIX IV

Comparison of Moose Sex and Age Composition Data

Nabesna Road Vicinity, 1965-1972

<u>Year</u>	<u>Large Males per 100 Females</u>	<u>Small Males per 100 Females</u>	<u>Calves per 100 Females</u>	<u>Moose per Hour</u>	<u>Sample Size</u>
1965*	22	20	39	52	83
1968*	14	5	12	44	140
1971	11	0	24	20	50
1972	0	7	19	16	39

*Area boundary change compared to boundaries of 1971 and 1972 count areas.

Submitted by: Carl W. McIlroy, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 12 - Upper Tanana River

Seasons and Bag Limits

Aug. 20 - Oct. 7
Nov. 1 - Nov. 30

One moose, provided that bull moose only may be taken from August 20 - September 30 and from November 1 - November 30 and only antlerless moose may be taken from October 1 - October 7.

Harvest and Hunting Pressure

The following table summarizes the annual moose harvest since harvest ticket use was initiated in 1963:

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

During the 1972 season resident hunting success was 14.9 percent while only 8.1 percent of non-residents were successful. The Nabesna Road area produced the most animals with 34 percent of the Unit 12 harvest coming from there. The Tok Cut-off produced 26 percent of the harvest and the Alaska Highway section contributed 16 percent. The White River and Chisana areas produced only 5 percent. The harvest location was not reported for the remaining 19 percent.

Approximately one-third of the total harvest occurred during November, with over half of that (25 animals) taken during the first week of November. Only seven antlerless animals were reported taken in Unit 12 during the 1972 season, a considerable decrease over past years. The average female harvest in Unit 12 since 1963 has been 29 animals. The reasons for the apparent decreased antlerless harvest is unknown at this time. Inaccurate harvest statistics are suspected of being at least partly responsible.

The following table summarizes the past harvest by area since 1969.

Area	<u>Harvest by Year</u>			
	1969	1970	1971	1972
Alaska Highway	29 (0)	30 (3)	29 (1)	23 (6)
Tok Cut-off	48 (0)	24 (1)	40 (2)	38 (4)
Nabesna Road	45 (4)	59 (14)	52 (25)	50 (28)
Wrangell Mtns.	15 (0)	12 (0)	9 (0)	7 (0)
Unknown Area	21 (2)	23 (4)	22 (1)	27 (9)
Total	158 (6)	139 (22)	152 (29)	145 (47)

(figure in parentheses is the November harvest.)

The following table illustrates how use of various transportation modes has changed between 1967 and 1972:

Mode	Percentage Increase Since 1967	Number Reported Used, 1972
Aircraft	425	34
Horse	34	20
Motor bike	200	2
Snowmachine	489	44
ATV	47	66
Highway vehicle	68	227
Boat	42	17

Total number of hunters reporting hunting in Unit 12 has increased 19 percent since 1967, while the harvest has decreased 20 percent and success ratio has decreased from 39 percent to 26 percent. The November harvest has increased from 4 percent in 1967 to 32 percent in 1972.

Composition and Productivity

Aerial composition surveys conducted during November in the Tok and Dry Tok River Valleys indicated that the calf:cow ratio has improved slightly since 1971, from 16:100 to 19:100. Moose seen per hour of flying re-

mained high (114/hr.) and the bull:cow ratio improved from 6:100 to 16:100. This area receives relatively light hunting pressure compared with roadside areas within Unit 12. Little is known about moose populations in other parts of Unit 12.

Survey data since 1968 are summarized below:

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

The aged jaw sample collected during the 1972 season was too small to be statistically significant, therefore, those data are not presented.

Range and Habitat

Five snow measuring stations were established along the Tok-Slana Highway in Unit 12 and snow depths are measured periodically at the stations throughout the winter. While the snow measurements are largely meaningless by themselves, when compared over several years they may show comparative differences which may partially indicate the severity of the winter so far as food gathering conditions for moose are concerned.

Browse utilization plots were established along the same route as the snow depth measurement stations. Browse utilization is classified as light, moderate and heavy. Green leaf willow (*Salix pulchra*) is the primary indicator species. When snowfall along the highway exceeds two feet, moose are forced to the valley floor and if this movement takes place before mid-December, browse utilization is 100 percent (all available twigs show use).

During the winter of 1972 snowfall was light, measuring less than two feet along the valley floor throughout the winter. Most moose remained in the foothills throughout the winter. Browse utilization on critical winter range along the Tok River valley was consequently light.

Population Trends

Moose population trend data are badly needed in Unit 12, both to measure the effectiveness of management programs and to help bolster public confidence by furnishing reliable population information. An attempt should be made to gather such information. Late winter aerial surveys when moose are concentrated near valley floors and are relatively easy to locate might be one possible way to gather trend data, and should be tried.

Management Summary and Recommendations

Distribution and abundance data gathered during moose composition surveys indicate that moose numbers have changed little since 1968 in the Alaska Range and in the Tok-Little Tok River drainages. Moose are sparse adjacent to road systems but increase away from highways, perhaps indicating that local roadside moose have been harvested and/or normal seasonal movements are such that moose are not normally found in these areas during the fall. Composition surveys are made in November. The shift in the harvest to November (4% in 1967 to 32% in 1972) could account for the sparsity of moose adjacent to the highways.

There is potential for increased harvests in the Tok River drainage (away from the highway) and in the Little Tok, but limited access restricts the number of people able to utilize these areas. Distances are too great for snow machines. Probably ORV's or ski-equipped aircraft offer the best means of access into these remote areas.

The Nabesna Road area has shown a fairly consistent harvest since 1969, but total moose populations there appear to be decreasing, and hunting success has decreased. Improved hunting techniques (ORV's and snow machines) may be responsible for maintaining the harvest level in the face of an apparently declining moose population. Over half of the Nabesna Road harvest now occurs during November, compared with only about 9 percent in 1969.

With the restricted seasons currently imposed in Unit 13, especially with respect to the elimination of antlerless and November seasons, some moose hunting pressure has shifted to Unit 12. The amount is difficult to determine because of the way the harvest ticket is designed. It is often difficult and sometimes impossible to determine where a hunter hunted unsuccessfully if he hunted in several units, as many people do.

November hunters are usually more successful than August or September hunters, presumably because the November snow cover permits use of more successful hunting transportation such as snow machines and ski planes. Moose are often easier to locate in November because of fall movements than during August and September. There is also some indication that November hunters are more determined than early fall "fair weather" hunters, and are willing to exert themselves more in an effort to obtain a moose.

Low calf survival continues to plague Unit 12 moose populations, the more important, specific causes of calf mortality are unknown. Predation and range condition are probably two of several possible causes. Nutritional and availability aspects of moose range in this unit may have an important bearing on moose welfare.

Heavy harvests in portions of Unit 12 have not succeeded in stimulating survival: indeed, some heavily hunted areas exhibit poorer calf/cow ratios than some unhunted areas. Weather conditions during the preceding winter appear to have little influence on summer and early fall calf survival.

Moose range rehabilitation through crushing, burning or chemical application should be experimented with in portions of Unit 12. Although we may not be able to confidently predict where such rehabilitation will do moose the most good, a program of experimental range rehabilitation should be initiated and carefully monitored to determine the results. In view of the difficulty experienced in utilizing fires to rehabilitate moose range in other areas, consideration should be given to use of the various herbicides as a means of removing undesirable vegetation.

The upper Tok River Dry Tok area has improved in bull:cow sex ratios since 1970 when only a few bulls could be located in either drainage. This improvement is likely to continue, barring unforeseen hunting pressure or natural disasters to the moose population. We should strive to maintain a sex ratio of about 20 bulls per 100 cows in this area, and should impose the required regulations if necessary. It may be necessary to impose some sort of restrictions along some of the road systems in the near future to encourage people to utilize relatively inaccessible moose populations. Manipulation of seasons by zones within a unit may be one possibility to ease pressure on roadside moose populations. Total roadside closures probably are not desirable, however, because of the enforcement difficulties that would be encountered and the large amount of area that would have to be closed in order for such closures to be effective in protecting moose. Because of the decreasing moose population along the Nabesna Road, more restrictive seasons should be imposed there. It is recommended that the antlerless season be eliminated along with the November bull season.

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

PREPARED BY:

Larry B. Jennings
Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 13 - Nelchina Basin

Seasons and Bag Limits

Subunit 13A	Aug. 20 - Sep. 20	One bull moose
Subunit 13B	Aug. 20 - Sep. 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. **
Subunit 13C	Aug. 20 - Sep. 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.**
Subunits 13D & 13E	Aug. 20 - Sep. 20 Nov. 1 - Nov. 20*	One bull moose

* The late season was closed on November 4, 1972 by Commissioner's announcement.

** The antlerless moose season was closed before the hunt by Commissioner's announcement.

From 1960 through 1966, the season for bull moose was Aug. 20 - Sep. 30 and Nov. 1-30. The late season was reduced to Nov. 1-20 during 1967 through 1969. The early season was reduced, and the season became Aug. 20 - Sep. 20, and Nov. 1 - 20 from 1970 through 1971. There have been antlerless moose seasons in addition to bull moose seasons since 1962 except for bull moose only seasons during 1965 and 1969. A portion of Unit 13 comprising what is now the eastern half of subunit 13A was closed to antlerless moose hunting during 1967 and 1968. Prior to 1970, antlerless moose seasons were 2 to 7 days in length. During 1970 and 1971, however, permits were issued to achieve designated harvest levels in subunits 13B and 13C only.

Harvests and Hunting Pressure

Harvest and hunting pressure information is summarized in Appendix I.

The annual bull harvest generally ranged between 1200 to 1400 until 1969. Reduced bull harvests during 1970 and 1971 may be partially attributed to the reduced early season length. However, the bull harvest dropped somewhat during 1971 in spite of a marked increase in numbers of hunters. The late season harvest during 1972 was low due to early closure of the late season by Commissioner's Announcement. The low early season harvest during 1972 coupled with the low hunter success suggest that there was also a reduced availability of moose to the hunters.

A comparison of age data from annual harvests in Unit 13 is given in Appendix II. These data were selected where possible to apply to the same area for trend comparisons. The mean age of bulls has been less than the mean age of cows, and fewer bulls were 6 years and older in comparison to cows. No increasing or decreasing trends are clearly apparent.

Composition and Productivity

Unit 13 moose population indices are shown on Figure 1. There were large fluctuations in the number of moose seen per hour of survey prior to 1964. These fluctuations were probably due to the gradual development of count areas with fixed boundaries, the gradual addition to previously existing count areas, and a gradual increase in survey intensity. Moose per hour values have had reduced fluctuations since 1964, and a line segment can be constructed to obtain the closest fit to the existing values. A point on this line at the 1964 intercept has the value of 80 moose per hour and another point on the line at the 1972 intercept has the value of 45 moose per hour, indicating a 44 percent decrease since 1964. Moose seen per hour of survey is an index of moose density, although this index may be influenced by many factors (LeResche and Davis, 1971). A line segment drawn through values of large bulls per 100 cows shows a decrease from 71 large bulls per 100 cows in 1952 to 15 large bulls per 100 cows in 1972, indicating a decrease of 79 percent. Large bulls per 100 cows is an index of hunting pressure when antlerless moose harvests have been nominal, and this has been the case in Unit 13. A straight line segment (dashed line in Figure 1) drawn through values for calves per 100 cows indicates a 56 percent reduction since 1952 (using values of 55 in 1952 and 24 in 1972). Another straight line segment through small bulls per 100 cows values indicates a 76 percent reduction (using values of 25 in 1952 and 6 in 1972). Small bulls per 100 cows is an index of overwinter calf survival, although harvests occurring before November composition surveys have probably had a major influence on this index.

Moose were apparently very scarce in Unit 13 during the early 1900's, even in timberline situations where they are now common (Powell, 1910). Moose did not become common enough in the Nelchina Basin to be a staple food source of local natives until the late 1920's (Tony Jackson and Joe Secondchief, personal communications). Moose apparently remained common through the 1930's and 1940's. Wolves were reduced throughout much of interior Alaska during 1908 to 1925 but regained abundance in the late 1920's (Murie, 1944). A predator control program with emphasis upon wolves was initiated by the federal Fish and Wildlife Service during 1948 through 1953. Reports by Fish and Wildlife personnel during the mid-1950's indicate that moose populations in Unit 13 were increasing in abundance

but still below carrying capacity of the range (Kelly, 1954). The increase in moose abundance may have been partly due to forest fires during 1900 to 1950 that created deciduous browse in lowland areas (Johnson, 1973). Utilization of winter range was excessive during the late 1950's and early 1960's (Rausch, 1969), and it seems probable that moose reached levels near or over sustained carrying capacity of the range. Rausch (1969) reported a substantial winter-kill during 1961-62. He also reported that winter range was recovering by the mid-1960's, indicating that moose may not have regained their former abundance following 1961-62. Declining moose abundance is evident since 1964 (Fig. 1). In retrospect, it appears that moose may have reached peak abundance in the late 1950's and early 1960's.

Whether populations of adult moose increase or decrease is a function of calf survival and immigration minus total mortality and emigration. Assuming that immigration and emigration roughly balanced each other, both increasing mortality and decreasing calf survival were probably responsible for declining moose abundance since 1964. A list of factors that must be considered as potentially causative or contributive would include hunting of bulls, hunting of cows, food competition by varying hares, deep snows, inadequate quantity of food, inadequate quality of food, wolf predation, and grizzly bear predation. These factors will be briefly discussed in an attempt to assess their importance. Disease and parasitism are believed to have been minor contributing factors to moose mortality.

Hunting of bulls could decrease total density and depress conception rates. In addition hunting of yearling bulls has probably depressed small bull:cow ratios. Moose per hour values have declined rapidly in heavily hunted areas, but these values have been stable or slowly decreasing in lightly hunted areas (count areas #11 and #15). Because bull harvests have been high relative to cow harvests, it seems probable that hunting of bulls has been a major cause of the rapid decrease in overall moose abundance. However, hunting of bulls has probably not been a major cause of decreasing calf survival because: (1) calf survival was decreasing while bulls were relatively abundant (Fig. 1) and (2) calf survival has been low in count areas #11 and #15 where large bull:cow ratios exceeded 40:100. An exception may occur in certain local areas where large aggregations of cows with only one bull during the rut could reduce conception rates and contribute to reduced numbers of calves seen during November. In summary, hunting of bulls may now be contributing to low calf:cow ratios in certain areas, but it has probably not been a major factor. Given low calf survival with a reduced potential for replacing losses, however, hunting of bulls has probably been a major cause of the decreasing moose density.

Moose calves are weaned in the fall, and cow harvests would probably not decrease calf survival prior to November composition counts. Cow harvests prior to 1971 have been low relative to bull harvests (Appendix I) and were consequently less important in depressing moose density.

Varying hares suffered a population decline in the mid-1950's and did not regain abundance until 1970 in the Boulder Creek-Chickaloon River vicinity (John Lester, personal communication), although they did undergo another population build-up with subsequent crash during 1965 elsewhere in Unit 13 (Rausch, 1969). Moose calf survival has remained relatively low since 1965, although the possibility of moose and hare competition for browse sufficient to affect moose abundance cannot be excluded.

Deep snows may cause periodic food shortages by burying low-growing browse and may also increase the energy cost of movement. By these means, deep snows may cause adult and calf mortality and may reduce calf:cow ratios the following year through effects on the cow and unborn calf. The winters of 1955-56, 1961-62, 1965-66, 1966-67, 1970-71, and 1971-72 had unusually deep snow depths in at least part of Unit 13. Fall calf:cow ratios were depressed during 1956, but they regained former levels in the late 1950's. In contrast, fall calf:cow ratios were depressed during 1962, the mid-1960's, and the early 1970's, but the amplitude of recovery during intervening mild winters was reduced. It is believed, therefore, that severe winters have been a major influence on subsequent fall calf:cow ratios, but other factors must have been influential in depressing calf survival following mild winters since the mid-1960's. Correlations of snow depths from weather stations located near specific count areas do not discount this hypothesis.

An assessment of browse as a limiting factor must be speculative because of the lack of objective data. As suggested previously, winter browse may have been limiting during the late 1950's and early 1960's when moose were at peak abundance and calf survival was reduced from values seen during the early 1950's. The possibility exists that the quantity and/or quality of moose forage has been steadily reduced since the early 1960's through maturation of fire-caused subclimax vegetation, over-browsing or climate-induced change of riparian willows, or other factors. Limited observations suggest that gradual changes in the quantity of food supply (in contrast to periodic shortages during winters with deep snows) have not been responsible for the declining moose calf survival during recent years. As an example, the moose population(s) in the Gulkana and Chistochina River basins was reduced by substantial bull and cow harvests during 1971 and by a heavy winter-kill during 1971-72. Although the winter of 1972-73 was mild, the 1973 calf crop was poor in these areas. The inference made is that the moose population(s) was reduced below carrying capacity of the range by harvesting and winter-kill, but productivity did not increase following a mild winter as it should have if moose were limited by quantity of food. However, as discussed by LeResche, Franzmann, and Arneson (1973), declining browse quality may have had a major influence on low calf survival during recent years.

Wolf predation could be a contributing factor to adult moose mortality and could also be a major influence on calf survival. A series of straight line segments (solid lines in Figure 1) were found to make a better fit of calves per 100 cows values and small bulls per 100 cows values than single line segments. Maximum wolf population estimates prior to 1968 (Figure 1) are based on data by Rausch (1969). Wolf abundance during 1970 is based on an

assessment by Johnson (Stephenson and Johnson, 1972). A U.S. Fish and Wildlife service predator control program during 1948 to 1953 reduced wolf numbers to a low level. Wolves subsequently increased to peak levels during the mid-1960's and again during 1970. The inverse correlation between high wolf abundance and depressed calf survival (Fig. 1) may be causative. Studies of winter food habits of wolves in the Nelchina Basin (Stephenson and Johnson, 1972) have shown moose to be a principal prey species. Limited evidence based on analysis of wolf scats from two dens in the Nelchina Basin suggests that wolves may select for moose calves (vs adults) during the summer months.

The limited information on grizzly bears in the Nelchina Basin coupled with reports by local guides and air taxi operators indicate that grizzly bears have continuously increased in abundance since the 1950's. I have received numerous reports of grizzly bears feeding on moose carcasses. However, the extent of grizzly bear predation on moose, as opposed to scavenging, is unknown.

Management Summary and Conclusions

Moose seasons have generally become more restrictive as moose abundance and bull:cow ratios have declined in the Nelchina Basin. Adding effects of the decreased moose density and decreased bull:cow ratio, there may be one seventh as many bull moose in the Nelchina Basin during 1972 as compared to the late 1950's. Reductions in the numbers of bulls have probably been greater in some areas. The increased prevalence of ORVs and snow machines since the early 1960's has made possible greatly increased access into previously lightly hunted areas. Harvests have probably been maintained during recent years by continual utilization of new hunting areas.

Moose composition data since the early 1950's show substantial reductions in calf survival and moose density. A combination of increasing total mortality and decreasing calf survival has probably been responsible for the declining moose density. Several factors may have had varying degrees of influence in causing this declining abundance.

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

Recommendations

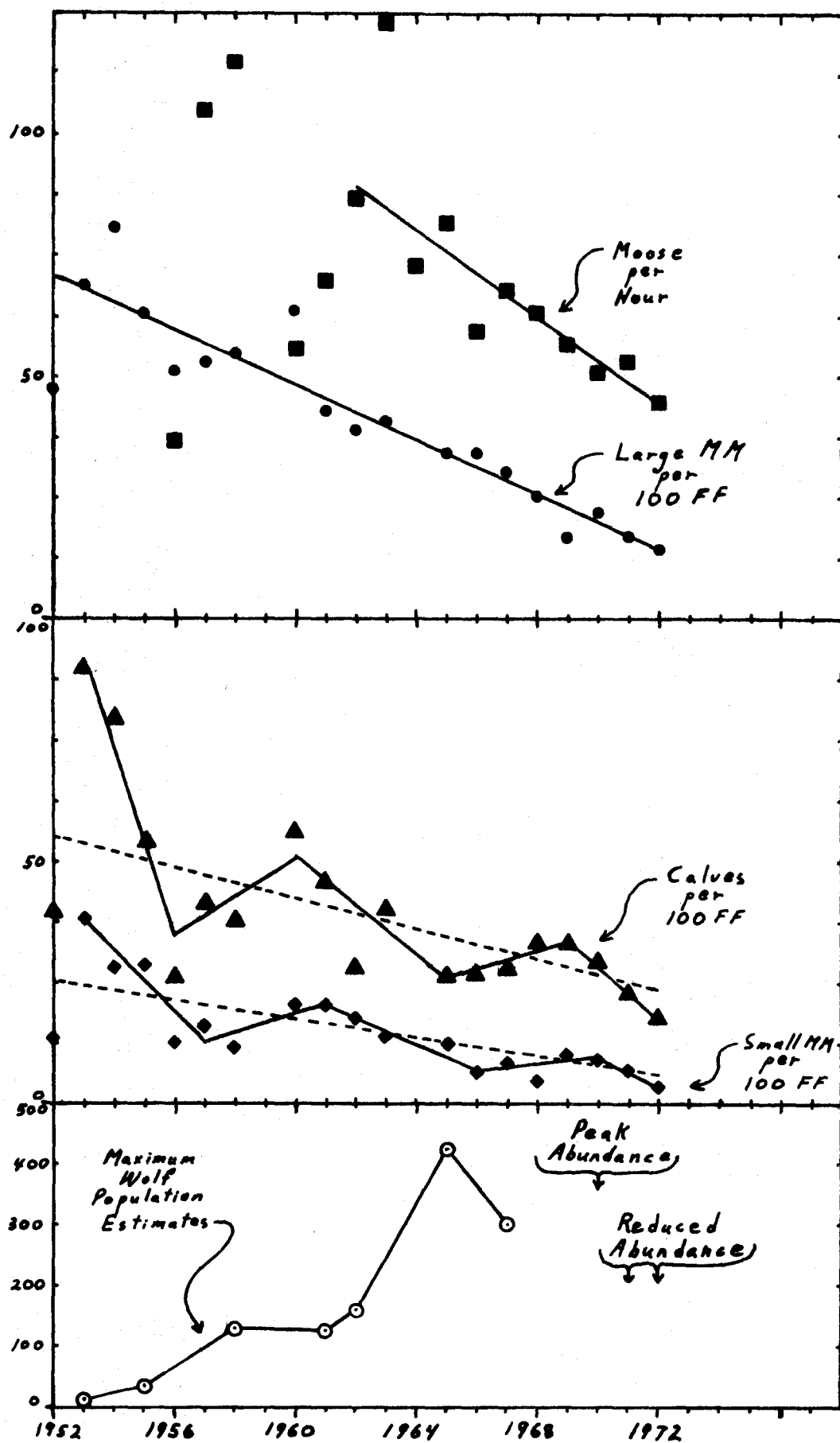
Unless the present trend is reversed, moose in Unit 13 may become markedly less abundant in the near future. A reasonable program for the future could consist of establishing a 2-year field study to test the hypothesis that wolf predation has been the limiting factor on moose abundance. Concurrently, investigations should be made in Unit 13 to establish natality rates (or late pregnancy rates), the nutritional adequacy of moose diets, and movement studies to indicate seasonally important habitat.

Hunting of bull moose should be continued throughout the Nelchina Basin with subunit seasons adjusted to prevent large bull per 100 cow ratios from falling below a specified level (perhaps 5:100). There are heavily-hunted areas in Unit 13 with stabilized but low bull:cow ratios, suggesting that the increasingly unproductive hunter effort (indicated by reduced hunter success) will prevent bull:cow ratios from reaching dangerously low levels in many areas. This may be particularly true if the bull moose season is adjusted to not coincide with seasons of alternate game species. Antlerless moose harvests should be discontinued because there has been no evidence of density dependent changes in productivity in Unit 13 since the mid-1960's. With these harvesting techniques, an opportunity for ~~maximum~~ recreational use of moose can still be safely provided.

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- Submitted by: Carl McIlroy, Game Biologist III

Figure 1. A comparison of Unit 13 moose population indices and estimates of wolf abundance for the period 1952 through 1972.



MOOSE - GMU 13 - Nelchina Basin

APPENDIX I

A Comparison of Annual Moose Harvest and Hunting Pressure

Year	Season	Male	Female	Unknown	Total	Hunters	Percent Success
1963	Total	1385	343	7	1735		
1964	Total	1213	394	0	1607		
1965	Total	1318	3	10	1331		
1966	Total	1336	181	36	1553	4163	27
1967	1st	1009	319				
	2nd	112	0				
	Total	1217*	319	16	1552	4027	39
1968	1st	1013	243				
	2nd	171	0				
	Total	1240*	243	29	1512	4476	34
1969	1st	817	0				
	2nd	87	7	8			
	Total	1204*	7	8	1219	3381	36
1970	1st	746	56	14			
	2nd	271	58	8			
	Total	1141*,***	158***	30*	1329	3585	37
1971	1st	703	333				
	2nd	205	338				
	Total	1126*	671****	18	1815	4881	36
1972	1st	559	5	7			
	2nd	39	2	1			
	Total	689*	7*	16*	712	3199	22

* Date unknown kills are included.

** 220 antlerless moose were known killed.

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

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

Submitted by: Carl McIlroy, Game Biologist III

APPENDIX II

A Comparison of Age Indices of Moose from Annual Harvests in Unit 13

Males

Year	Area	Mean Age* (excluding Calves)	Percent older than 6 years	Sample Size
1964	Denali Check Sta.	2.7	5.8	104
1965	Denali Check Sta.	3.1	0.0	89
1966	Denali Check Sta.	4.0	16.7	125
1966	Total Unit	4.0	15.8	222
1967	Denali Check Sta.	3.7	13.1	153
1968	Denali Check Sta.	3.9	19.2	130
1969	Denali Check Sta.	3.4	14.5	186
1970	13B	3.4	10.4	103
1971	13B	2.4	12.4	153
1972	Mainly, Denali Check Sta.	3.4	14.1	71

Females

Year	Area	Mean Age* (excluding Calves)	Percent older than 6 years	Sample Size
1964	Denali Check Sta.	6.0	39.7	58
1966	Denali Check Sta.	6.4	46.9	32
1967	Denali Check Sta.	4.3	17.8	45
1968	Denali Check Sta.	5.2	20.0	25
1970	13B	5.7	54.4	68
1971	13B	6.2	41.2	318

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

Submitted by: Carl McIlroy, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Subunit 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 IBM reported harvest of moose in Subunit 14A totaled 309 animals, of which 212 were males, 94 were females, and 3 were of unknown sex. Appendix I presents IBM harvest data from 1968 through 1972.

Appendix II reveals that 26 of 85 male moose (31 percent) harvested in Game Management Subunit 14A were taken from September 8 through September 23. If harvest pressures do not shift, a reduction in season on males during this period, in theory, would assist in raising the bull/cow ratio. The male moose harvested during the 16th through the 20th of November accounted for 32 percent of the bulls taken during the second season in Game Management Subunit 14A. A decrease in season length during this time period may also prove beneficial to the bull/cow ratio.

One antlerless hunt was held in Subunit 14A during 1972. All of the subunit was included in the hunt except the portion described in Appendix III. The hunt ran from September 1 to September 20, with 94 female moose reported taken by hunters who turned in harvest reports. A second antlerless season in Subunit 14A was not held when it became apparent through aerial sex and age composition data collected in November and December 1972, that severe winter conditions in 1970-71 had resulted in poor calf survival.

Because the antlerless moose permit stipulated that successful hunters must report to Alaska Department of Fish and Game field stations and bring in moose incisors for aging, biologists were able to tally a greater number of successful antlerless moose hunters than from harvest reports. The data collected reveal that 102 adult females, 5 female calves, and 2 male calves were actually taken.

Permits for the antlerless hunt were issued on a first-come, first-served basis from July 31, through August 4, 1972. Because a large number of individuals desired permits for Subunit 14A, the quota was issued within a few hours after Alaska Department of Fish and Game offices opened on July 31. A total of 524 permits were issued (Appendix IV).

Because a large percentage of successful hunters voluntarily turned in their antlerless permits during the 1971 antlerless season, only successful permittees who took an antlerless moose during 1972 were required to turn in their permits. The 109 antlerless moose harvested represents 22 percent of the regulatory allowable harvest of 500.

Due to report deadlines the data collected on moose mortality during the winter of 1972-73 in Subunit 14A from causes other than hunting are not complete at this writing. Appendix V discloses verified moose mortality from such causes for Subunit 14A during the period June 1, 1971 through May 31, 1972. Documented highway-killed moose totaled 109, illegal kills 45, train kills 15, incidental kills 29, and winter kills 25; for a total of 223. Of the 223, the ratio of adult females to adult males was approximately 4.5 to 1.

Composition and Productivity

A sex and age composition count of 1,395 was conducted during the period November 30 through December 2, 1972 in count areas 1 through 8 (Appendix VI). With nearly two times as many bulls harvested as cows in 1972, the bull/cow ratio decreased slightly and predictably from 9.9 bulls/100 cows in 1971 to 8.6 bulls/100 cows in 1972. The calf ratio dropped from 39.9 calves/100 females to 29.0 calves/100 females over the same period. The incidence of twins also dropped from 3.4 twins/100 females with calf in 1971 to 2.1 twins/100 females with calf in 1972.

Ninety-five female moose incisors from hunter-killed moose were collected processed and read at the Palmer office of the Alaska Department of Fish and Game. Of the 90 adult female moose incisors acquired, 32.2 percent were seven years old or older (Appendix VII). This is comparable to the reported percentage (34.3 percent) of that age segment of the females harvested in 1971.

Sixty-eight adult female moose incisors from train, automobile, incidental and illegally killed moose were collected during the period June 1, 1971 through May 31, 1972. Processing and reading was done in the Palmer office of the Alaska Department of Fish and Game. Of this sample, 33.8 percent were seven years or older, which is comparable to 34.3 percent females of the same age class taken during the fall 1971 hunting season.

The average age of ten male moose jaws acquired during the 1972 hunting season was 1.7 years. In 1971 the average age was 2.2 years. In both years' data, sample sizes are too small to be meaningful.

The average age of sixteen adult male moose killed by train, automobile, incidental, or illegal causes in Game Management Subunit 14A during the period June 1, 1971 through May 31, 1972 was 4.75 years (Appendix VIII).

Management Summary and Conclusions

The 1972 moose harvest was significantly lower than the 1971 harvest although the total number of bulls taken was slightly higher than the number reportedly taken in 1967 (200).

Hunters with antlerless moose permits during the September 1972 antlerless hunt were less successful (21 percent successful) than were antlerless permit holders during the September 1971 season (33 percent successful).

Verified nonhunting mortality during the winter 1971-72 was only slightly higher (223) than during the winter of 1970-71 (219). However, verified winter kills rose from 15 in 1970-71 to 25 in 1971-72.

Sex and age composition counts reveal a downward trend in the moose population in Game Management Subunit 14A. In 1968, 2,378 moose were tallied at the rate of 54 moose/hour, in 1971, 2,063 at 34.8/hour, and in 1972, 1,395 at 28.1/hour.

Bull/cow ratios have declined from 16.4 bulls/100 cows in 1968 to 8.6 bulls/100 cows in 1972 due primarily to unchanged bull seasons and restricted or cancelled antlerless seasons.

Similarly, calf/cow ratios declined from 48.4 calves/100 cows in 1968 to 29.0 calves/100 cows in 1972. Twinning rates have also declined.

Age data reveal fairly constant average ages for female moose during the past several years. Average ages of bull moose taken by hunters in Game Management Subunit 14A have been much lower than average ages of moose killed during winters from automobile, train, illegal, and incidental causes. This suggests that many of the moose in Subunit 14A may not be available to hunters during the present regulatory moose seasons.

In general, a decline in the Subunit 14A moose population during the past several years and particularly during the winter of 1971-72 has been observed. Unusually severe weather during the winters 1970-71 and 1971-72 has undoubtedly been a significant factor. In addition, a lowering bull/cow ratio may be causing a decrease in calf survival by extending the breeding season. Calves born late in the spring probably have less chance of survival upon entering the winter period. A decline in available browse in Subunit 14A may also be contributing to this reduction of the moose population. The change in the amount of available browse has been brought about by more efficient fire control in Subunit 14A and by a reduced number of abandoned homestead clearings.

Recommendations

Reduce the 1973 bull moose season in Game Management Subunit 14A by ten days in the September season and ten days in the November season. The new season should run from August 20, through September 10, and November 1, through November 10. This proposal will retain traditional opening dates on bull moose, and still allow for a reduced bull harvest. The bull/cow ratio should be closely watched and if it fails to increase, other courses of action should be taken.

A program to rehabilitate moose browse in Subunit 14A should be initiated as soon as possible.

Submitted by: Jack C. Didrickson, Game Biologist III
Donald Cornelius, Game Biologist II

1972

Moose - GMU 14 (A)

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

Year	Date	Season	Bulls	Cows	Unid.	Total	Number of Hunters	Percent Success
1968	8/20-9/30	First	187	0	0	187		
	11/1-11/20	Second	209	0	0	209		
	To be announced	Antlerless	Season cancelled by Public Pressure					
		Unk. Date	15	0	3	18		
		TOTAL	411	0	3	414	1773	23.4
1969	8/20-9/20	First	213	0	4	217		
	11/1-11/20	Second	84	1	2	87		
	1/28-2/5/70	Antlerless	28	93	3	124		
		Unk. Date	109	47	0	156		
		TOTAL	434	141	9	584	1169	50.4*
1970	8/20-9/20	First	182	0	1	183		
	11/1-11/20	Second	102	0	6	108		
	To be announced	Antlerless	Season Cancelled by Public Pressure					
		Unk. Date	79	2	4	85		
		TOTAL	363	2	11	376	897	41.9
1971	8/20-9/20	First	177	0	1	178		
	11/1-11/20	Second	225	0	0	225		
	9/1-9/20	Antlerless - 1st	0	101	0	101		
	11/1-11/14	Antlerless- 2nd	0	233	0	233		
		Unk. Date	127	145	9	281		
		TOTAL	529	479	10	1018	2090	No Data
1972	8/20-9/20	First	83	1	1	85		
	11/1-11/20	Second	100	1	0	101		
	9/1-9/20	Antlerless - 1st	0	75	0	75		
	To be announced	Antlerless - 2nd	Season cancelled				No Data	No Data
		Unk. Date	29	17	2	48		
		TOTAL	212	94	3	309		

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

Submitted by: Jack C. Didrickson, Game Biologist III and
Donald Cornelius, Game Biologist II

Appendix II. Chronology of moose harvest in Alaska's GM Subunit 14A, 1972

	<u>August</u> 20 - 31	1-7	8-15	<u>September</u> 16-23	24-30	1-7	<u>October</u> 8-15	16-23	24-31	<u>November</u> 1-7	8-15
M	43	14	9	17	2			1		41	27
F	1	37	18	20	0			0		0	0
?	0	1	0	0	0			0		0	0
Total	44	52	27	37	2			1		41	27

	<u>November</u> 16-23	24-30	1-7	8-15	<u>December</u> 16-23	24-31	<u>Jan.Feb.</u>	<u>No date</u>
M	32							26
F	1							17
?	0							2
Total	33							45

Total M - 212
Total F - 94
Total ? - 3

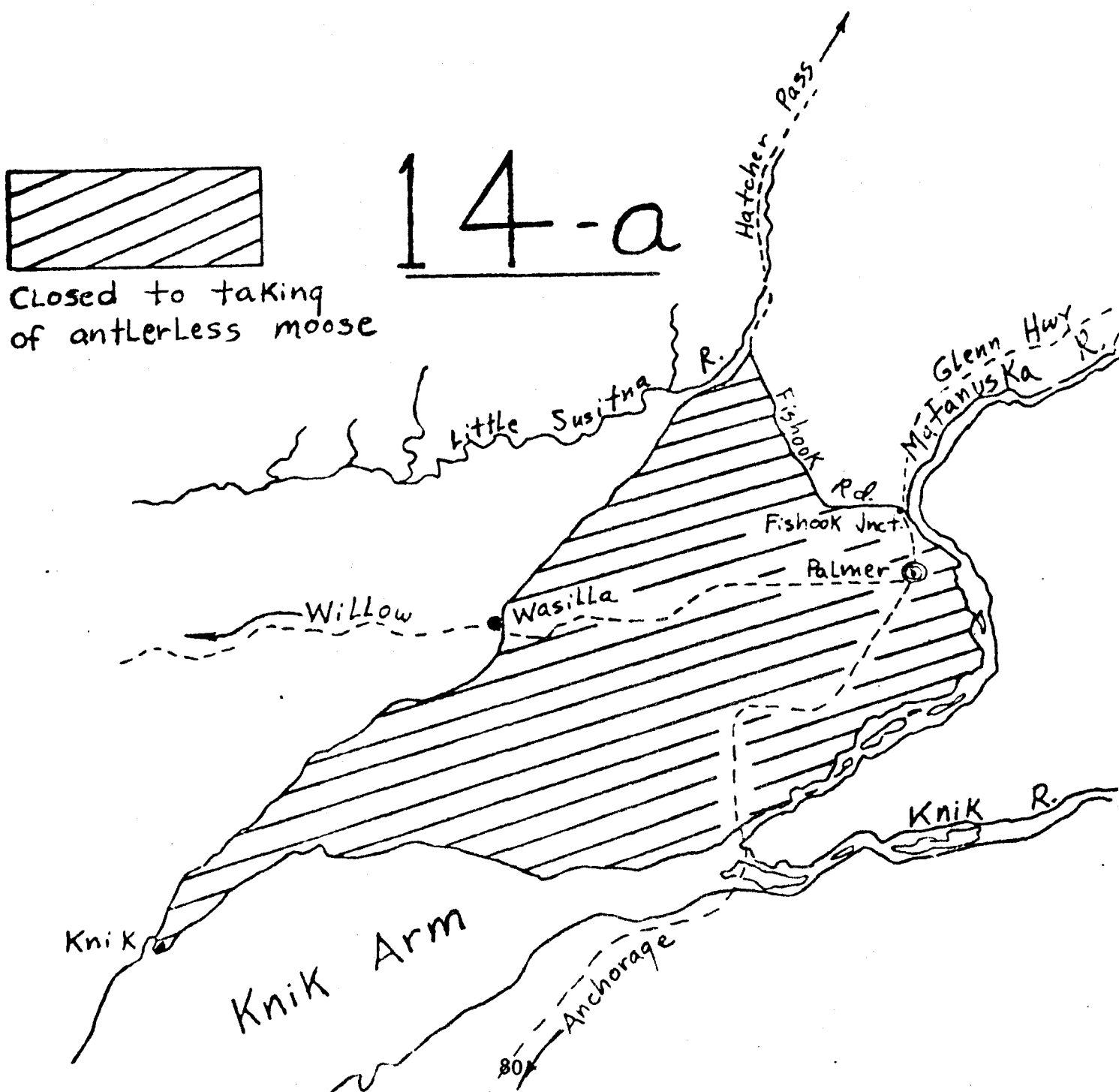
Total 309

Submitted by: Jack Didrickson, Game Biologist III
Donald Cornelius, Game Biologist II

Appendix III. Area Closed to the Taking of Antlerless Moose in Alaska's
Game Management Subunit 14A, 1972.

SEPTEMBER 1-20, 1972

The area enclosed by a line drawn from the townsite of Knik northeasterly following the highway to Wasilla; thence following the Wasilla Fish Hook Road northeasterly to the Fish Hook Road Junction; then southerly on the Fish Hook Road to the Matanuska River; thence downstream to the Knik Arm and following its north shore to the point of beginning, the townsite of Knik is closed to the taking of antlerless moose.



Appendix IV. Antlerless moose permits issued and antlerless moose harvested in Alaska's Game Management Subunit 14A, 1971 and 1972 Hunting Seasons.

<u>Season</u>	<u>Permits Issued</u>	<u>Permits Returned</u>	<u>Antlerless Moose (F adults, M and F calves) Harvested</u>
Sept. 1 - 20, 1971	502	491 (98%*)	166 (33% of 500)
Nov. 1 - 14, 1971	687	647 (94%*)	354 (71% of 500)
Combined seasons, 1971	1189	1138 (95%*)	520 (104% of 500)
Sept. 1-20, 1972	524	Only hunters Successfully taking antlerless moose required to return permits.	109 (22% of 500)

* Not completely voluntary returns; Alaska Department of Fish and Game personnel contacted as many non-returnees as possible.

Submitted by: Jack Didrickson, Game Biologist III
Donald Cornelius, Game Biologist II

Appendix V. Verified Moose Mortality (Excluding Hunting) in Alaska's Game Management Subunit 14A, June 1, 1970 - May 31, 1971 and June 1, 1971 - May 31, 1972.

1970-71

Road Kill						Train Kill						Incidental Kill						Illegal Kill						Winter Kill					
*Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.	
M.	F.	M	F			M.	F.	M	F			M.	F.	M	F			M.	F.	M	F			M.	F.	M	F		
18	31	15	31	4	99	6	4	-	1	11	22	2	10	7	10	2	31	3	20	5	6	18	52	1	6	5	3	-	15

1971-72

88 8 35 27 28 11 109 2 4 0 3 6 15 6 13 2 3 5 29 3 30 0 4 8 45 0 6 8 10 1 25

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

Non-hunting kill, 1970-71

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

Total 219

Non-hunting kill, 1971-72

Adult Male = 79
 Adult Female = 88
 Calf Male = 37
 Calf Female = 48
 ? Sex & Age = 31

Total 223

Submitted by: Jack Didrickson, Game Biologist III
 Donald Cornelius, Game Biologist II

Appendix VI. Moose Sex and Age Composition and Ratios - Alaska's Game Management Subunit 14 (A).

Year	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unfd. Sex & Age	Total Sample	Count Time (Hrs.)	Moose per Hour
1968 12/2- 6, 14	138	98	236	793	603	42	1438	1674	9	696	8	2378	43.7	54
1969	Sex and age composition counts were not conducted due to unfavorable weather conditions.													
1970 11/24-27	83	60	143	957	543	48	1548	1694	13	652	19	2360	48.1	49
1971 11/23-24, 29	58	78	136	866	485	17	1368	1504	27	546	13	2063	59.20	34.8
1972 11/30- 12/2	34	52	86	715	274	6	995	1081	3	289	25	1395	49.7	28.1

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

Submitted by: Jack Didrickson, Game Biologist III
Donald Cornelius, Game Biologist II

Appendix VII. Ages of Female Moose Taken by Hunters During Antlerless Moose Seasons, 1971 and 1972; and Train, Automobile, Illegal, and Incidental Kills During the Periods June 1 through May 31, 1970-71 and 1971-72 in Alaska's Game Management Subunit 14 A.

Age	Miscellaneous* Kills June 1, 1970 - May 31, 1971		Hunter Kills Sept. 1 - 20 and Nov. 1 - 14, 1971		Miscellaneous* Kills June 1, 1971 - May 31, 1972		Hunter Kills Sept. 1 - 20, 1972	
Calf	36	81.8%**	39	8.9%	38	55.9%	5	5.6%
1+	3	6.8%	62	14.2%	12	17.6%	16	17.8%
2+	5	11.4%	85	19.5%	10	14.7%	14	15.6%
3+	9	20.5%	57	13.0%	11	16.2%	8	8.9%
4+	2	4.5%	41	9.4%	3	4.4%	11	12.2%
5+	9	20.5%	24	5.5%	5	7.4%	7	7.8%
6+	4	9.1%	18	4.1%	4	5.9%	5	5.6%
7+	2	4.5%	35	8.0%	5	7.4%	5	5.6%
8+	1	2.3%	28	6.4%	3	4.4%	4	4.4%
9+	0	0.0%	25	5.7%	3	4.4%	3	3.3%
10+	1	2.3%	10	2.3%	2	2.9%	5	5.6%
11+	2	4.5%	17	3.9%	5	7.4%	3	3.3%
12+	1	2.3%	13	3.0%	2	2.9%	4	4.4%
13+	1	2.3%	6	1.4%	1	1.5%	5	5.6%
14+	0	0.0%	7	1.6%	0	0.0%	0	0.0%
15+	2	4.5%	5	1.1%	1	1.5%	0	0.0%
16+	1	2.3%	2	0.5%	1	1.5%	0	0.0%
17+	0	0.0%	1	0.2%	0	0.0%	0	0.0%
18+	0	0.0%	0	0.0%	0	0.0%	0	0.0%
19+	1	2.3%	1	0.2%	0	0.0%	0	0.0%
Total	44 adults + 36 calves		437 adults + 39 calves		68 adults + 38 calves		90 adults + 5 calves	
Mean Age Excl. Calves	- 5.93		5.15		5.22		5.19	
% over 6 years =	27.3%		34.3%		33.8%		32.2%	

* Miscellaneous kills include Automobile, Train, Incidental, and Illegally killed moose.

** Calves not included in calculating percentage in each age class, but calf percent is included for comparison

Appendix VIII. Ages of Male Moose Taken by Hunters During Moose Seasons, 1971 and 1972; and Train, Automobile, Illegal, and Incidental Kills During the Periods June 1 through May 31, 1970-71 and 1971-72 in Alaska's Game Management Subunit 14 A.

Age	Miscellaneous* Kills		Hunter Kills		Miscellaneous* Kills		Hunter Kills	
	June 1, 1970 - May 31, 1971		Aug. 20 - Sept. 20 & Nov. 1 - 20, 1971		June 1, 1971 - May 31, 1972		Aug. 20 - Sept. 20 & Nov. 1 - 20, 1972	
Calf	23	164.3%	13	45.8%	29	181.3%	2	20.0%
1+	2	14.3%	16	55.2%	1	6.3%	6	60.0%
2+	2	14.3%	7	24.1%	1	6.3%	1	10.0%
3+	2	14.3%	3	10.3%	3	18.8%	3	30.0%
4+	1	7.1%	1	3.4%	4	25.0%	0	0.0%
5+	4	28.6%	0	0.0%	1	6.3%	0	0.0%
6+	0	0.0%	0	0.0%	4	25.0%	0	0.0%
7+	0	0.0%	0	0.0%	1	6.3%	0	0.0%
8+	1	7.1%	1	3.4%	0	0.0%	0	0.0%
9+	1	7.1%	0	0.0%	0	0.0%	0	0.0%
10+	0	0.0%	0	0.0%	0	0.0%	0	0.0%
11+	1	7.1%	0	0.0%	0	0.0%	0	0.0%
12+	0	0.0%	1	3.4%	1	6.3%	0	0.0%
13+	0	0.0%	0	0.0%	0	0.0%	0	0.0%
14+	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	14 adults + 23 calves		29 adults + 13 calves		16 adults + 29 calves		10 adults + 2 calves	
Mean Age Excl. calves =	4.57		2.17		4.75		1.7	
% over 6 years =	21.4%		6.9%		12.5%		0.0%	

* Miscellaneous kills include Automobile, Train, Incidental, and Illegally killed moose.

** Calves not included in calculating percentage in each age class, but calf percent is included for comparison.

Submitted by: Jack Didrickson, Game Biologist III
Donald Cornelius, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Subunit 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

The final IBM reported harvest in Subunit 14B totaled 48 moose, of which 35 were males and 13 were females. Appendix I presents IBM reported harvest data from 1968 through 1972.

One antlerless hunt was held in Subunit 14B from September 1 through September 30. Thirteen female moose were reported taken by hunters who turned in harvest reports. A second antlerless season in Subunit 14B was not held when hunts in GMU's 13, 7, 15, and 16 were cancelled due to poor winter conditions in 1971-72 which in turn led to high calf mortality.

Because the antlerless moose permit stipulated that successful hunters 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 antlerless moose hunters than those reporting on harvest reports. These data indicated that 16 adult females were taken during the above mentioned antlerless season.

The antlerless permits for 14B were issued on a first-come, first-served basis with the permits available from July 31, through August 4, 1972; however, the entire quota of 222 permits was issued during the first day (Appendix II).

Only successful permittees were required to turn in their permits. The 16 antlerless moose harvested represent 4.6 percent of the regulatory allowable harvest of 350.

Due to report deadlines, the data collected on moose mortality during the winter of 1972-73 in Unit 14B from factors other than hunting are not complete at this writing. Appendix III discloses verified moose mortality from causes other than hunting for Subunit 14B during the period June 1, 1971 through May 31, 1972. Documented highway kills totalled 7, illegal kills 6, train kills 75, incidental kills 3, and winter kills 19, for a total of 110.

The ratio of adult female to adult male moose from this sample was approximately 1 to 1.

Composition and Productivity

A sex and age composition count of 1,142 moose was conducted during the period December 5 through 15, 1972 in Subunit 14B (Appendix IV). The bull/cow

ratio decreased slightly from 25.3 bulls/100 cows in 1971 to 22.1 bulls/100 cows in 1972. The calf ratio held fairly constant, with 29.5 calves/100 cows observed in 1971 and 28.2 calves/100 cows in 1972. The incidence of twins dropped from 3.6 twins/100 females with calf in 1971 to 2.4 twins/100 females with calf in 1972.

Sex and age composition counts conducted in the Willow to Little Willow area revealed a ratio of 4.9 bulls/100 cows. The low bull/cow ratio in this area could possibly be attributed to the access available to hunters in the uplands of Willow Creek on a swamp buggy road called the Peters-Purchases Creek trail.

As a condition of the permit, successful antlerless moose hunters were required to turn in their antlerless moose jaws to an Alaska Department of Fish and Game office. Thirteen female moose incisors were collected, processed and read at the Palmer office. Of this very small sample, 15.4 percent were seven years or older (Appendix V). This is much lower than the 36.7 percent of that age segment found in the females harvested in 1971. Small sample size in 1972 could explain this discrepancy.

Thirteen adult female moose incisors from train, automobile, incidental and illegally killed moose during the period June 1, 1971 through May 31, 1972 were collected, processed and read at the Palmer office. Of this sample, 38.5 percent were seven years or older. Again, the sample size may be too small to be meaningful.

No male moose jaws from Subunit 14B were acquired during the 1972 hunting season. The average age of fifteen adult male moose killed by train, automobile, incidental or illegal causes in GMU 14B during the period June 1, 1971 through May 31, 1972 was 3.34 years (Appendix VI).

Management Summary and Conclusions

The 1972 moose harvest in Subunit 14B was significantly lower than the 1971 harvest. The 1972 bull harvest was only 28 percent of the 1971 harvest while the 1972 cow harvest was only 7 percent of the 1971 harvest.

Hunters with antlerless moose permits during the September, 1972 antlerless season were slightly less successful (7.2 percent successful) than were antlerless permit holders during the September, 1971 season (7.9 percent successful).

Verified nonhunting mortality during the winter of 1971-72 was approximately half of the nonhunting mortality during the winter of 1970-71. The reduction in verified kills during the very severe winter of 1971-72 may be attributed to the late date which Fish and Game surveys were made and to the fact that concentrations of wintering moose during the winter of 1971-72 did not appear to be along the road-railroad belt as they were during the previous winter.

Sex and age composition counts reveal a downward trend in the moose population in Game Management Subunit 14B. The number of moose tallied in 1972 was 37 percent less than were seen in 1971, and the moose counted per hour were down 39 percent. Bull/cow, calf/cow, and twinning ratios have declined slightly.

Average ages of female moose killed from automobile, train, incidental or illegal causes during the winters 1970-71 and 1971-72 and by hunters during the 1971 hunting season are fairly consistent. The same may be said of average ages of bull moose during the same time periods.

In general, a decline in the 14B moose population during the past several years, and particularly during the winter of 1971-72, has been observed. Unusually severe weather during the winters of 1970-71 and 1971-72 has undoubtedly been a significant factor. The scarcity of available moose browse in much of Subunit 14B is, and will continue to be, a limiting factor on this moose population until steps are taken to alleviate the situation.

Recommendations

Reduce the 1972 bull moose season in GMU 14B.

A program to rehabilitate moose browse in Subunit 14B should be considered.

Submitted by. Jack Didrickson, Game Biologist III

1972 Moose - GMU 14B

Appendix 1. Moose harvest and hunting pressure - Subunit 14B

Year	Date	Season	Bulls	Cows	Unid.	Total	Number of Hunters	Percent Success
1968	8/20-9/30	First	67	0	0	67		
	11/1-11/20	Second	67	0	0	67		
	To be announced	Antlerless	Season canceled by public pressure					
		Unk. Date	9	0	0	9		
		Total	143	0	0	143	473	30.2
1969	8/20-9/30	First	37	0	0	37		
	11/1-11/20	Second	25	0	0	25		
	1/28/2/5/70	Antlerless	29	30	0	59		
		Unk. Date	30	16	0	46		
		Total	121	46	0	167	310	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 canceled by public pressure					
		Unk. 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		
		Unk. Date	40	43	0	83		
		Total	124	183	5	312	890	35.0
1972	8/20-9/30	First	13	0	0	13		
		Second	12	0	0	12		
		Antlerless	0	13	0	13		
		Unk. Date	10	0	0	10		
		Total	35	13	0	48	286	16.7

Submitted by: Jack Didrickson, Game Biologist III

Appendix II. Antlerless Moose Permit Information, Subunit 14B, 1971, 1972

<u>Season</u>	<u>Permits Issued</u>	<u>Permits Returned</u>	<u>Antlerless Moose (female adults, male and female calves) Harvested</u>
Sept. 1-Sept. 30, 1971	992	692 (70%)	78 (33% of 350)
Nov. 1-Dec. 15, 1971	570	512 (90%*)	176 (50% of 350)
Combined seasons, 1971	1562	1204 (77%)	254 (73% of 350)
Sept. 1-Sept. 30, 1972	222	Only hunters successfully taking antlerless moose required to return permit.	16 (4.6% of 350)

* Increased % of returns may be due to individually instructing permitters during second season.

Submitted by: Jack Didrickson, Game Biologist III

Appendix III. Verified Moose Mortality (Excluding Hunting) in Alaska's Game Management Subunit 14B, June 1, 1970 through May 31, 1971 and June 1, 1971 through May 31, 1972.

1970 - 71																													
Road Kill						Train Kill						Incidental Kill						Illegal Kill						Winter Kill					
*Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.		Ad.	Ad.	Calf	?	Tot.	
M.	F.	M	F			M.	F.	M	F			M.	F.	M	F			M.	F.	M	F			M.	F.	M	F		
0	7	0	0	3	10	16	43	7	9	40	115	0	0	0	0	0	0	1	0	0	1	0	2	24	9	19	24	5	81
1971 - 72																													
2	1	2	1	1	7	13	18	7	7	30	75	3	0	0	0	0	3	3	3	0	0	0	6	3	4	8	4	0	19

1971 - 72																													
2	1	2	1	1	7	13	18	7	7	30	75	3	0	0	0	0	3	3	3	0	0	0	6	3	4	8	4	0	19

Non-hunting kill, 1970-71

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

208

Non-hunting kill, 1971-72

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

110

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

Submitted by: Jack Didrickson, Game Biologist III

Appendix IV. Moose Sex and Age Composition and Ratios - Alaska's Game Management Subunit 14 (B).

Year	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs.)	Moose per Hour
1968 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
1972 12/5-15	148	19	167	550	201	5	756	923	2	213	6	1142	36.0	31.7

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

Submitted by: Jack Didrickson, Game Biologist III

Appendix V. Ages of Female Moose Taken by Hunters During Moose Seasons, 1971 and 1972; and Train, Automobile, Illegal, and Incidental Kills During the Periods June 1 through May 31, 1970-71 and 1971-72 in Alaska's Game Management Subunit 14B.

Age	Miscellaneous* Kills June 1, 1970- May 31, 1971		Hunter Kills Sept. 1-30 & Nov. 1-Dec. 15, 1971		Miscellaneous* Kills June 1, 1971- May 31, 1972		Hunter Kills Sept. 1-30, 1972	
Calf	20	33.3%	26	12.4%	8	38.0%	0	0.0%
1+	5	8.3%	11	5.2%	0	0.0%	1	7.7%
2+	6	10.0%	28	13.3%	2	9.5%	2	15.4%
3+	3	5.0%	21	10.0%	1	4.8%	2	15.4%
4+	6	10.0%	17	8.1%	1	4.8%	0	0.0%
5+	2	3.3%	16	7.6%	0	0.0%	4	30.8%
6+	3	5.0%	14	6.7%	4	19.0%	2	15.4%
7+	1	1.7%	9	4.3%	2	9.5%	0	0.0%
8+	2	3.3%	9	4.3%	0	0.0%	1	7.7%
9+	2	3.3%	17	8.1%	0	0.0%	0	0.0%
10+	2	3.3%	9	4.3%	0	0.0%	1	7.7%
11+	4	6.7%	11	5.2%	0	0.0%	0	0.0%
12+	1	1.7%	12	5.7%	1	4.8%	0	0.0%
13+	0	0.0%	4	1.9%	1	4.8%	0	0.0%
14+	0	0.0%	5	2.4%	1	4.8%	0	0.0%
15+	3	5.0%	0	0.0%	0	0.0%	0	0.0%
16+	0	0.0%	1	0.5%	0	0.0%	0	0.0%
Total	40 Adults + 20 Calves		184 Adults + 26 Calves		13 Adults + 8 Calves		13 Adults + 0 Calves	
Mean Age								
Excl. Calves = 6.00			6.21		6.77		4.69	
% Over 6 Yrs =25.0%			36.7%		23.8%		15.4%	

* Miscellaneous kills include Automobile, Train, Incidental and Illegally killed moose.

Submitted by: Jack Didrickson, Game Biologist III

Appendix VI. Ages of Male Moose Taken by Hunters During Moose Seasons, 1971 and 1972; and Train, Automobile, Illegal, and Incidental Kills During the Periods June 1 through May 31, 1970-71 and 1971-72 in Alaska's Game Management Subunit 14B.

Age	Miscellaneous* Kills		Hunter Kills		Miscellaneous* Kills		Hunter Kills	
	June 1, 1970- May 31, 1971		Aug. 20-Sept. 30 & Nov. 1-Dec. 15, 1971**		June 1, 1971- May 31, 1972		Aug. 20-Sept. 30 & Nov. 1-20, 1972	
Calf	9	31.0%	6	31.5%	11	42.3%	NO SPECIMENS COLLECTED	
1+	7	24.1%	1	5.2%	1	3.8%		
2+	1	3.4%	2	10.5%	3	11.5%		
3+	2	6.8%	3	15.8%	4	15.4%		
4+	3	10.3%	3	15.8%	3	11.5%		
5+	2	6.8%	3	15.8%	3	11.5%		
6+	0	0.0%	0	0.0%	1	3.8%		
7+	3	10.3%	0	0.0%	0	0.0%		
8+	1	3.4%	1	5.2%	0	0.0%		
9+	0	0.0%	0	0.0%	0	0.0%		
10+	1	3.4%	0	0.0%	0	0.0%		
11+	0	0.0%	0	0.0%	0	0.0%		
12+	0	0.0%	0	0.0%	0	0.0%		
Total	20 Adulst + 9 Calves		13 Adults + 6 Calves		15 Adults + 11 Calves		-- --	
Mean Age								
Excl. Calves =	3.80		3.77		3.47			
% Over 6 Yrs =	17.2%		5.2%		0.0%			

* Miscellaneous kills include Automobile, Train, Incidental and Illegally killed moose.

** Regular bull season was Nov. 1-20. Some bull moose that had shed their antlers were taken as antlerless moose between Nov. 20 and Dec. 15, 1971.

Submitted by: Jack Didrickson, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Subunit 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

Appendix I presents the 1972 IBM harvest data for Game Management Subunit 14C. A total of 94 moose including 55 males and 39 females were harvested. This includes 36 females and 14 males taken during the antlerless season on Fort Richardson. Three females were also taken by bow and arrow during a December 1, 1972 through March 31, 1973 special archery season on Anchorage International Airport, during which 265 archers hunted 1,001 hours and took 16 shots.

The harvest of 55 bulls from Subunit 14C is below the previous four-year average of 86. Similarly, the total harvest of 97 moose is below the previous four-year average of 112. This decrease in harvest is significant when one considers that no antlerless hunt was held on Fort Richardson during the 1969 and 1970 seasons.

Verified moose mortality excluding hunting in Subunit 14C for the period June 1, 1971 through May 31, 1972 totaled 137 moose (Appendix II). The majority (106) occurred in moose-auto collisions.

Composition and Productivity

Sex and age composition count data for Subunit 14C in 1972, are presented in Appendix III. Bull/cow ratios for the entire subunit declined slightly from 21.3 bulls per 100 cows in 1971 to 20.3 bulls per 100 cows in 1972. The calf/cow ratio for the entire subunit was up slightly from 26.0 calves per 100 cows in 1971 to 29.9 calves per 100 cows in 1972. The total sample decreased from 870 in 1971 to 703 in 1972. The number of moose counted per hour decreased from 61 in 1971 to 35 in 1972.

Although the overall bull/cow ratio in Subunit 14C dropped only slightly from 1971 to 1972, individual count areas showed some marked changes. In the Hunter Creek count area, the calf/cow ratio dropped from 25.0:100 in 1971 to 4.2:100 in 1972. In the Eklutna River drainage the bull/cow ratio declined from 20.4 per 100 in 1971 to 10.0 per 100 in 1972 and the calf/cow ratio dropped from 34.7 in 1971 to 10.0 in 1972.

On Fort Richardson, the bull/cow ratio was up from 19.7:100 in 1971 to 25.7:100 in 1972 and the calf/cow ratio was up from 21.5:100 in 1971 to 40.2:100 in 1972. Similarly, in the Eagle River count area the bull/cow ratio was up from 18.5:100 in 1971 to 22.2:100 in 1972, and the calf/cow ratio was up from 35.4:100 in 1971 to 47.2:100 in 1972.

In all of these areas sample sizes decreased and in all except Hunter Creek moose observed per hour decreased.

Age data from the Fort Richardson antlerless hunt (Appendix IV) reveal that 25.0 percent of the female moose taken were over six years of age. The average age of 26 adult females taken was 5.7 years. No yearling females were taken, perhaps indicating poor calf survival during the winter of 1971-72. A similar situation was observed in the limited number of bulls taken during the hunt. Of 8 adult bulls harvested, only one was aged as a yearling.

Management Summary and Conclusions

The decreasing hunter harvest of moose in Subunit 14C reflects the increasing restrictions placed on hunters in this area. The harvest in 1972 was further affected by the closure of portions of the subunit in Chugach State Park.

Sex and age composition surveys suggest marked differences in trends of various moose populations in the subunit. In the Fort Richardson and Eagle River areas, where moose in 14C are subjected to heavy automobile "harvests" and where antlerless seasons are periodically held on Fort Richardson, calf production appears good and bull/cow ratios are up. In the northern portions of the subunit, in the Hunter Creek and Eklutna drainages which are lightly hunted and where no antlerless seasons have been held, calf production is extremely low and bull/cow ratios are decreasing.

Age data from the Fort Richardson antlerless hunt seem to indicate a small number of yearling moose were present in the population. This is further evidence of the severe weather conditions experienced during the winter of 1971-72.

An increasing problem in Subunit 14C is the large number of moose-automobile collisions. In 1972 the number of road kills exceeded the hunter harvest. It was anticipated that as a beneficial side effect of the antlerless hunt on Fort Richardson, the number of road kills would decrease. In spite of the antlerless harvest, car-moose collisions increased, even though there was a probable decrease in total population due to winter kill in 1971.

Recommendations

In areas of Chugach State Park that receive limited use by the public, the moose season should be in accordance with existing seasons and bag limits. A permit antlerless hunt is recommended for Fort Richardson and should be extended to other portions of Subunit 14C such as Eagle River, Peters Creek, and Eklutna. If a permit antlerless hunt is considered for the Eklutna Basin, it should not be held until after Labor Day, when use of the area by the nonhunting public decreases.

Submitted by: Jack C. Didrickson, Game Biologist III
Donald A. Cornelius, Game Biologist II
Dimitri Bader, Game Biologist II

MOOSE - GMU 14C - Anchorage

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

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

* Airport Archery

** Fort Richardson

Submitted by: Jack C. Didrickson, Game Biologist III
Donald A. Cornelius, Game Biologist II
Dimitri Bader, Game Biologist II

MOOSE - GMU 14C - Anchorage

Appendix II. Verified Moose Mortality (excluding hunting), Alaska's Game Management Subunit 14C, June 1, 1971 through May 31, 1972.

	Adult Male	Adult Female	Calf Male	Calf Female	Unknown Sex or Age	Total
Road Kill	9	60	21	14	2	106
Train kill	0	1	0	0	0	1
Incidental kill	2	4	3	1	0	10
Illegal kill	5	4	2	2	2	15
Winter kill	0	0	0	3	2	5
Subunit Total	16	69	26	20	6	137

Submitted by: Dimitri Bader, Game Biologist II

Appendix III. Moose Sex and Age Composition and Ratios, Alaska's Game Management Subunit 14C, 1972.

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

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

Year	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 Cows W/Calf	Calf % in Herd	Moose per Hour	Total Moose
1967	22.1	14.7	200.0	7.8	57.1	51.5	3.1	27.3	24	128
1968	22.9	8.4	58.3	5.5	61.8	27.7	11.5	18.3	74	376
1970	23.7	9.5	66.7	5.3	40.0	47.4	6.4	26.4	46	757
1971	21.3	11.2	112.1	7.5	86.7	26.0	2.8	17.2	61	870
1972	20.3	5.8	39.7	3.8	38.6	29.9	7.1	19.9	35	703

Submitted by: Dimitri Bader, Game Biologist II

MOOSE - GMU 14C - Anchorage

Appendix IV. Ages of Moose Taken by Hunters During the January 22 through 26, 1972 Antlerless Moose Season, Alaska's Fort Richardson, Game Management Subunit 14C.

Age	No. of Females	No. of Males
Calf	10	6
1+	0	1
2+	4	6
3+	3	0
4+	4	0
5+	5	1
6+	1	0
7+	3	0
8+	1	0
9+	1	0
10+	1	0
11+	2	0
12+	0	0
13+	0	0
14+	0	0
15+	1	0
16+	0	0
17+	0	0
18+	0	0
Total	36 (26 adults)	14 (8 adults)
Sample size =	36	14
Mean age excluding calves	5.73	2.25
% over 6 years	25.0%	0.0%

Submitted by: Dimitri Bader, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 15A - Kenai

Seasons and Bag Limits

Unit 15A East, that portion 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.
Unit 15A West, that portion 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.
Unit 15A South, the remainder of Unit 15A.	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.

Harvest and Hunting Pressure

Harvest report returns indicate a hunter harvest of 193 bulls, 130 cows, and 1 moose sex unknown during the 1972-73 season (Appendix I). The bull harvest declined 48 percent from the 1971-72 season when 369 bulls were taken. This decline ended a four year upward trend in the bull harvest.

Antlerless hunts by permit registration were held in 15A East and 15A West from September 1-20. One thousand twenty-eight permits were issued and 145 antlerless moose were reported taken (permit return data). A second hunt planned for November was cancelled because the harvest in the September season was sufficient to remove most of the annual increment.

Composition and Productivity

Sex and age composition counts conducted in 1972 showed 15.6 bulls per 100 cows and 41.2 calves per 100 cows (Appendices II & III). The bull/cow ratio dropped by 27 percent from 1971 and the calf/cow ratio increased by 31 percent.

Small bulls/100 cows, small bulls/100 large bulls and small bull percent of herd all decreased sharply from 1971 (Appendix III).

Ages of 127 cows taken during the 1972 antlerless season were determined by the cementum annuli technique (Appendix IV). The mean age of cows older than calves was 5.07 years. The mean age of cows has been on a declining trend; it was 6.87 (n=132) in 1970, 5.61 (n=368) in 1971 and 5.07 (n=127) in 1972.

Deep snow that came early and persisted late through the winter of 1971-72, and unusually low temperatures, combined to produce one of the most severe winters for moose in recent years. These severe conditions resulted in the loss of approximately 80 percent of all calves over the winter (Appendix V). Mortality was first observed in December and continued until after break up. No losses of adult animals were noted that could be attributed to winter.

Analysis of femurs from 27 winter-killed moose calves in 15A showed fat in femur marrow ranging from 5.4 to 8.3 percent. These low values are symptomatic of severe malnutrition. In all cases calves had food in the rumen.

Management Summary and Conclusions

The severe winter of 1971-72 caused approximately 80 percent calf mortality which in turn resulted in the very low bull harvest during the 1972-73 season. Low recruitment of calves is reflected in the lowered bull/cow ratio (after a small harvest); the lowered small (yearling) bull/large bull ratio and the lowered small bull percent of herd (Appendix III).

Poor recruitment of yearlings directly affects the harvest of bulls because a large part of the bull harvest is normally yearlings.

Calves per 100 cows observed during 1972 sex and age composition counts were up 31 percent over 1971. Although part of this increase may reflect bias due to the low number of nonproductive yearling cows, part of it may be due to improved production.

The decline in mean age of females harvested between 1970 and 1972 cannot be accounted for. Some change could have resulted from harvesting cows; however, the change could not have been of this magnitude; and low recruitment of yearlings in 1972 should have increased the mean age. Most probably differences are due to harvesting from different segments of the herd because of varied timing of hunts and sampling error.

Calf survival through the winter of 1972-73 does not appear to have been as good as expected. Some calf mortality due to malnutrition has been documented. The extent of this mortality has not yet been determined.

Recommendations

No changes are recommended at this time; however, a conservative approach to harvesting of both bulls and cows is in order. Dependent upon the extent of winter mortality during the winter of 1972-73 a reduction in the bull take may be necessary. The taking of antlerless moose should not be allowed until after sex and age composition counts have been conducted. If recruitment is poor the allowable harvest should be set at a level commensurate with production.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX I

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

<u>Year</u>	<u>Season</u>	<u>Bulls</u>	<u>Cows</u>	<u>Unid.</u>	<u>Total</u>	<u>Hunters</u>	<u>Percent Success</u>
1965	1st	*	0	0	*		
	2nd	*	299	0	*		
	Combined	365	299	0	664	*	*
1966	1st	211	185	0	396		
	2nd	137 ¹	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	1	0	269	1092	25
1969	1st	*	*	*	*		
	2nd	*	*	*	*		
	Antlerless		NOT HELD				
	Combined	287	*	7	294		
1970	1st	134	0	3	137	*	*
	2nd	69	0	1	70	*	*
	Antlerless	16	191	3	209	*	*
	Combined	291 ²	191	11	493	918	54
1971	1st	153	223 ²	1			
	2nd	141	261 ²	0			
	Antlerless						
	Combined	369 ¹	484 ²	4	853	1637	52
1972	1st	106	145 ²	1	236		
	2nd	54 ²	0 ²	0	54		
	Combined	193 ²	145 ²	1	339	1518	22

* Data not available

¹ Total of first and second season may be less than for combined seasons because of inclusion of animals for which date of kill was not given.

² These data from permit returns. Numbers include both male and female calves.

Submitted By: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX II

Moose Sex and Age Composition - Subunit 15 (A)

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Year	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose Per Hour
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	92.0
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	58.0
11/8- 16/71	185	98	283	940	367	17	1324	1607	14	415	5	2027	40.8	40.7
11/27- 12/5/72	136	35	171	678	399	19	1096	1267	14	451	5	1723	43.95	39.2

* Lowlands only.

Submitted By: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX III

Moose Sex and Age Ratios - Subunit 15 (A)

Year	Total MM per 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	92.0	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	58.0	1586
1971	21.4	7.4	53.0	4.8	47.0	31.5	4.4	20.6	49.7	2027
1972	15.6	3.2	25.7	2.0	15.5	41.2	4.5	26.3	39.2	1723

* Varied count areas

** Lowlands only

*** Count areas 9A, 11, 12A, 12B, 18A, 18B

Submitted By: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15A - Kenai

APPENDIX IV

Cow Moose Harvest Age Structure 1972-73 Season September 1-20, Subunit 15A

<u>Age</u>	15A East	15A West	<u>Total</u>
	<u>1st Season Number</u>	<u>1st Season Number</u>	
C	6	14	20
1	8	7	15
2	8	9	17
3	6	9	15
4	5	4	9
5	8	5	13
6	1	2	3
7	2	3	5
8	0	8	8
9	2	5	7
10	2	4	6
11	4	0	4
12	1	2	3
13	1	0	1
14	0	1	1
	n=54 $\bar{x}$ =4.77 SD=3.49	n=73 $\bar{x}$ =5.31 SD=3.40	n=127 $\bar{x}$ =5.07 SD=3.45

($\bar{x}$ Does not include calves)

Early season held September 1-20, 1972.
 15A South not opened for antlerless moose.
 Late season not opened for antlerless moose.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15 (A) - Kenai

APPENDIX V

Productivity (Spring/Fall survival) Ratios and Percents

<u>Date</u>	<u>Bulls/* 100 Cows</u>	<u>Yearlings/* 100 Cows</u>	<u>Calves/ 100 Cows in Fall</u>	<u>Yrlg. % of Herd</u>	<u>Calf % of Fall Herd</u>	<u>% Calf Winter Mortality</u>	<u>Total Sample</u>
(4/14-5/4-70) ¹	21.4	24.6	42.8	16.4	29.7	44.8	744 ²
(5/14/71) ³	15.8	14.0	32.1	10.9	21.9	50.2	239
(5/15/72) ⁴	16.5	4.8	31.5	4.0	20.6	80.6	302

* Use only if survey is conducted late enough to distinguish bulls, if not, work with calf % in herd.

Remarks:

¹ From data compiled on tagging recon flights.) Data compiled by Bob LeResche.

² Includes 30 antlerless long yearlings.) Data compiled by Bob LeResche.

³ Area surveyed included only Moose River Flats.

⁴ Area surveyed included Moose River Flats and area between Kenai River and Skilak Loop, Sterling Highway.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 15B - Soldotna

Seasons and Bag Limits:

Unit 15B East, that portion east of the Funny River and a line from the headwaters of the west fork of the Funny River to the mouth of the Shantatalik 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 15B West, the remainder of Unit 15B	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 for the 1972 season indicate that hunters took 73 bulls, 3 cows and 1 moose sex unknown (Appendix I). The 1972 bull harvest was down 43 percent from the 1971 harvest which was one of the largest on record.

A permit registration antlerless season was held September 1 to September 30. Four hundred and three permits were issued and 11 antlerless moose were reported taken.

Subunit 15B West was not opened to antlerless moose hunting although a permit hunt is provided for in the regulations. Antlerless moose hunts will be held in this subunit only when timing of the migration causes a population buildup before mid-winter.

Composition and Productivity:

Sex and age composition counts conducted December 1-2, 1972 showed 30.9 bulls per 100 cows and 26.8 calves per 100 cows (Appendices II & III). Small bulls per 100 cows, small bulls per 100 large bulls and small bull percent of herd all dropped sharply from 1970 (Appendix III).

Deep snow that came early and persisted late in the winter of 1971-72 and unusually low temperatures combined to produce one of the most severe winters for moose in recent years. These severe conditions resulted in the loss of a high percentage of calves during the winter. Although no measure of the loss was possible in Subunit 15B, mortality is thought to have been at least as high as in 15A where the rate of mortality was about 80 percent.

An effort to conduct spring survival counts in 1973 resulted in the classification of 92 moose (Appendices IV & V). Based on these data calf survival over winter was 95.9 percent.

Analysis of femurs from 10 winter-killed moose calves in Subunit 15B showed marrow fat contents ranging from 6.2 to 11.0 percent. These low values are symp-

tomatic of severe malnutrition. In all cases calves had food in the rumen.

Management Summary and Conclusions:

The high loss of calves during the winter of 1971-72 is reflected in lowered ratios of bull per 100 cows, small (yearling) bulls per 100 large bulls and in the small bull percent of herd (Appendix III). The resulting low recruitment of yearling bulls may account for part of the decline in the bull harvest; however the number of hunters reported hunting in this unit also declined, and early season hunting in the benchland area appears to have been poor due to an unusual distribution of moose within the unit. The bull:cow ratio declined between 1970 and 1972 by 18.3 percent and appears to be on a downward trend.

Calf production, on a downward trend since 1962, improved considerably in 1972 (Appendix III). The 26.8 calves per 100 cows observed was the highest level of production observed since 1962 when there were 36.9 calves/100 cows.

Limited spring survival counts indicate that survival of calves through the winter of 1972-73 was excellent at 95.9 percent. Although the sample size is small it bears out a general observation of high survival.

Recommendations:

Since Subunit 15B East has been designated as a trophy management area, steps should be taken to improve the bull:cow ratio. Although it does not appear feasible to harvest this herd at the sustained yield level it may be possible to improve or at least maintain the bull:cow ratio through restriction on bull hunting and liberalization of antlerless moose hunting.

The season in Subunit 15B West should be made to conform with that of Subunit 15A.

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 ²	26	0	145 ²	*	*
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 ²	6	2	116 ²	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 ²	*	*
1970 ⁴	1st	14	0	1	15		
	2nd	23	0	0	23		
	Antlerless	4	75	1	80		
	Combined	69 ²	75	2	146 ²	283	52
1971 ⁵	1st	36	54 ¹	2	93		
	2nd	62	32 ¹	2	96		
	Combined	128 ²	86 ¹	0	214 ²	488	44
1972 ⁶	1st	45	11 ¹	1	47		
	2nd	19	0	0	19		
	Combined	73 ²	11 ¹	1	85 ²	336	25.2

* 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.

⁶ Antlerless season held September 1-30.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX II

Moose Sex and Age Composition - Subunit 15B

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

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15B - Soldotna

APPENDIX III

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									
1972	30.9	2.0	7.0	1.3	15.1	26.8	2.3	17.0	61.4	1093

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Submitted by: Paul A. LeRoux, Game Biologist III

GMU - 15 (B) - Soldotna

Appendix IV

Moose Productivity (spring-fall survival) Composition

<u>Date</u>	<u>Cows w/1 Ylgs.</u>	<u>Cows w/2 Ylgs.</u>	<u>Total Cows</u>	<u>Unid. Adults</u>	<u>Total Adults</u>	<u>Lone Ylgs.</u>	<u>Total Ylgs.</u>	<u>Unid. Sex & Age</u>	<u>Total Sample</u>
5/11/73	10	0	10	67	77	5	15	0	92

Appendix V

Moose (spring-fall survival) ratios and percents

<u>Date</u>	<u>Calves/ 100 cows in fall</u>	<u>Yrlg. % of herd</u>	<u>Calf % of fall herd</u>	<u>% Calf winter mortality</u>	<u>Total Sample</u>
5/11/73	26.8	16.3	17.0	4.1	92

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 15 C - Homer

Seasons and Bag Limits:

Unit 15 C	Aug. 20-Sept. 30	One moose; 250 antlerless moose
	Nov. 1-Nov. 10	may be taken by permit only; dates and conditions of the hunt will be described by Commissioner's announcement.

Harvest and Hunting Pressure:

Harvest report returns show a harvest of 170 bulls in Subunit 15C (Appendix I) during 1972. This harvest was 49 percent below the preceding five-year average.

An antlerless hunt by permit registration was held from September 1-30, 1972; 502 permits were issued and 114 antlerless animals were taken. All of Subunit 15C 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 Mountain Road; then south of Ohlson Mountain 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 15C.

The harvest report return data for the antlerless harvest differ somewhat from the above data which were obtained from the registration hunt permit returns. Harvest report data show 107 females taken. An additional female calf may have been reported as a male. This would make a total of 108 antlerless animals reported which is five percent less than indicated by permit returns.

Composition and Productivity:

Sex and age composition counts were conducted in the same count areas as 1971 and showed considerable changes (Appendices II & III). The bull:cow ratio dropped from an average for 1970 and 1971 of 23.2 bulls/100 cows to 9.8 bulls/100 cows. A similar comparison using calves per 100 cows shows an increase from an average of 21.5 for 1970 and 1971 to 25.4 in 1972. However, the increased calf:cow ratio is more apparent than real since the very heavy calf loss of the 1971-72 winter greatly reduced the number of yearlings in the population thus giving inflated calf:cow ratios.

Documentation of the 1971-72 winter calf mortality was accomplished by examining dead or moribund calves reported by the public and others located during field activities, making roadside observations of numbers and locations of calves and their demise throughout the winter, and an aerial spring survival count. That a substantial winter kill of calves did occur was reflected in sex and age composition surveys and in the percent of yearling females in the 1972 antlerless harvest.

The protection officer in Homer said that he personally saw or verified over 30 dead calves during the winter in the immediate vicinity of Homer. Game Division personnel handled or personally observed another 29 dead calves south of the Kenai River. Daily roadside observations between Ninilchik and Soldotna suggested that only one calf of twenty-plus calves frequently observed survived until late April.

A spring survival flight was conducted May 8, 1972. Only one calf was observed out of the 102 animals sighted. Based on the above and in part on subjective impressions, it is believed that calf mortality exceeded 95 percent over most of the area south of the Kenai River during the 1971-72 winter.

The 1972 sex and age composition counts substantiated the suspected calf mortality. The bull:cow ratio decreased from 26.0 bulls/100 cows in 1971 to 9.8 bulls/100 cows. That the majority of this decline is attributable to lack of yearling recruitment is better exemplified by looking at the small (yearling) bull:cow ratio and the small bull percent in the herd. The small bull:cow ratio decreased 89.6 percent from 7.7 small bulls/100 cows in 1971 to 0.8 small bulls/100 cows in 1972. The percent of small bulls in the herd had averaged 4.63 percent over the preceding 11 years but decreased to 0.6 percent in 1972. The smallest percent of the herd that small bulls had ever comprised during the preceding 11 years was 2.3 percent. The winter 1971-72 was the most severe winter that has occurred in 15C in the past 15 years as indicated by Homer weather data. This may account for the magnitude of the calf mortality. Little adult mortality was observed.

As contrasted to over-winter survival of calves during 1971-72, the survival during 1972-73 appears excellent from the limited data available as shown in Appendix IV. Although the data have bias because of sex and age segregation at the time of year the data were collected and the admitted small sample size during March and May, the data do sharply contrast to 1971-72 data which indicated poor survival which was later substantiated as mentioned above.

Ninety-eight cows older than calves from the 1972 antlerless harvest were aged by cementum annuli (Appendix V). These data compared to data from 1969-72 suggest that there has not been any significant change in the female age structure.

Management Summary and Conclusions

The 1972 bull harvest and the 1972 bull:cow ratio were the lowest ever recorded for the unit since reliable data became available in 1964. Even considering the reduction of season length, the harvest was significantly less than any preceding harvest. The 1972 bull:cow ratio in some count units was low enough so that estrous females may not have been bred at the optimum time. Although calf production appears to have improved, the 1972 production probably is not much different from the low rates of the preceding two years because the calf/cow ratio is inflated from a lowered percentage of yearlings in the population.

The decreased calf:cow ratios since 1968 are probable indication that there are more animals on the range than optimum for the reproductive segment of the population to produce at the previous level.

The antlerless kill was again considerably less than the antlered harvest and was well below the 250 antlerless quota for the subunit. Although the lack

of yearling recruitment in 1972 and the resultant decrease in the bull portion of the herd might suggest a conservative harvest of males is in order, it will be desirable to harvest a minimum of 250 antlerless animals to reduce competition for forage and to help improve the bull:cow ratio.

Comparison of mean ages of antlerless animals from 1969-72 does not show any trend of significant change. The magnitude of the female harvest through these years has not been sufficient to account for any lowering of the mean age.

Recommendations

It is recommended that (1) the bull season be significantly shortened to increase the number of bulls in the population and (2) a minimum of 250 antlerless animals be taken by permit.

Submitted by: Paul A. LeRoux, Game Biologist III
James Davis, Game Biologist II

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
1972	1st	89	114 ³	0	203		
	2nd	54	0	0	54		
	Unk.	27	0	0	27		
	Combined	170	114	0	284	1041	27

*Data not available.

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

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

³Permit returns

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	48.4	1436
1972	9.8	0.8	8.7	0.6	6.2	25.4	2.1	18.8	72.5	2073

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15C - Homer

APPENDIX III

Moose Sex and Age Composition - Subunit 15C

Year	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Moose Per Hour
12/8- 17/64	97	52	149	323	336	7	665	1487	-	361	673	1848	-	52
11/30/65 12/17/65	265	112	377	824	313	20	1158	1538	12	361	3	1899	33.08	57
12/20- 29/66	57	34	91	384	147	7	538	629	4	165	13	794	13.0	64
10/24- 28/67	277	127	404	1196	641	50	1887	2291	6	747	0	3038	19.0	160
11/68	170	71	241	738	404	30	1172	1413	6	470	0	1883	31.0	60.7
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	48.4
11/28- 12/2/72	138	12	150	1149	368	8	1525	1675	3	387	11	2073	28.6	72.5

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE - GMU 15C - Homer

APPENDIX IV

1972-73 Spring-Fall Survival Data for GMU 15C

Date	FF W/1	FF W/2	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (Hrs.)	Calf % In Herd
11/28- 12/2/72	368	8	1675	3	387	11	2073	28.58	18.72
2/22/73	39	1	236	5	46	7	289	3.50	16.31
5/11/73**	16	0	125	8	24	0	149	ca: 3.0	16.11

**Calf numbers for this date are actually yearlings.

Submitted by: Paul A. LeRoux, Game Biologist III

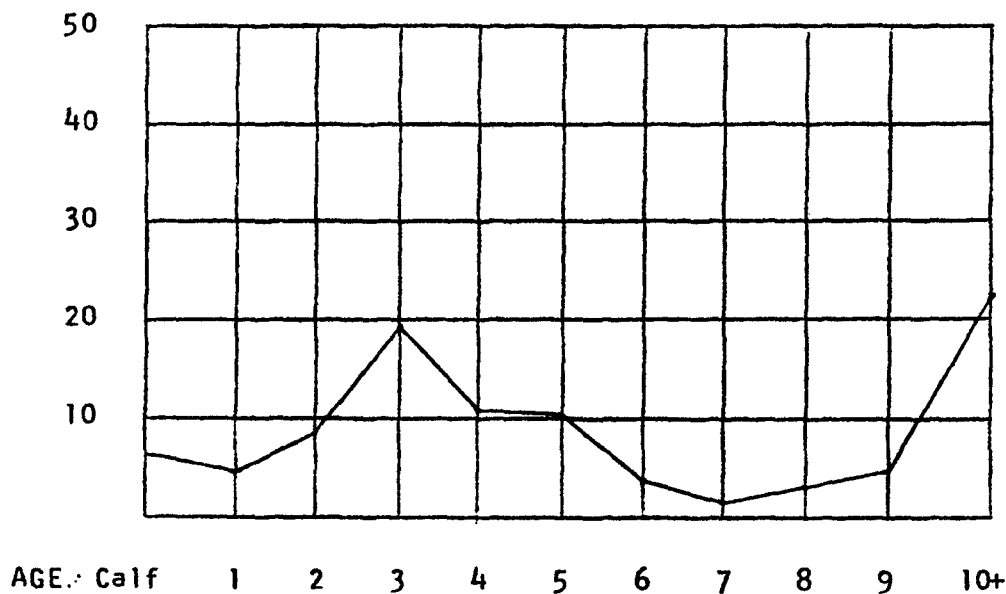
MOOSE - GMU 15C - Homer

APPENDIX V

Age Structure of Antlerless Moose Harvest 1972

Percent of Sample

Sex = Female



Sample Size = 106
 Mean Age = 6.06
 (exclude calves)
 % Over 6 Years = 33.0

<u>AGE</u>	<u>#</u>	<u>%</u>	<u>AGE</u>	<u>#</u>	<u>%</u>
Calf	8	7.5	11 -	4	3.8
1 -	5	4.7	12 -	4	3.8
2 -	10	9.4	13 -	5	4.7
3 -	21	19.8	14 -	2	1.9
4 -	12	11.3	15 -	1	0.9
5 -	11	10.4	16 -	0	0
6 -	4	3.8	17 -	0	0
7 -	2	1.9	18 -	1	0.9
8 -	4	3.8	19 -	0	0
9 -	5	4.7	20 -	0	0
10 -	7	6.6			

TOTAL	106	99.9
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Remarks: Early season held Sept. 1-30, 1972
 Late season not held.

Submitted by: Paul A. LeRoux, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 16 - West side of Cook Inlet

Seasons and Bag Limits

Unit 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.
Unit 16B, that portion from the junction of the Yentna and Skwentna Rivers, thence along the Skwentna River to Portage Creek to its headwaters at Stoney Glacier, thence north along the Unit 16 boundary to the west side of the Yentna Glacier, thence down the Yentna Glacier to the east fork of the Yentna River, thence down the Yentna River to its junction with the Skwentna River. Boundaries will be the outermost bank of the rivers and creeks.	Aug. 20 - Nov. 30	One moose
Remainder of Unit 16B	Aug. 20 - Sept. 30 Nov. 1 - Nov. 30	One moose

Harvest and Hunting Pressure

Harvest report data for Game Management Unit 16 for 1972 are presented in Appendix I. Six hundred and seven moose were reported harvested, a decrease of 228 moose from 1971, and a decrease of 37 moose over the previous five-year average of 644. Of the total moose harvested, 458 were males, 144 were females, and five were reported as unknown sex.

That portion of Unit 16 which lies east of the Kahiltna River and Glacier is known as Subunit 16A or the Petersville area. One hundred and one moose were reported harvested in 16A, including 92 males, 8 females and 1 of unknown sex. More than twice as many male moose (56) were harvested in the second season as in the first season (25).

That portion of Unit 16B which lies west of the Skwentna River and north and west of the Yentna River was open to moose hunting for 103 days, from August 20 to November 30. Ninety-three moose were reported harvested in this area of which 76 were males and 17 were females. Nearly the same number of moose were harvested in the first season as in the second season. During

October, only five moose were harvested.

The harvest in the remainder of Subunit 16B was 332, of which 234 were males, 95 were females, and 3 were of unknown sex. In the male segment of the harvest, 80 were taken in the first season and 130 in the second season. In addition, 4 were taken in October and 20 were reported taken but no date given. In the female segment of the harvest, over three times as many were taken during the second season (63) as the first (20). Twelve of the females harvested in the remainder of Subunit 16B had no date reported.

Two hundred and fifty antlerless permits were issued in 16A and 10 successful permittees returned their permits. No age analysis was done because of the small sample size. It is believed that few moose were available near the limited road system in Subunit 16A during the September 1 through September 30 antlerless permit hunt, resulting in the low harvest. No other permit hunts were held in Unit 16 during 1972.

The reported harvest in the Redoubt Bay area was 35 moose, of which 25 were males (10 in the first season, 12 in the second season, 3 unknown date), 9 were females (all taken during the second season), and one was of unknown sex.

Appendix II reveals the extensive use of aircraft by hunters in Unit 16. Of 642 successful hunters reporting transportation means, 512 listed aircraft while 42 used highway vehicles. The unsuccessful hunters also utilized aircraft extensively (239), but more highway vehicle users were unsuccessful (342). Unit 16 has a very limited road system forcing hunters to utilize aircraft, which in turn accounts for the larger harvest of bulls than cows because the choice of the moose taken is much more easily attained.

Unit 16 was hunted by 696 resident hunters and 98 non-resident hunters during the 1972 season.

Composition and Productivity

A moose mortality survey was flown in Unit 16 on March 23, 1972 revealing a total of 16 dead moose plus 101 live adults. On June 23, 1972, another mortality flight was conducted revealing 26 dead moose and 91 live moose including 36 calves. The latter flight resulted in 54.5 calves/100 cows noted. The calf percentage in the herd was 30.8 percent, but the sample size was minimal. In 1971, the number of dead moose located warranted engaging a helicopter to acquire the teeth of the animals to examine their sex and age composition, but the flights in the spring of 1972 did not reveal enough mortality to warrant further investigation.

Aerial sex and age composition counts were conducted in portions of Unit 16 during 1972 and the data are presented in Appendices III, IV, V, and VI. One thousand six hundred and twenty-nine moose were sampled in three areas of Unit 16. One of the areas, Redoubt Bay (Appendices V and VI), is presented separately because it was flown for the first time in many years.

During 1972, composition counts were conducted in the Mt. Susitna-Beluga area with 557 moose tallied (Appendices III and IV). Poor weather conditions did not allow a complete coverage of the area. The bull-cow ratio decreased from 48.1/100 in 1971 to 21.0/100 in 1972. As noted in the 1971 S & I report, males were dominant in the sample of moose winter mortality which occurred in Unit 16. These sex and age composition data acquired in December of 1972 (Appendix IV) complement the data acquired in the mortality study of 1971. The calf-cow ratio declined from 31.2/

100 cows to 18.3/100 cows in the same period, again reflecting the winter mortality during 1971 which was highest in the calf age class. The "small male" percentage in the herd also declined in 1972; this was to be expected due to the winter loss in 1971. Twin ratios declined from 4.2/100 cows in 1971 to 1.4/100 cows in 1972. The calf percentage in the herd decreased from 17.4 in 1971 to 13.1 in 1972. The number of moose seen per hour decreased from 61.9 in 1971 to 39.8 in 1972. Unit 16 was not the only unit to suffer winter losses in 1971, as the mortality was noted in several other units in southcentral Alaska. This caused cancellation of antlerless moose seasons in most areas.

The Kahiltna (or Petersville) area of Unit 16 reveals a similar trend (Appendices III and IV). Bulls per 100 females decreased from 26.2 in 1971 to 18.8 in 1972. The calves per 100 females ratio declined from 32.0 in 1971 to 29.6 in 1972. Representation of small bulls in the herd decreased from 4.9 percent in 1971 to 1.6 percent in 1972. Calf twinning ratios increased from 3.2 in 1971 to 9.0 in 1972, an unexplained phenomenon which also occurs in some other game management units in Alaska. The number of moose seen per hour in the Kahiltna area decreased from 42.2 in 1971 to 40.3 in 1972.

Examination of the data acquired in the Redoubt Bay area (Appendices V and VI) reveals a low bull-cow ratio (10.8 bulls/100 cows) which may reflect utilization of that segment of the population by aircraft hunters based near Kenai. The calf/cow ratio is 26.1, which is higher than the Susitna-Beluga area (18.3), but lower than the Kahiltna area (29.6). The calf percentage in the herd is 19.1 percent which is nearly the same (19.9 percent) as in the Kahiltna area. The small bulls per 100 cows ratio is very low, a possible indication of sex specific survival in this age class. The small bull percentage in the herd is also very low (0.6 percent).

Management Summary and Conclusions:

Previous attempts to liberalize harvests in Game Management Unit 16 have met with limited success. Early last winter mortality was recorded which may indicate excessive numbers of moose which the range cannot support. The total moose harvest decreased from approximately 800+ moose in each of the past three years to 607 in 1972, reflecting the winter mortality of 1971. Composition and productivity data reveal a downward trend, but it must be remembered that Unit 16 has very little road access and hunting is limited primarily to areas accessible to aircraft, and on occasion, boats. It would be desirable to stabilize seasons to enable observers to record the effect of winters such as the one experienced in 1971. Subunit 16A, which contains all of the road system and is accessible by automobile and snowmachine, could receive some restriction on season length. A lowered bull-cow ratio in that portion of Unit 16 in the Redoubt Bay area calls for some restriction on the take of bulls.

Submitted by: Jack Didrickson, Game Biologist III
Dimitri Bader, Game Biologist II
Don Cornelius, Game Biologist II

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

Year	Season	Bulls	Cows	Unid.	Total	Hunters	Percent Success
1967	First	168	0	1	169		
	Second	97	0	0	97		
	Antlerless	0	0	0	0		
	Unk. Date	16	0	0	16		
TOTAL		281	0	1	282	505	55.8
1968	First	227	0	0	227		
	Second	183	0	0	183		
	Antlerless	0	39	0	39		
	Unk. Date	22	7	9	38		
TOTAL		432	46	9	487	860	56.6
1969	First	252	0	5	257	* The antlerless season bull harvest unobtainable from present program.	
	Second	183	0	1	184		
	Antlerless	0*	123	0	123		
	Unk. Date	180	44	1	225		
TOTAL		615	167	7	789	1366	57.8
1970	First	238	0	3	241		
	Second	228	152	5	385		
	Antlerless	0	0	0	0		
	Unk. Date	132	60	7	199		
TOTAL		598	212	15	825	1442	57.2
1971	First	174	0	0	174	** All female harvest incorporated into antlerless season.	
	Yentna Area	9	**	1	10		
	Second	249	**	4	253		
	Antlerless	0	174	2	176		
	Unk. Date	153	61	8	222		
TOTAL		585	235	16	836	1648	50.7
1972	First	142	0	1	143	** All female harvest incorporated into antlerless season.	
	Yentna Area	11	**	0	11		
	Second	236	**	0	236		
	Antlerless	0	119	0	119		
	Unk. Date	69	25	4	98		
TOTAL		458	144	5	607	1413	42.9

Submitted by: Dimitri Bader, Game Biologist II

Appendix II. Alaska's Unit 16 Harvest Ticket Data on Hunter Success vs. Transport Means, 1972.

*Transport Means	**Successful Means of Transport				**Unsuccessful Means of Transport				Total of Success. & Unsuccess. Methods of Transport Reported
	Res.	NR.	Unk.	Total	Res.	NR.	Unk.	Total	
1. Aircraft	389	96	27	512	203	29	7	239	751
2. Horse	1	0	0	1	3	2	0	5	6
3. Boat	20	2	0	22	40	5	1	46	68
4. Motorbike	0	0	0	0	9	1	0	10	10
5. Snowmachine	31	1	2	34	133	3	7	143	177
6. Off-road Vehicle	13	2	0	15	82	8	4	94	109
7. Highway Vehicle ("afoot")	37	4	1	42	312	17	13	342	384
8. None Reported	14	2	0	16	77	2	6	85	101
TOTAL-----				642	-----				

* Transport means will be counted more than once when listed in combinations.

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

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

Submitted by: Dimitri Bader, Game Biologist II

Appendix III. Moose Sex and Age Composition, Alaska's Game Management Unit 16.

Year	Area	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 12/9, 20	Mt. Susitna - Mt. Beluga	105	19	124	191	64	3	258	382	0	70	5	457	8.5	53.7
	Peters Hills	55	27	82	198	94	7	299	381	5	113	2	496	6.4	77
	Petersville Road	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
1970 12/1	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	70.2
1971 10/29	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
1972 12/6-7	Mt. Susitna - Mt. Beluga	80	4	84	330	69	1	400	484	2	73	0	557	14.0	39.8
11/6	Kahiltna (A-F)	82	12	94	366	122	12	500	594	2	148	0	742	18.4	40.3
1972 TOTAL		162	16	178	696	191	13	900	1078	4	221	0	1299	32.4	40.1

Submitted by: Dimitri Bader, Game Biologist II

Appendix IV. Moose Sex and Age Ratios, Alaska's Game Management Unit 16.

Year	Area	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF/calf	Calf % in Herd	Moose per Hour	Total Sample
1968 12/9, 20	Mt. Susitna - Mt. Beluga	48.1	7.4	18.1	4.2	54.3	27.1	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 Road	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	12.2	26.4	70.2	633
1971 10/29	Mt. Susitna - Mt. Beluga	48.1	10.3	27.1	5.7	65.6	31.2	4.2	17.4	63.0	1139
11/8-9	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
1972 12/6-7	Mt. Susitna - Mt. Beluga	21.0	1.0	5.0	.7	11.0	18.3	1.4	13.1	39.8	557
11/6	Kahiltna (A-F)	18.8	2.4	14.6	1.6	16.2	29.6	9.0	19.9	40.3	742
1972 TOTAL		19.7	1.7	9.8	1.2	14.5	24.5	6.3	17.0	40.1	1299

Submitted by: Dimitri Bader, Game Biologist II

Appendix V. Moose Sex and Age Composition, Alaska's Game Management Unit 16.

Year	Area	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
1972 12/3-4	Redoubt Bay	24	2	26	183	54	4	241	267	1	63	0	330	7.3	45.2

Appendix VI. Moose Sex and Age Ratios, Alaska's Game Management Unit 16.

Year	Area	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Twins per 100 FF/calf	Calf % in Herd	Moose per Hour	Total Sample
1972 12/3-4	Redoubt Bay	10.8	0.8	8.3	0.6	6.3	26.1	6.9	19.1	45.2	330

Submitted by: Dimitri Bader, Game Biologist II

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 17 - Bristol Bay

Seasons and Bag Limits

August 20 - December 31

One bull.

Harvest and Hunting Pressure

The reported harvest for Unit 17 in 1972 was 38 moose (Appendix I). Residents reported taking 23 moose (60.5 percent of the harvest).

Composition and Productivity

No data are available.

Management Summary and Conclusions

Moose are not abundant throughout the majority of Unit 17 and only in a few relatively inaccessible areas do limited concentrations of animals occur. The reported harvest of 38 animals is minimal since an equal or greater unreported number are taken by villagers during the winter and spring. The present use of the resource is primarily subsistence; and in some areas, this harvest is probably holding the moose population below the carrying capacity of the habitat.

Recommendations

No changes in seasons or bag limits are recommended. An I & E program should be mounted to explain the reasoning behind existing regulations and to seek voluntary compliance with the regulations. Without public acceptance and cooperation, enforcement of the existing regulations is nearly impossible.

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	49.4
1968	45	0	1	46	66	69.7
1969	11	1	3	15	31	48.4
1970	23	0	2	25	35	71.4
1971	36	0	1	37	63	58.7
1972	35	0	3	38	74	51.4

*No legal cow season has been held.

Submitted by: James B. Faro, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 18 - Yukon-Kuskokwim Delta

Seasons and Bag Limits

Aug. 20 - Dec. 31

One Bull

Harvest and Hunting Pressure

The reported 1972-1973 moose harvest was eight moose. Actual harvest was probably in excess of 350 moose. Aircraft hunters from the Bethel area took an estimated 100 moose from the Paimute Portage area. The Sleetmute and the Holy Cross areas contribute heavily to the annual moose harvest of Unit 18 hunters. Reluctance to comply with the harvest ticket regulation continues to hamper management of moose in this area.

Composition and Productivity

No surveys were made in Unit 18.

Management Summary and Recommendations

None

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Peter E. K. Shepherd
Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 19 - McGrath

Seasons and Bag Limits

Aug. 20 - Feb. 28

Two moose; one of which may be antlerless (antlerless moose may not be taken prior to October 1).

Harvest and Hunting Pressure

Reported 1972-73 moose harvest was 74 bulls and 13 cows and one unspecified for a total of 108 animals. These data suggest a slight decrease in reported harvest from the 1971-72 season. Much of this decrease can be attributed to heavy mortality accompanying the severe winter of 1971-72. However, fall conditions and moose distribution in August and September of 1972 were such that moose were not available to local hunters. Local hunters took roughly half as many moose as during the same period in the fall of 1971. Late winter movements and concentration of moose on the Takotna and Kuskokwim Rivers provided hunters with more moose than in the fall season. This observation is supported by the jaw collection and hunter comments. Harvest in the McGrath area in the 1972-73 season was approximately the same as in 1971-72 but only as a result of the heavy February kill.

Composition and Productivity

No sex and age composition counts were made in Unit 19 during the 1972-73 reporting period. Moose did not move to the river valleys until early February 1973, thereby providing no opportunity to make a late fall census. In hopes of correcting this problem, several count areas have been selected in the foothills of the Kuskokwim Mountains and Alaska Range. Casual observations suggest roughly the same fall bull:cow ratios as observed in the past. A brief count (30 minutes on November 25, 1972) between Takotna Mountain and Waukeen Mountain resulted in the locating of 27 cows, 8 bulls but no calves. This particular area composes the majority of the early winter range of the Takotna River and some of the Kuskokwim River drainage moose. Few calves were seen throughout the fall and spring of 1972-73 suggesting poor productivity and/or survival following the winter of 1971-72. Selective hunting of cows during the spring may be the cause of the high bull:cow ratios as suggested by previous (1972) counts in this area.

Age determinations were made from moose taken in 1970, 1971, 1972 and 1973. Of interest is a comparison of age distribution in the female segment of the population between the springs of 1972 and 1973. Calves and younger age classes were present in the 1972 sample along with a representation of most age levels up to 10 years. However, in the 1973

sample only one calf was taken and the majority of animals taken were between three and six years of age, thus providing evidence of losses to this herd incurred throughout the winter of 1970-71 and 1971-72. Hunter selectivity for cows during this season is also shown in the bull:cow ratio of the harvest. Such a low ratio in this area could not occur by chance only.

Range and Habitat

Snow depths for the period are presented in Table 1. These data are compared with the weather bureau data in order to show the differences due to the location of measurement stations. Snow depths in three wooded areas were averaged for the early, mid and late winter periods. Both sets show the effect of settling, wind and rain, during late December, January and February. McGrath weather bureau data are gathered at the McGrath field which is not truly representative of snow depths in the adjacent wooded areas.

Table 1. Snowfall 1971 - 1972.

Location	Dec. 15-30	March 1-15	April 16-30
Average wooded areas	48.0 in.	41.0 in.	60.0 in.
McGrath airfield	35.0 in.	31.0 in.	40.0 in.

Snow profiles of the winter snow pack showed at least five distinct ice layers of various thicknesses. One was over two centimeters, December 1971. The effect of ice layers in an extremely deep snow winter would seem to magnify big game survival problems especially in regards to escape from predators and in the elimination of any ground feeding. Deep snow further concentrates moose along the river systems which invariably overflow as a result of snow weight. Moose concentrated along these icy corridors are easily run down and killed by predators which can travel with ease and ambush their prey.

Population Trends

Severe winter mortality and predation resulted in heavy losses of moose in most of Unit 19 during the 1971 and 1972 winters. Wolf kills were noted commonly in the spring of 1972, largely along rivers and streams in Unit 19. Other winter mortality was not observed until late May and June when the winter snows melted. These observations were largely made by local pilots spotting moose carcasses along rivers and flats in the McGrath area.

Management Summary and Recommendations

The moose population in this unit is down compared to 1970 and earlier population levels. Reduced availability of moose in the latter part of the season (November through February) should result

in a comparatively smaller harvest. Compensation in the harvest should make season or bag limit changes unnecessary. If heavy snows in the winter of 1973-74 cause concentration of moose along river systems where they are vulnerable to hunters the season should be closed by emergency field announcement.

PREPARED BY:

Peter E. K. Shepherd
Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

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

Seasons and Bag Limits

Aug. 20 - Nov. 30

One moose; bull moose
may not be taken from
October 1 - October 31

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported sport kill of moose in Unit 20A for the 1972 season was 484 animals, an increase of 137 moose over the 1971 harvest of 347, and well above the 5 year (1967-71) average subunit harvest of 275. The 1972 harvest consisted of 281 bulls, 201 cows and 2 unknown. Bulls comprised 58 percent of the harvest and cows 42 percent, reflecting a slight variation in the 5-year (1967-71) average bull and cow composition of the subunit harvest of 68 percent and 32 percent, respectively. Military personnel harvested 7 bulls and 5 cows while hunting in GMU 20A on Ft. Wainwright during 1972; in addition, 15 bulls and 3 cows were taken on Ft. Greely. Since these latter figures represent harvest by licensed hunters, and may be included in harvest ticket compilations, only the harvest on Ft. Wainwright should be added to the subunit total to assess the magnitude of the harvest.

Corresponding to the steadily increasing harvest is an increase in hunting pressure the past three years. In 1970, a total of 642 persons hunted moose in GMU 20A. In 1971 hunting pressure increased to 904 hunters, while in 1972 participation rose to 1059 hunters. Despite this increased pressure, hunter success has not declined proportionately; in the past three years success has varied from 48 percent in 1970 to 39 percent in 1971 to 45 percent in 1972. Participation by resident hunters has remained fairly constant. Residents (successful and unsuccessful) have comprised 83 - 88 percent of the total hunters over the past three seasons (1970-1972).

Appendix I lists those areas contributing substantial numbers of moose in the 1972 subunit harvest. These nine areas furnished 330 moose, or 81 percent of the known location harvest in GMU 20A. Although the harvest of large antlered bulls is unknown, the bull composition of the harvest from the Wood River and Gold King areas was 64 percent, which may reflect the suspected hunting pressure for trophy bulls in the foothills of the Alaska Range.

Harvest chronology data for the 1972 season indicate that 57 percent of the harvest of both sexes of known date kills occurred from August 20 to September 30, while 40 percent of the moose were taken from November 1 to November 30, reflecting the even distribution of the harvest through the

early and late seasons. In contrast, 76 percent and 71 percent, respectively, of the harvest of both sexes occurred from Aug. 20 - September 30 during the 1970 and 1971 seasons. This variation in chronology of harvest is partly explained by unfavorable hunting conditions early in the 1972 season when leaves persisted on deciduous vegetation and moose distribution was unfavorable. Weather and snow conditions in November provided hunters with easy access into areas relatively inaccessible during the 1970 and 1971 seasons.

Composition and Productivity

Age composition data for the 1972 moose harvest in Unit 20 are shown in Appendix II. Although the small sample ($n = 74$) in relation to the total subunit harvest (15% of the harvest was sampled) may preclude adequate interpretation, it is interesting to note that yearlings and 3- and 4-year-old age classes are well represented, indicating a fairly constant rate of recruitment of adult moose to the population in 1968, 1969 and 1971. The 2-year-old cohort comprises 1.4 percent of the sample and reflects the excessive mortality to the 1970 calf crop during the 1970-71 winter. The high percentage (24.3) of animals in the older age classes (10+ years) corresponds to age structure of the 1971 harvest when 26.1 percent of the sample was composed of animals in the 10+ category, and indicates a continued low rate of exploitation of the moose population in the subunit.

Parturition counts were conducted on May 24 and 25, 1972, on the Tanana Flats to assess winter mortality and survival. Percent yearlings in the herd (11) decreased from a fall 1971 calf percentage of 18, representing an overwinter calf loss of 39 percent, compared to an 80 percent loss following the winter of 1970-71. Yearlings per 100 cows in the spring of 1972 (17:100) showed a similar reduction from fall 1971 calf:cow ratio of 31:100.

Extensive fall composition counts were conducted in portions of the Tanana Flats, Alaska Range foothills and upper Wood River in 1972. Surveys conducted on the Flats revealed 38 calves:100 cows (compared to 31:100 in 1971) and a calf crop of 21 percent (compared to 18% in 1971). Consequently, production was adequate, but did not increase significantly following the severe winter of 1970-71, indicating the moose "herd" on the Flats may have stabilized. The bull:cow ratio of 47 males per 100 females decreased slightly from 1971 surveys which indicated a ratio of 42:100 on the Tanana Flats.

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 revealed bull:cow ratios of 35:100 and 28:100, respectively, reflecting the suspected disproportionate utilization of the bull segment of the population in those areas.

Table 1 summarizes fall survey results for all three count areas the past two years, and reflects little significant change in bull:cow ratios (37M:100F vs. 40M:100F), or calf production (27 calves:100 cows vs. 30 calves:100 cows), but a higher rate of recruitment (3% vs. 9% yearlings in the

population) in 1972 compared to 1971.

Table 1. Game Management Unit 20A fall sex and age composition summary 1971-72.

	1971	1972
Males per 100 females	36.8	40.4
Calves per 100 females	26.7	29.6
% yearling bulls in herd	1.6	4.7
% calves in herd	16.3	17.4
% large bulls in herd	20.9	19.1
% lone cows in herd	45.6	42.0
% cows in herd	61.1	58.8
% adults in herd	83.6	82.6

Management Summary and Recommendations

Unit 20A experienced the largest reported moose harvest in 1972 since the harvest ticket program was established. A steadily increasing harvest and hunting pressure have not appreciably affected hunter success from 1970-1972. Hunting effort in the foothills of the Alaska Range appears to have depressed bull:cow ratios to the point where the availability of trophy bulls may be decreasing, although sex ratios are still adequate to insure production. This disproportionate utilization has resulted in an increased percentage of cows in the harvest in 1972. If 58 - 68 percent of the harvest continues to come from a bull segment comprising 20 - 25 percent of the population, hunters will become less selective for males and the sex composition of the harvest will approach the observed composition of the population. Hunters appear unwilling to accept restrictions necessary for trophy management, but instead favor a maximum sustained yield of total animals.

Despite the severe winter of 1970-71, the moose population in GMU 20A has recovered, with production and survival stabilizing at levels observed since 1968. In 1971 and 1972, 46 percent and 42 percent, respectively, of the population was comprised of lone cows; if the harvest continues to increase and recruitment does not also increase it may result in an overharvest. If the sex composition of the 1972 harvest is any indication of future trends, production and survival may improve, resulting in a larger moose population.

It is recommended that seasons and bag limits remain unchanged for the 1973 season.

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SUBMITTED BY:

Oliver E. Burris
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Appendix I. Areas contributing the majority of 1972 moose harvest.
Game Management Unit 20A.

Area	Male	Female	Unknown	Total	% of Unit 20A Harvest of Known Location Kills
Tanana River	9	18	-	27	6.7
Bonnifield Trail	2	9	-	11	2.7
Blair Lakes	14	27	-	41	10.1
Salchaket Slough	9	3	-	12	3.0
Wood River	52	29	-	81	20.0
Clear Creek	15	31	-	46	11.3
Dry Creek	18	6	-	24	5.9
Gold King	41	22	1	64	15.8
Tanana Flats	13	10	1	24	5.9

Appendix II. Age composition of 1972 moose harvest in Unit 20 (legal sport kill only).

Age Class	GMU 20A				GMU 20B				GMU 20C*			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	-	-	-	-	6	9	15	15.2	-	1	1	3.6
1	8	3	11	14.9	11	6	17	17.2	-	2	2	7.1
2	1	-	1	1.4	4	4	8	8.1	2	-	2	7.1
3	8	4	12	16.2	3	5	8	8.1	7	-	7	25.0
4	8	5	13	17.6	1	7	8	8.1	2	-	2	7.1
5	3	2	5	6.8	5	6	11	11.1	3	-	3	10.7
6	2	2	4	5.4	1	1	2	2.0	-	-	-	-
7	4	2	6	8.1	-	2	2	2.0	1	-	1	3.6
8	-	-	-	-	-	2	2	2.0	2	1	3	10.7
9	4	-	4	5.4	1	4	5	5.0	1	-	1	3.6
10+	9	9	18	24.3	3	18	21	21.2	2	4	6	21.4
Total Sample Size												
	47	27	74		35	64	99		20	8	28	

* Excluding Taylor Highway eastern 20C

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20B - Fairbanks, Central Tanana

Seasons and Bag Limits

Aug. 20 - Sept. 30

Nov. 1 - Nov. 30

Antlerless season:

Oct. 2 - Oct. 8

One moose; 100 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

Based on harvest ticket returns, the legally reported sport kill of moose in Unit 20B for the 1972 season was 189 animals, consisting of 116 bulls, 65 cows and 8 unknown sex. An additional 10 bulls were reported taken by military personnel hunting on Ft. Wainwright, where harvest tickets were not required. The bull-only season for the preceding five years (1967-1971) resulted in harvests ranging from 85 moose in 1967 to 209 moose in 1970, for a five year average harvest of 146.

Appendix I lists those areas supporting the majority of the Unit 20B moose harvest during 1972, and reflects the concentrated hunting effort along road systems in the area. Ninety-seven moose, or 59 percent of the known location unit harvest, were taken from the road network, and only four off-road areas contributed significant numbers of moose to the harvest (40 moose, or 24% of the known-location harvest).

Harvest chronology data indicate that 76 bulls, or 76 percent of the total reported male harvest of known date kills, occurred from August 20 to September 30, while 20 bulls, or 20 percent of the bull harvest, were taken from November 1 to November 30.

The first year in which an antlerless hunt was held in Unit 20B was 1972. The Board authorized the taking of 100 antlerless moose by permit only, with mandatory return of jaws and permits to monitor the harvest.

The season opened October 2 and was to continue until 100 moose were taken. Based on the large number of permits issued prior to and during the hunt (2,222 permits issued at the Fairbanks office) and the anticipated hunting pressure during the first weekend of the hunt, it was decided to close the season on October 8. The large harvest did not occur, and a total of 69 moose were taken during the 7-day season. Based on 1,661 permits returned, 1,131 permittees hunted, 440 did not hunt, and 90 did not specify participation in the hunt.

The average number of days spent hunting before an antlerless moose was taken (based on 64 successful permittees and assuming one day equals 8 hours of hunting) was 1.5. Kill locations of successful permittees indicate that off-road areas supported the majority of the harvest. The Chena drainage furnished 33 moose, or 48 percent of the harvest, while the Chatanika and Goldstream drainages contributed 20 moose, or 29 percent of the harvest. Harvest chronology data indicate that 40 moose, or 58 percent of the harvest, occurred during the first three days of the season, while 42 percent of the moose were taken in the last four days.

Excluding the antlerless moose harvest in 1972, the bull kill of 116 animals was the lowest reported unit harvest since 1967, when 85 moose were taken. Increasing hunting pressure the past three years (1970-72) has not resulted in an increase in harvest. Total hunters in the unit in 1970, 1971 and 1972 rose from 640 to 915 to 1,098, respectively, while success for the same period declined from 36 percent to 20 percent to 17 percent, respectively. Limited access to much of the suitable moose habitat in the area has resulted in heavy hunting pressure along the road system, and the inevitable decline in harvest and success.

Composition and Productivity

Age composition data for the 1972 season are listed in Appendix II. The mandatory return of jaws required by the antlerless hunt contributed to the large sample, which represents 52 percent of the harvest, and probably reflects the age structure of the population in the adult categories. Calves and yearlings comprised 32 percent of the sample, reflecting the high level of exploitation the small portion of the moose herd receives in accessible hunting areas. Adults older than five years comprised 32 percent of the sample, while 21 percent of the adults were 10 years or older. Forty-two percent of the adult female harvest was animals over 5 years of age, while only 14 percent of the bull harvest consisted of animals older than 5 years. The average age of bulls (excluding calves) was 3.5 years, while cows averaged 6.2 years, reflecting the exploitation of the bull segment through past bull-only seasons.

Aerial sex and age composition surveys were conducted in portions of the Chena and Goldstream drainages from November 13 to 21, 1972. Moose distribution during this period was such that adequate samples were obtained only in disturbed areas (burns, tailing piles, homesteads), ridges, and willow draws of small drainages. A large sample (803 moose) was obtained to provide an index to production, survival, and sex ratios. Despite the relatively mild winter of 1971-72, production and survival showed little change from 1971. Poor survival of the 1971 calf crop is indicated by a three percent yearling segment of the population (compared to 6% in 1971), and a ratio of two small males per 100 females (compared to 5:100 in 1971). Overwinter loss of the 1971 calf crop is calculated at 82 percent. A slight improvement occurred in calf production in 1972, with a 20 percent calf crop (compared to 17% in 1971) and 33 calves per 100 females (compared to 28:100 in 1971). Bull:cow ratios varied from 7:100 in the Angel Creek and Colorado Creek drainages to 79:100 in the East Fork Chena drainage with an overall average of 28:100 (compared to 34:100 in 1971). Although sex ratios appear adequate to insure conception

(16% and 59%, respectively, of the population are adult bulls and adult cows), 68 percent of the cows observed were without calves, while only 30 percent of the cows had one calf. Calf and yearling mortality due to hunting prior to aerial surveys may account for a portion of the calculated low survival, but does not adequately explain the poor calf survival and apparent inability of the moose herd in this unit to recover following the severe winter of 1970-71.

Management Summary and Recommendations

Past bull-only seasons in this unit have failed to further the sustained yield principle. Heavy utilization of the bull segment of the population by a steadily increasing number of hunters, while sacrificing the remainder of the herd to periodic winter mortality has depressed bull:cow ratios in accessible areas. Limited or poor range conditions and calf predation are probably the cause of high calf mortality and low recruitment in 1971 and 1972. The antlerless moose harvest in 1972 provided for limited utilization of the female segment of the population. The harvest of 69 antlerless moose will have little effect on overall numbers or densities inasmuch as most of the moose population is inaccessible to the majority of the hunters. The age structure of the harvest and results of composition surveys indicate that overexploitation of males has occurred while the female segment is composed of old-age animals. Recent action by the Board authorizing a 7-day antlerless season (October 1 - 7) in 1973 will allow for continued utilization of the female segment. Only if antlerless harvests are substantial will there be any appreciable effect on age structure, sex ratios, density and survival. Improved access into areas previously unhunted or lightly hunted is necessary to insure more animals in the harvest and higher hunter success, while reducing competition on the range.

Public information efforts in the Fairbanks area should be accelerated to demonstrate the increased harvests of antlerless moose in this unit are desirable to achieve a greater sustained yield of the moose population.

In the event moose distribution during the 1973 season does not allow for a substantial antlerless harvest, future seasons should be scheduled later in winter when "high land" moose populations move to lower elevations and are more accessible to hunters.

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SUBMITTED BY:

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Regional Management Coordinator

Appendix I. Areas contributing the majority of 1972 moose harvest,
Game Management Unit 20B.

<u>Road System Areas</u>	M	F	?	Total
Chena Hot Springs Road (mile 0-28)	7	2	1	10
Chena Hot Springs Road (mile 29-50+)	3	4	1	8
Chena Hot Springs Road (unspecified)	9	6	-	15
Steese Highway	13	1	1	15
Elliott Highway	9	4	-	13
Fairbanks and vicinity	6	6	-	12
Nenana Highway	5	4	-	9
Eielson A.F.B.	4	3	-	7
Johnson Road	<u>1</u>	<u>7</u>	<u>-</u>	<u>8</u>
Total road system moose harvest	57	37	3	97

Road system harvest as percent of Unit 20B
harvest of known location kills - 59%

Off-Road Areas

Murphy Dome	4	4	-	8
Goldstream Valley	6	4	-	10
Tanana River	6	2	-	8
Chena River	<u>4</u>	<u>8</u>	<u>2</u>	<u>14</u>
Total off-road moose harvest	20	18	2	40

Off-road harvest as percent of Unit 20B
harvest of known locations kills - 24%

Appendix II. Age composition of 1972 moose harvest in Unit 20 (legal sport kill only).

Age Class	GMU 20A				GMU 20B				GMU 20C*			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	-	-	-	-	6	9	15	15.2	-	1	1	3.6
1	8	3	11	14.9	11	6	17	17.2	-	2	2	7.1
2	1	-	1	1.4	4	4	8	8.1	2	-	2	7.1
3	8	4	12	16.2	3	5	8	8.1	7	-	7	25.0
4	8	5	13	17.6	1	7	8	8.1	2	-	2	7.1
5	3	2	5	6.8	5	6	11	11.1	3	-	3	10.7
6	2	2	4	5.4	1	1	2	2.0	-	-	-	-
7	4	2	6	8.1	-	2	2	2.0	1	-	1	3.6
8	-	-	-	-	-	2	2	2.0	2	1	3	10.7
9	4	-	4	5.4	1	4	5	5.0	1	-	1	3.6
10+	9	9	18	24.3	3	18	21	21.2	2	4	6	21.4
Total Sample Size	47	27	74		35	64	99		20	8	28	

* Excluding Taylor Highway eastern 20C

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20C - Tok, Central Tanana, Kantishna

Seasons and Bag Limits

Aug. 20 - Oct. 7

Nov. 1 - Nov. 30

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

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported sport kill of moose in Unit 20C for the 1972 season was 474 animals, consisting of 410 bulls, 59 cows, and 5 unknown sex. This compares to a harvest of 496 moose in 1971, and represents a decrease in the 5-year (1967-1971) average harvest of 588. The bull composition of the harvest in 1972 (86%) increased slightly from the five year average of 80 percent.

Unit harvests and percent success the past three years (1970-1972) have not corresponded to variations in hunting pressure. Total hunters in Unit 20C in 1970, 1971 and 1972 varied from 1,480 to 1,681 to 1,597, respectively, while success for the same period declined from 43 percent to 30 percent to 29 percent.

Appendix I lists those areas contributing a substantial number of moose to the 1972 harvest from northern, central, western, and southwestern portions of the unit, and reflects hunting effort along river systems and off-road areas. Excluding the Taylor Highway and Alaska Highway from Delta Junction to Tok, the road system contributed 70 moose, or 17 percent of the known location unit harvest in 1972, approximating the road system harvest of 18 percent in 1970, and 16 percent in 1971. Off-road areas furnished 233 moose, or 56 percent of the total unit harvest, corresponding closely to the 1971 season when off-road areas supported 57 percent of the harvest. However, in 1970 only 38 percent of the harvest came from these same off-road areas, representing the suspected increase in hunting pressure exerted by a greater number of residents in the Fairbanks vicinity.

Fifty-seven males and nine females were reported harvested from the Taylor Highway, five of which were taken in November. A total of 12 moose were reported taken in that portion of 20C between Delta and Tok.

Data collected at the Taylor Highway check station, operated at Six Mile from September 16 to October 2, indicated that more than 500 people hunted the Taylor Highway for moose during 1972, approximately the same number that has hunted the area since at least 1968. Despite the rather

mediocre hunting success realized by most hunters, the Taylor Highway remains a popular moose hunting area, especially with residents from Southeastern Alaska.

Off road vehicles are becoming increasingly popular with Taylor Highway moose hunters every year. While ORV's tend to reduce the number of people hunting along the road, ORV users tend to all use the same hunting trails, i.e. those in the vicinity of 9, 26, 50, 57, and 96 Mile, resulting in rather high hunting pressure on local moose populations occupying these areas. Such situations may require close attention to prevent overuse and excessive harvests from occurring. Local moose populations may be important in maintaining harvest levels along these trails, unlike most of the roadside harvest which depends primarily on moose from outlying areas becoming available along the highway through normal movements during the rut.

Composition and Productivity

Age composition data for the 1972 harvest are listed in Appendix II and Appendix III. Despite the small sample from Unit 20C, excluding the Taylor Highway, it appears the population is weighted heavily with old animals (21% of the sample was 10+ years) indicating a low rate of exploitation. Three-year-olds comprised 25 percent of the sample, reflecting the high rate of recruitment in 1970 from good survival of the 1969 calf crop.

Fall composition surveys were not conducted in count areas in the Nenana, Teklanika and Totalanika drainages during 1972. Surveys in 1971 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 cows, compared to 16 percent and 23:100, respectively, for 1970. The expected poor survival of the 1970 calf crop was verified by a ratio of 5 small bulls per 100 cows (compared to 9:100 in 1970), and a 3 percent yearling bull segment in the herd (compared to 6% in 1970).

Only limited composition data are available from central and northern portions of the unit; current surveys are needed. December 1970 counts were previously reported in the 1971 Annual Report of Survey-Inventory Activities.

Sex and age composition data from the Taylor Highway since 1968 are summarized in Appendix IV. Except for Mt. Fairplay, where bull:cow ratios have fluctuated rather severely (probably due to sampling error), the bull:cow ratio has decreased slightly in the two sample areas along the Taylor Highway (Kechumstuk and West Fork of the Dennison), but not enough to be a significant factor in affecting reproduction or bull hunting success. Calf survival through November was about or slightly below average.

Range and Habitat

Formal range investigations have not been initiated in Unit 20C.

Composition surveys have established that moose in Unit 20C and adjacent subunits are concentrated in burned areas for much of the late fall and early winter (October - February). Snow conditions influence movements out of the burns in the late winter period.

Numerous fires in past years have undoubtedly contributed to the present moose populations throughout Unit 20C. The paucity of fires in the past 10 to 15 years is likely to result in smaller moose populations in many locations.

Several more recent burns should be investigated to determine if they have an increased capacity for moose.

Population Trends

Indirect information obtained from hunting pressure, hunting success, composition surveys, age composition and general range reconnaissance tends to indicate that it is unlikely that moose populations throughout Unit 20C are increasing. Calf survival and yearling percentages indicate stable or potentially declining moose herds.

Management Summary and Recommendations

The 1972 moose harvest in Unit 20C was the lowest reported since the harvest ticket program was established. Reasons for this decline are uncertain, especially since composition data for most of the subunit are lacking for 1972. Heavy mortality may have occurred during the winter of 1971-72 to the extent that recruitment did not compensate for natural and hunter mortality in the heavily hunted areas, so that the population declined. If this is the case, the moose population has not recovered from losses experienced during the severe winter of 1970-71. The establishment of Unit 20D, which was formerly part of Unit 20C, and the closing of the season in Unit 20D would account for a decline in the harvest of approximately 100 moose in 1971 and in 1972.

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 calf survival, and sex ratios adequate to assure maximum conception, despite the disproportionate utilization of the bull segment throughout much of the unit. Consequently, antlerless hunts should be continued to further the sustained yield principle. Continued harvests of bulls at the current level may eventually depress bull:cow ratios; it appears unlikely that future antlerless harvests during a 7-day season will maintain optimum sex ratios. If the herd has stabilized, more liberal antlerless seasons might result in either lowering the average age of females or a lower population which would stimulate production and calf survival. Until more is learned concerning the causes for the present low survival, no changes in seasons or bag limits are recommended.

Composition data from northern and central portions of the unit are badly needed.

A program of trail, airstrip and boat launch site construction should be initiated, when the land ownership situation is settled, along with a moose habitat improvement program (crushing, controlled burns and herbicides). These programs would help spread hunting pressure from already overcrowded road systems to under-utilized moose populations occupying presently inaccessible back country, and increase moose numbers by providing an increased browse supply.

The site of the Y-66 burn should be closely monitored to observe willow resprouting and moose range development. Should moose fail to fill the newly created niche, consideration should be given to restricting hunting in the area in an attempt to encourage moose immigration into the burn.

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

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Appendix I. Areas contributing the majority of 1972 moose harvest
GMU 20C (excluding Taylor Highway, Eastern 20C).

Area	Male	Female	Unknown	Total
<u>Road System Areas</u>				
Richardson Highway	4	-	-	4
Elliott Highway	14	2	-	16
Nenana Highway	38	3	-	41
Steese Highway	9	-	-	9
Total Road System Harvest	65	5	-	70
<u>River System, Off-road Areas</u>				
Central 20C				
Shaw Creek	7	-	-	7
Salcha River	14	6	-	20
Goodpaster River	18	6	1	25
Northern 20C				
Yukon River	6	-	-	6
Nome Creek	4	3	-	7
Beaver Creek	9	1	-	10
Birch Creek	2	-	-	2
Western 20C				
Minto Flats	25	-	1	26
Tolovana River	7	-	-	7
Kantishna River	11	-	-	11
Minchumina, Muddy River	6	-	-	6
Southwestern 20C				
Totatlanika River	11	-	-	11
Sevenmile Lake (Rex Trail)	11	1	1	13
Fish Creek	4	-	-	4
Healy	14	5	-	19
Lignite	7	1	-	8
Healy Creek, Moody Creek	3	1	-	4
Savage River, Toklat River	10	-	-	10
Otto Lake, Stampede Road	10	1	-	11
Yanert River (includes 7♂, 1♀ in GMU 20A)	24	2	-	26
Total River System, Off-road Harvest	203	27	3	233

Appendix II. Age composition of 1972 moose harvest in Unit 20 (legal sport kill only).

Age Class	GMU 20A				GMU 20B				GMU 20C*			
	M	F	No.	%	M	F	No.	%	M	F	No.	%
Calf	-	-	-	-	5	9	14	14.6	-	1	1	4.2
1	8	3	11	16.4	11	6	17	17.7	-	2	2	8.3
2	1	-	1	1.5	4	4	8	8.3	2	-	2	8.3
3	7	4	11	16.4	2	5	7	7.3	7	-	7	29.2
4	6	5	11	16.4	1	7	8	8.3	2	-	2	8.3
5	1	1	2	3.0	4	6	10	10.4	2	-	2	8.3
6	2	1	3	4.5	1	1	2	2.1	-	-	-	-
7	4	2	6	9.0	-	2	2	2.1	1	-	1	4.2
8	-	-	-	-	-	2	2	2.1	1	1	2	8.3
9	4	-	4	6.0	1	4	5	5.2	-	-	-	-
10+	9	9	18	26.9	3	18	21	21.9	2	3	5	20.8
Total Sample Size	42	25	67		32	64	96		17	7	24	

* Excluding Taylor Highway eastern 20C

Appendix III. Taylor Highway moose ages.

Age	1965			1966			1967			1968			1969			1970			1971			1972		
	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%	♂	♀	%
calf	0	0	-	0	0	-	1	0	2.3	0	1	2.6	1	2	5.1	1		4.0	-	4	10.8	1	0	2.4
1	1	1	5.0	0	0	-	3	0	6.8	0	0	-	2	0	3.4	5		20.0	-	1	2.7	3	0	7.1
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	0	7.1
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	2	0	4.8
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	1	2	7.1
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	10	0	23.7
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	1	0	2.4
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	1	0	2.4
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	1	0	2.4
9	1	0	2.5	0	0	-	0	0	-	1	0	2.6	4	0	6.8	2		8.0	1	1	5.4	2	0	4.8
10	0	0	-	0	0	-	1	0	2.3	1	1	5.3	5	0	8.5	1		4.0	2	2	10.8	2	0	4.8
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	7	0	16.7
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	3	0	7.1
13	0	0	-	0	0	-	0	1	2.3	1	0	2.6	2	0	3.4	1		4.0	1	0	2.7	1	0	2.4
14	0	0	-	0	0	-	0	0	-	0	1	2.6	0	0	-	0		-	1	1	5.4	1	0	2.4
15	0	0	-	0	0	-	0	0	-	1	0	2.6	0	0	-	0		-	0	0	-	0	1	2.4
Total (♂+♀)	40	100		25	100		44	100		38	99.9		59	100		25	100		37			42	100	

Appendix IV. Sex and age composition surveys, Taylor Highway area.

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

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20D - Delta Junction

Seasons and Bag Limits

No Open Season

Harvest and Hunting Pressure

Game Management Unit 20D was created by subdividing GMU 20C during 1971. Game Management Unit 20D has been closed to moose hunting since the 1970 harvest. There was a 70-to 72-day bull season and a one-to eight-day antlerless season in this area from 1962 through 1970. The annual moose harvests since 1964 and the percentages of the harvests that were bulls are given below.

	<u>1964</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971*</u>	<u>1972*</u>
Moose Harvested:	171	131	115	116	115	105	21	15
Percent Bulls in Harvest:	64	54	68	72	64	70	60	67

* No legal season in 1971 and 1972.

The reported harvests during 1971 and 1972 were illegal or inaccurate reporting. Harvest data for 1965 and for four subunits of GMU 20D are missing, but the missing data are not likely to substantially alter these results. Some figures differ slightly from published figures last year because of my vacillation in the assignment of a few ambiguous reporting units to specific areas. The data illustrate a declining annual moose harvest, although the percentage of bulls in each harvest has remained fairly constant.

Game Management Unit 20D has been partitioned into five subdivisions for management purposes (Fig. 1). The number of moose harvested within each subdivision of GMU 20D is tabulated below.

<u>GMU 20D Subdivisions</u>	<u>1964</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971*</u>	<u>1972*</u>
A - Granite Mtn. Burn	23	35	23	22	33	24	0	4
B - Jarvis Creek	7	6	8	9	12	6	0	0
C - Sawmill Creek	6	7	8	8	9	15	1	0
D - Little Gerstle River	0	0	0	5	2	6	1	0
E - Clearwater to Donnelly	135	83	76	72	59	54	19	11

* No legal season in 1971 and 1972.

These data show that subdivisions A, B, C, and D have had generally stable or slightly increasing moose harvests. Only subdivision E has had a decreasing moose harvest.

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

<u>GMU 20D Subdivisions</u>	<u>Percent of GMU 20D Hunters Within Subdivision</u>	<u>Percent Hunter Success Within Subdivision</u>
A - Granite Mtn. Burn	25	29
B - Jarvis Creek	3	90
C - Sawmill Creek	5	50
D - Little Gerstle River	4	38
E - Clearwater to Donnelly	63	38

The relatively extensive network of access roads and trails in subdivisions A and E probably accounts for the fact that 88 percent of the hunters used these two areas. Additional hunting pressure in subdivision A was probably due to the fact that this area is within Ft. Greely, and nonresident soldiers could hunt here without a nonresident hunting license. Overall hunting success was good, but hunters were generally more successful where there was less competition.

Data from the accumulated harvest chronologies from 1968 through 1970 indicate that 33 percent of the bull harvest has occurred during the first week of open season. Eighty-eight percent of the bull harvest and all of the legal antlerless harvest has occurred during the early moose season, and only 12 percent of the bull harvest has occurred during November.

Abundance and Distribution

All of GMU 20D, except a small area of poor habitat, was systematically surveyed for moose during November 1972. Moose observations were numbered and located on a map. These observations were subsequently used to prepare a map of moose distribution (Fig. 2). Each dot on the distribution map represented five moose within the same general vicinity (two moose or less were not represented in an area; three or more moose were represented by dots to the nearest five; therefore, the total number of moose seen in a drainage may not be exactly represented by dots, although there should be a close agreement). Of the moose observed, 61 percent were in an alpine or subalpine habitat, 28 percent were in burns, and 11 percent were in other areas (mainly alongside willow-bordered drainages).

The harvest data indicate that most moose have been harvested early in the season at low altitudes in subdivision E. During the November moose counts in 1971 and 1972, relatively few moose were found at low altitudes in subdivision E. This agrees with observed shifts in moose distribution and suggests a movement of moose from low altitudes early in the season to higher altitudes by November. More information on these vertical and possibly horizontal movements of moose is needed.

A method of inflating aerial counts to approximate a true population number was applied on a 16-square-mile area on upper Jarvis Creek. The study area was selected to be representative of the subalpine habitat

where moose were found in greatest abundance. Based on these data, I counted 82 percent of the moose **actually present**. Counting efficiency was probably lower for moose that **were in areas** other than subalpine habitat. Therefore, extrapolations from moose seen to moose probably present (based on the 82 percent counting efficiency) should be safely conservative. Extrapolated values from moose seen to moose present for each GMU 20D subdivision are given in the Management Summary of this report.

Composition and Productivity

Composition surveys of moose in GMU 20D have been made on four occasions, and the results are shown below.

	<u>1960</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>
Large bulls per 100 cows	28	5	14	23
Yearlings per 100 cows	22	6	10	7
Calves per 100 cows	55	32	16	19
Sample size	257	133	441	491

The calf:cow ratio has been relatively poor in recent years. A combination of deteriorating range and severe winter conditions is the likely reason for the relatively small calf crops. The large bull:cow ratio dropped to a low level by 1970 due to selective hunting pressure on bulls and a relatively long bull season. Since closure of the moose season in 1970, the large bull:cow ratio has risen spectacularly. The large bull:cow ratio appeared to be a better indicator of hunting pressure (when hunting was solely or mainly on bulls) than total bull:cow ratios for the following reasons: 1) The observed increase in large bulls per 100 cows could not be accounted for by the preceding year's yearling:cow ratio. Apparently, almost half of the yearling bulls have been tallied as cows, large bulls, or both. 2) Large bulls with conspicuous antlers have survived more than two hunting seasons; small bulls have survived only two hunting seasons (as calves and as yearlings) and do not always have obvious antlers. Therefore, data on large bulls alone should be a more sensitive and accurate indicator of hunting pressure than data diluted with questionable numbers of young bulls of which a portion may have survived because they resembled cows.

The ratio of large bulls per 100 cows within each subdivision of GMU 20D is given below where data are available.

	<u>GMU 20 D Partitions</u>				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
1960	18	--	69	--	5
1970	0	← 5 →		--	4
1971	11	13	11	21	0
1972	32	23	26	22	9

The large bull:cow ratios found during 1960 indicate that hunting pressure had been fairly heavy in subdivisions A and E, but subdivision C had received relatively little hunting pressure. By 1970 all subdivisions had low bull:cow ratios, but these ratios have increased in all subdivisions since 1970. The bull:cow ratio in subdivision E during 1972 was low as compared to the remainder of GMU 20D.

Range and Habitat

Moose habitat in Unit 20D is badly in need of renovation. The youngest burns of substantial area are 18 years old. Casual observation indicates heavy use of available range. Browse in the burned area is showing the long term effects of heavy utilization and decadence.

In the fall of 1971 a cooperative effort with the Department of Natural Resources, the U.S. Army and the Department of Fish and Game resulted in the crushing of 352 acres with a Filco Roller-chopper. The effort was to determine the practicality of creating a fuel break and producing moose browse. It is too early to determine its results at this time.

Management Summary and Conclusions

The antlerless moose season in GMU 20D was discontinued by the Board of Fish and Game in 1971 primarily because of public alarm at the diminishing numbers of moose seen in recent years. The bull season was also closed by Commissioner's Announcement before the 1971 hunt because of the low bull:cow ratio and because of the low increment of yearling bulls due to the severe winter of 1970-71.

The harvest data illustrate a steadily declining moose harvest for GMU 20D from 1964 through 1970. Subdividing the harvest data in subdivisions A to E revealed that virtually all of the decrease in harvest has occurred in subdivision E (an area that includes Clearwater Lake, Delta Junction, Donnelly Dome and the Richardson Highway). Although subdivision E constitutes only 27 percent of the area in GMU 20D, it has supported 63 percent of the hunting effort (in 1968) and has supplied from 74 percent (in 1964) to 51 percent (in 1970) of the moose harvested in GMU 20D. Generally, subdivision E has more human activity, more access roads and trails, and affords better visibility of moose because of extensive subalpine areas and farm clearings in comparison to the rest of GMU 20D. Since closure of the moose season, the ratio of large bulls per 100 cows has increased from 5 to 23 in GMU 20D. Only in subdivision E was the bull:cow ratio still too low to justify the hunting of bulls. The closure of subdivisions A through D of GMU 20D to moose hunting cannot be justified on biological grounds.

The yearling composition data are considered to be inaccurate, but the annual increment of moose can be estimated by the increase in large bulls per 100 cows since 1970. Assuming that the natural mortality of cows and bulls was proportional to the abundance of each sex, the annual increment was about 16 percent each year during 1970 and 1971. The net increase in 1970 was probably reduced by the harvesting of some yearling moose. In addition, the severe winter of 1970-71 probably caused a reduced survival

of calves and yearlings. Based on these data, a harvest of 15 percent (including calves) appears to be safely conservative following normal winters. Approached from a different angle, data from Unit 20 indicate that an annual increment of 20 percent may be a reasonable expectation following normal winters. Allowing for a 5 percent natural mortality (including wolf predation), a harvest of 15 percent appears reasonable.

Game Management Unit 20D has generally good access and there is a public need (even if unrecognized by some of the public) for all of the moose that can be produced. Almost all symptoms indicate the subunit has a decreasing carrying capacity for moose. The youngest burns of substantial area are 18 years old. A habitat rehabilitation program is urgently needed. Maximum recreational utilization of moose must be achieved to produce favorable cost:benefit ratios by which a habitat rehabilitation program will be evaluated. Data have been gathered during this past year on the assumption of future intensive management of moose in GMU 20D.

An idealized, detailed management plan for harvesting moose in Unit 20D during 1973 is described below.

	GMU 20D Subdivisions				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
Moose seen	75	145	75	134	63
Moose present	92	177	92	164	77
Total harvest (15%)	14	26	14	25	0
Bull harvest	13	16	13	15	-
Cow harvest	1	10	1	10	-
Moose remaining	78	150	78	139	77
Bulls	13	25	13	23	16
Cows	65	125	65	116	61
Bulls per 100 cows	20	20	20	20	26

Values for moose present within each subdivision are extrapolations based on an 82 percent counting efficiency. A 15 percent harvest by permit would be applied to each subdivision. Using moose composition data found for each subdivision, the ratio of bulls and cows harvested would be manipulated as shown to maintain a ratio of 20 bulls per 100 cows. Hunting of both bulls and cows would be required to achieve maximum utilization and to maintain a prescribed sex ratio. Subdivision E would not be harvested because of the currently low bull:cow ratio and because local people are still perturbed about the depletion of moose along roadside areas. An early November hunt is recommended.

The harvest plan that is finally adopted should be a compromise between the idealized plan detailed above, the desires expressed by the public, and whatever is most practical. I recommend an initial negotiating position of issuing up to several hundred either-sex and all-age-class permits for GMU 20D. As the allowable harvest is reached in each subdivision, that area could be closed by Commissioner's Announcement. If, in future years, the bull:cow ratio starts deviating from 10 to 20 bulls per 100 cows, short extensions of the season for one sex may be used to improve the sex ratio. I recommend against compromising on the combination of a permit

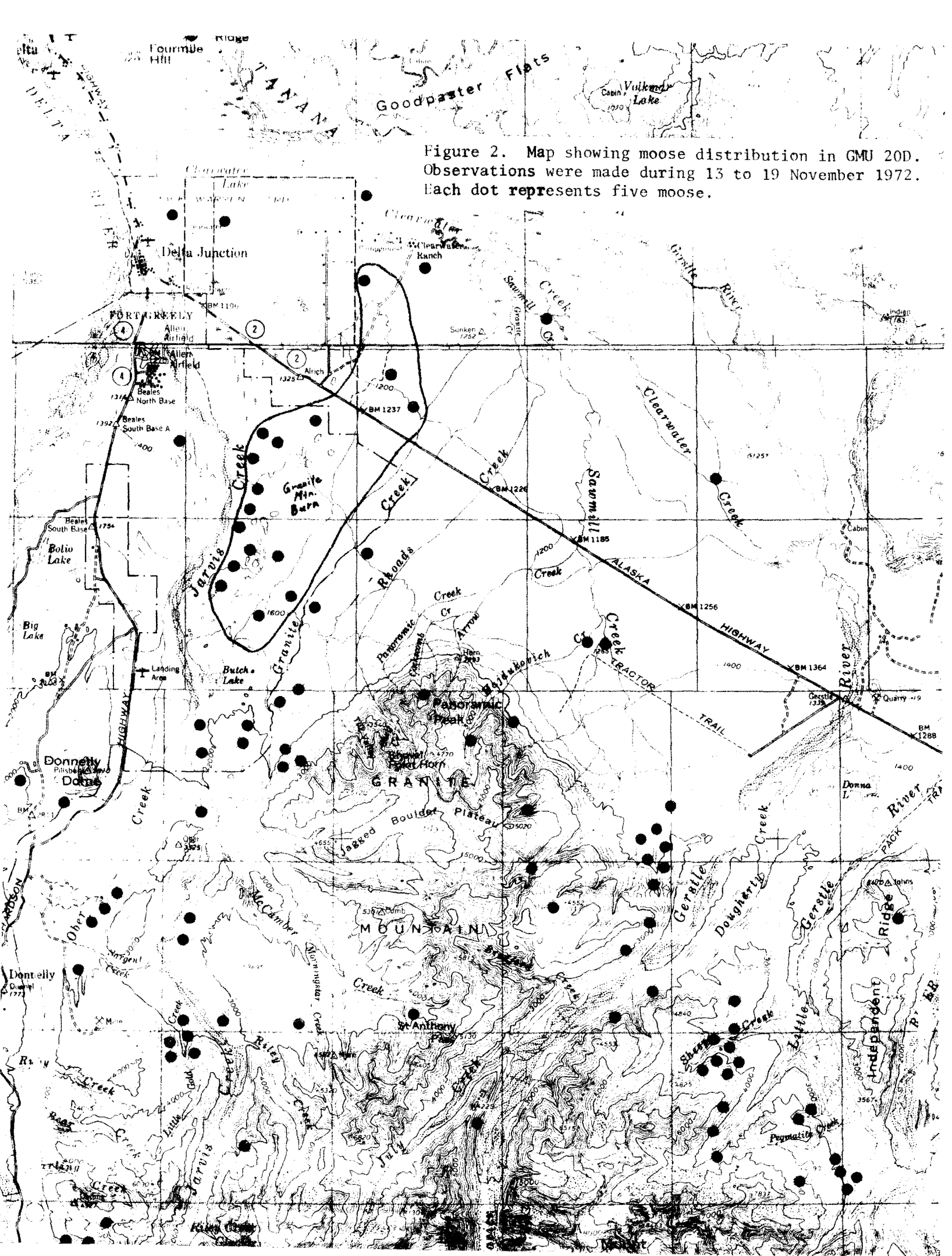
system, either-sex hunting, and some form of partitioning GMU 20D. Excessive harvesting of bulls and uneven distribution of harvests have been the major moose problems in the past. Furthermore, there is little justification for habitat improvement if the additional moose that are produced are not utilized. Late fall hunts, after the ground is frozen and after moose have moved to higher altitudes away from the roadsides, may further minimize conflicts between viewing and hunting moose and may provide for better access by off-road vehicles. The limited information available indicates that we should hunt no earlier than October. Otherwise the moose distribution may be very different from that found during November, and the detailed harvest plan would not apply. A better knowledge of local moose movements and a winter severity test station (to assess the effects of winter prior to hunting season) would be needed should plans for maximum utilization be implemented.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 21 - Middle Yukon

Seasons and Bag Limits

Aug. 20 - Feb. 28

Two moose; only one of which may be antlerless

Harvest and Hunting Pressure

The reported harvest in 1972-1973 was 141 moose, of which 94 were bulls, 45 cows, and 2 unspecified. The percentage of cows in this sample is somewhat higher than in past years.

Moose populations were at a low level during the 1972-73 season. However, hunting pressure continued to increase in the Holy Cross, Shageluk and Greyling areas. Most of this increase was by aircraft hunters from Bethel.

Composition and Productivity

Aerial surveys of the Middle Yukon and Koyukuk were conducted in early April of 1972. These counts suggested poor calf production and survival (Appendix I).

Spring flooding in 1970 and 1971 was responsible for much early calf mortality and the loss of many adult moose. Residents reported finding numerous drowned adults and calves along the lower Innoko and Yukon Rivers near Holy Cross during the above period.

Range and Habitat

Snow depths were comparable with those reported in Unit 19, i.e. heavy snowfall in the winter of 1971-72. Spring flooding occurred in 1970 and 1971. High water along the Middle Yukon usually persists until mid-June or later. This annual inundation therefore, coincides with the moose calving period which largely occurs on the flood plain of the Yukon. The unusually severe flooding during the springs of 1970 and 1971 is directly related to previous winters' snowfall, which were records for the Middle Yukon area.

Population Trends

Decreasing population levels are evident throughout the unit. Winter mortality is difficult to assess, other than the sighting of seven obvious winter kills. Wolf kills were commonly seen along the major drainages. Thirty-five wolves in five packs were seen during the course of these surveys (10 hours flying time).

Poor survival of calves, wolf predation and losses through drowning are the contributing factors to the population decline. Increasing hunter kill may also be a significant factor.

Management Summary and Conclusions

Normal winter and spring conditions may allow the population to return to former levels. Present population levels are probably sufficient to accomodate most or all of the local subsistence demands of persons residing within the unit. Increasing competition between hunters may result in serious social problems, particularly concerning hunters coming from outside the unit from Bethel and Fairbanks. The basic regulations which have been designed to accomodate the needs and desires of persons residing within the unit should not be changed. Emergency regulations should be enacted if social problems increase and/or harsh winter and spring conditions should reoccur.

PREPARED BY:

Peter E. K. Shepherd
Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

Appendix I. Yukon and Koyukuk spring moose population counts, April 1972.

Area	Date	Adults	Calves	Total Moose	Hours Flown
Tanana to Ruby	4/6/72	290	38	328	3.1
Koyukuk to Hughes	4/14/72	1058	92	1150	3.9
Holy Cross to Nulato	4/15/72	<u>325</u>	<u>15</u>	<u>340</u>	<u>2.7</u>
		1673	145	1818	9.7

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 22 - Seward Peninsula

Season and Bag Limits

That portion including the drainages of the Kuzitrin, Kruzgamepa (Pilgrim) Rivers and all the area between the Sinuk and Nome Rivers.	Aug. 20 - Sept. 14	One bull moose
---	--------------------	----------------

Remainder of Unit 22	Aug. 1 - Nov. 30	One bull moose
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Hunting and Harvest Pressure

Not all moose taken in Unit 22 are being reported on the harvest tickets. The reported harvest for Unit 22 was 44 males. The actual harvest was probably 4 or 5 times as high. Twenty bulls are known to have been taken in the short season area. The average age of 14 from which jaws were collected was 2.6 years. Five were yearlings and the oldest was 6 years old. Half were over three years old, which is a higher percent of "older" bulls than during the last two years. Hunting pressure remained high but for the last two years the harvest has been below normal. Late winter counts indicate a population of about 200 moose in this area. This fall the bulls appeared to have remained widely dispersed and did not move into the area for the rut.

Composition and Productivity

Snowfall was heavy during the winter of 1971-1972 for the second consecutive winter. Moose were concentrated on the major river systems in the spring of 1972; therefore, aerial surveys indicated minimum populations and calf survival.

<u>River System</u>	<u>Minimum population</u>	<u>Calf % in herd</u>
Pilgrim	36	28
Kuzitrin	19	42
Kougarok	161	13
Serpentine	60	17

In late fall moose were very widely dispersed and generally appeared to be more numerous than normal. Late winter counts are planned for early 1973.

Management Summary and Recommendations

Moose appear to be expanding their range and increasing in numbers throughout Unit 22. Residents of Shishmaref, Koyuk, Elim, Unalakleet

and Nome have inquired about having an either-sex season. An either-sex season would have to be closely regulated. A permit hunt may be appropriate due to easy access to some areas by the large number of hunters in Nome. It is recommended that a limited either-sex season be adopted for Unit 22.

PREPARED BY:

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Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 23 - Kotzebue Sound

Seasons and Bag Limits

Aug. 1 - Nov. 30

One moose; antlerless
moose may be taken only
from Sept. 1 - Nov. 30

Harvest and Hunting Pressure

Harvest tickets are not widely used in Unit 23 but the reported harvest was 46 males and 11 females. Visits to villages in Unit 23 revealed the moose harvest in 1972 was low due to an abnormally early freeze-up of the rivers which cut off boat traffic early. Moose are normally taken by most residents while they are gathering wood or fishing in the fall. The moose population on the lower Noatak receives the most intensive hunting pressure of any population in Unit 23. The lower Noatak is popular with boat hunters from Kotzebue and Noatak as well as hunters using aircraft.

Composition and Productivity

Only limited surveys have been conducted in Unit 23. On the Buckland and Kiwalik Rivers minimum populations are 47 and 46 moose, respectively. Other aerial surveys indicated moose are increasing in most areas of Unit 23. In late fall moose were still very widely distributed and were not concentrated on the main river systems.

Management Summary and Recommendations

Moose appear to be increasing over most of the unit. Many of the residents of this unit still rely heavily on moose or caribou for subsistence. A longer season would give most residents an opportunity to get a moose for their use. It is recommended that the season be extended to the end of December or January.

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SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 24 - Koyukuk

Seasons and Bag Limits

Aug. 20 - Dec. 31

Two moose; only one
of which may be
antlerless

Harvest and Hunting Pressure

The following table contains the reported moose harvest information from 1969 to 1972. The actual harvest in Unit 24 is probably several times greater than the harvest indicated by the return of harvest tickets. Harvest tickets are not generally used by persons residing in Unit 24. The reported harvest probably does not provide a basis for extrapolating the total kill or indicating annual trends in the harvest.

	<u>Males</u>	<u>Females</u>	<u>Unknown</u>	<u>Total</u>
1969	59	12	-	71
1970	46	7	4	57
1971	62	15	2	79
1972	34	13	-	47

Composition and Productivity

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

Population Trends

Heavy snowfall and extensive snow accumulation have been reported in portions of Unit 24 within the past several winters. It is highly likely that the heavy snowfall has had some depressing effects upon the moose population in some local areas. The depressing effect of the heavy snowfall may have been partially or completely compensated for by heavy hunting and trapping pressure on wolves in the area.

Management Summary and Recommendations

The limited information 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 area. Therefore, these trends would be more readily detectable by the harvest ticket returns for that area. An effort should be made to evaluate the long-term environmental effects upon recent habitat changes in Unit 24, i.e. the effects of wildfire. An effort

should also be made to obtain moose composition and population data, particularly from the upper drainages of the Koyukuk River. No changes in season or bag limit are recommended.

PREPARED AND SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 25 - Fort Yukon

Seasons and Bag Limits

Aug. 20 - Dec. 31

Two moose; only one
of which may be
antlerless

Harvest and Hunting Pressure

The following table contains the reported moose harvest information for 1969, 1970, 1971 and 1972. The actual harvest in Unit 25 is probably several times larger than the harvest indicated by the return of harvest tickets. The reported harvest may indicate harvest trends but a great degree of reliability cannot be placed upon conclusions made from these data.

	<u>Males</u>	<u>Females</u>	<u>Unknown</u>	<u>Total</u>
1969	77	31	0	108
1970	42	15	1	58
1971	53	21	0	74
1972	55	26	2	83

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. Moose abundance, distribution and composition information is urgently needed for this unit. Recent information is not available from this unit. Biological reconnaissance work has recently been initiated in this area, particularly in conjunction with proposed non-renewable resource development and removal from the Arctic. This information has not generally been available and, therefore, not analysed to determine the significance to moose management in Unit 25. No changes in season and bag limit are recommended.

PREPARED AND SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 26 - Arctic Slope

Seasons and Bag Limits

Aug. 20 - Dec. 31

One moose

Harvest and Hunting Pressure

Based upon harvest ticket returns the moose harvest for the 1972 season was 17 moose. The harvest falls within the range of moose harvest reported from this unit for the past several years. However, the reported harvest is not considered to be indicative of the actual harvest. Harvest tickets are not generally utilized by residents of Unit 26 and other methods of estimating the harvest have not been adapted to the unit.

Composition and Productivity

Several surveys have been made in Unit 26 since the survey reported in the Survey-Inventory Progress Report for 1969. These surveys are listed in the following table:

<u>Area</u>	<u>Date</u>	<u>Adults</u>	<u>Calves</u>	<u>Percent Calves in Sample</u>	<u>Total Moose</u>
Unit 26	April 1970	1636	732	31	2488*
Chandler R.	March 1971	132	26	16	158
Colville R.	June 1971	126	30 yearlings	19% yearlings in sample	168**
Colville R.	Oct. 1971	66	18	21	84

* Total includes 120 unclassified moose from Arctic Wildlife Range

** Total includes 12 calves of the year. Calving was probably not complete at the time of the count.

An additional survey has been reported for Unit 26. This survey was conducted by Renewable Resources Ltd. but the data are not available at this time.

Management Summary and Recommendations

Surveys from 1969 to 1971 have indicated good to excellent rates of production and survival. Very little is known about the effects of hunting or other adult mortality. Several observers including Department biologists have the impression that moose populations in certain drainages, particularly tributaries of Colville River, are substantially lower than levels observed from 1969 to 1971. Additional surveys are planned to determine moose population trends. Moose habitat is very limited in Unit 26 and winter browse is particularly limited. Surveys should be initiated to determine

the degree of utilization and the condition of the critical moose habitat.
No changes in the season or bag limits are recommended.

PREPARED AND SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 7 and 15 - Kenai Peninsula (Kenai Herds)

Seasons and Bag Limits

Unit 7, that portion including the drain-ages of Resurrection Creek and all Chickaloon River drainages.	Aug. 10 - Nov. 30	One caribou; a limited number of caribou by permit only. Conditions and numbers of permits will be described by Commissioner's announcement.
Remainder of Units 7 and 15	No Open Season	

Harvest and Hunting Pressure

Forty-six hunters applied for permits to take a caribou in the first open season since prior to 1910. Twenty permits and 15 alternates were drawn. Two permits were issued to alternates; one because a permit was returned by the post office and another when a permittee turned in his permit before the end of the season.

Permit returns indicate that 6 bulls were taken. At least 4 permittees did not hunt and two reported passing up opportunities to take a caribou because they were looking for larger antlered animals.

Composition and Productivity

Two distinct groups of caribou have become established on the Kenai Peninsula, one in the American Pass area of Unit 7 and another in Subunit 15A.

American Pass Group - Trend counts conducted after the hunting season on December 21, 1972 turned up 214 caribou in this group. This group has been increasing annually at the rate of 36 percent. Based on this rate of growth and a 1971 minimum fall population of 162 animals, it was projected that this herd would number about 220 animals in the fall of 1972. Adding the 6 animals harvested to the 214 seen on survey indicates that the minimum fall population in 1972 was 220 and that the herd has continued to produce an increment of 36 percent annually.

Using the 36 percent growth rate to project the fall population in 1973 indicates that there will be approximately 300 animals in this group at that time.

Subunit 15A Group - This group of caribou is small and ranges over a large area making accurate trend counts difficult. On March 21, 1973 a herd of at least 34 was observed on the Moose River Flats. This group is estimated to number between 34 and 45.

Management Summary and Conclusions

Twenty-one permittees harvested 6 bull caribou in the first caribou season on the Kenai Peninsula since the early 1900's.

Two groups of caribou have been established on the Kenai Peninsula, one group in the American Pass area of Unit 7 and the other in Subunit 15A.

Based on the past growth rates it is estimated that the American Pass group will number about 300 animals by the fall of 1973.

Recommendations

The American Pass group of caribou should be limited to not more than 250 animals in the winter. Regulations should be enacted to insure removal of the surplus over 250. The harvest should be balanced between bulls and cows.

No hunting should be permitted on the Subunit 15A group.

Submitted by: Paul A. LeRoux, Game Biologist III

CARIBOU

SURVEY - INVENTORY PROGRESS REPORT - 1972

Game Management Unit 9 - Alaska Peninsula
(Alaska Peninsula and Mulchatna Herds)

Seasons and Bag Limits

July 1 - June 30

Three Caribou

Harvest and Hunting Pressure

Harvest tickets are not required in Unit 9 so the harvest can only be estimated. Increased hunting pressure was exerted on the caribou population in 1972 because of the liberalized season and also because of restrictions in season and bag limits in other game management units. The estimated level of harvest was approximately 1,000 animals in the past year.

Composition and Productivity

No work was accomplished on either the Mulchatna or Alaska Peninsula herd.

Management Summary and Conclusions

During the fall of 1972, the Alaska Peninsula experienced the greatest hunting pressure in the unit's history. Harvest figures for brown bear and moose clearly reflect this increased pressure. Because of the restricted season and bag limits for moose and caribou in the roadside units accessible to the Anchorage area residents, many Alaskan hunters traveled to the Peninsula. The new year-round season allowed residents of the unit to harvest additional animals for meat during the summer. The estimated harvest in all likelihood was double the harvest for the 1971 season.

Neither the Alaska Peninsula nor the Mulchatna herds appeared to be adversely affected by this increased harvest. Observations made in conjunction with other work seem to indicate both herds are still growing. Biologically, there appears to be no justification for considering restrictions in season or bag limits at this time.

Recommendations

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

Submitted by: James B. Faro, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 10 - Aleutian Islands (Except Adak)

Seasons and Bag Limits:

Unit 10, except Unimak and Adak Islands	No Closed Season	No Limit
Unit 10, Unimak Island	Aug. 10- March 31	Four Caribou

Harvest and Hunting Pressure:

No harvest data are available for any area of Unit 10 except Adak Island. Hunting is primarily for meat by residents of the immediate area and pressure is light.

Composition and Productivity:

No data available.

Management Summary and Conclusions:

Because of the expense of logistics to and within Unit 10, this area does not experience heavy hunting pressure. To date herds on the various islands have been controlled by natural conditions and liberalization of seasons or bag limits has not aided in attempting to manage the populations.

Recommendations:

No changes in seasons or bag limits are recommended for Unit 10.

Submitted by: James B. Faro, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 10 - Aleutian Islands (Adak Island herd)

Seasons and Bag Limits:

Unit 10, Adak Island only Aug. 10-Mar. 31* One caribou

* Season will be closed by field announcement upon the taking of 50 caribou.

Harvest and Hunting Pressures:

Ninety-nine caribou were killed on Adak Island during the 1972-73 season (Appendix I). The sport harvest consisted of 60 males and 38 females; one female caribou died due to entanglement in wire. Caribou hunting was closed from October 22, 1972 through November 3, 1972 on the west side of Adak Island to concentrate on searching for a lost Navy caribou hunter (now presumed dead).

Composition and Productivity:

No data available.

Managment Summary and Conclusions:

Hunting on Adak Island is almost entirely the result of recreational efforts on the part of military and civilian personnel stationed there. The management policy for the Island is to keep the herd at approximately 200 animals.

According to U.S. Navy Chief Warrant Officer, H.C. Haggard (Conservation Officer for Adak Island), 347 caribou were counted on October 6, 1972 via UH2C-type helicopter. The count was conducted during the peak of the rut and caribou were concentrated into groups. Thirty caribou had been harvested in the 1972-73 season prior to that flight.

On November 7, 1972, Jerry Sexton counted 228 caribou on Adak Island via UH2C-type helicopter. About 60 caribou had been taken in the 1972-73 season prior to that flight.

Based on the above data the following action was taken to reduce the herd:

On November 15, 1972, a Finding of Emergency was issued which changed the bag limit on Adak Island from one to three caribou.

A Field Announcement was issued on March 12, 1973, to extend the caribou hunting season on Adak Island from April 1, 1973, through May 31, 1973.

Another Finding of Emergency was issued on March 15, 1973, to again change the bag limit on Adak Island from one to three caribou. This was necessitated due to the season extension.

Recommendations:

Recent caribou surveys on Adak Island indicate that the present bag limit of one caribou is not liberal enough to effectively check the herd growth. Therefore, the Adak Island bag limit should be changed to read:

Two caribou; season may be closed by field announcement.

If the herd is not reduced to 200 caribou during the 1973-74 hunting season, the Alaska Department of Fish and Game will be forced to collect the surplus. An effort should be made to reduce both sexes equally if possible.

Submitted by: Jerome J. Sexton, Game Biologist II

APPENDIX I

Adak Caribou Herd, Population and Mortality 1958 - 1972

Year	Winter Population	Natural Mortality*	Hunting Mortality*
1958	10	1	0
1959	23	1	0
1960	-	0	0
1961	-	1	0
1962	36	0	0
1963	43	0	0
1964**	65	1	4
1965**	87	8	2
1966**	106	3	18
1967**	126	1	24
1968**	163	3	55
1969**	167	0	51
1970**	214	0	53
1971**	230	3	45
1972**	347	1	98

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

** Allowable harvest: 1964 - 10; 1965 - 30; 1966 - 30; 1967 - 50; 1968 - 50; 1969 - 50; 1970 - 50; 1971 - 50 plus 20 more; 1972 - 50 plus 97 more.

Submitted by: Jerome J. Sexton, Game Biologist II

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 11 - Wrangell Mountains - Chitina River
(Mentasta herd)

Seasons and Bag Limits

Aug. 10 - Dec. 31*

Three caribou

*The season was closed on September 20 by Commissioner's announcement.

Seasons and bag limits from 1968-69 until 1972-73 are listed in Appendix I. Earlier seasons and bag limits corresponded with those listed for the Nelchina herd (GMU 13, Appendix I).

Abundance and Mortality

Known and estimated harvests, percentage of bulls in the harvests, and abundance estimates are listed in Appendix I. If the abundance estimates of 1969-70 and 1970-71 are reasonably accurate, their comparison with the summer 1973 preliminary census value indicates a nearly constant herd size. In contrast, harvests since 1968-69 were very high relative to the estimated herd size. An examination of data on past distributions of the Nelchina caribou herd revealed that major or minor groups of the Nelchina herd shared all or part of the Mentasta herd's winter range during 1961-62 and during 1963-64 through 1971-72. The combined data suggest that only a small portion of the indicated harvests actually came from the Mentasta herd.

The harvest and average kill per hunter were low during the 1972-73 hunting season (Appendix II). Transportation used by successful hunters indicates that most of the herd was not available to roadside hunting pressure.

Of 1,995 caribou seen in cow-calf groups during the summer of 1973, 64.2 percent or 1,280 were cows. Numbers of cows present during the summer of 1972 are assumed to have been similar. Of the known harvest of 89 caribou, 28.3 percent or 25 caribou were cows. The harvest rate for adult females is calculated to be 2.0 percent.

There is insufficient information on wolf numbers on the Mentasta herd's range to estimate predation rates. However, the following information is available: (1) reports of wolves on Mt. Drum and Mt. Sanford indicate that wolves are moderately abundant, (2) Mentasta caribou have been located on these mountains throughout most months of the past two years, and (3) caribou remains were in 52 percent (ratio calf: adult: : 52 : 48) of 157 scats from a wolf den on Mt. Drum that was used during 1971. A wolf predation rate on adult female caribou of 6.5 percent was estimated for the Nelchina herd, and it is assumed that this predation rate also applies to the Mentasta herd. An adult natural mortality rate of 4 percent, exclusive of harvesting and wolf predation, was estimated by Skoog (1968) for Nelchina caribou.

Composition, Productivity and Annual Increment

No information is available on bull:cow ratios in the Mentasta herd. The percentage of large bulls has been noticeably greater than that for the Nelchina herd, however (L. Johnson, personal communication).

Spring classifications during 1971-72 and 1972-73 probably included portions of both the Nelchina and Mentasta caribou herds. The results were 34 yearlings per 100 cows in 1971 and 16 yearlings per 100 cows in 1972. Assuming 45 percent of the yearlings were females (Skoog, 1968), female productivity was 7.2 percent. Accumulated mortality rates (harvesting, wolf predation and "other") total 12.5 percent. By subtraction, an adult female recruitment rate of -5.3 percent is indicated for 1972-73. Spring calf survival was low during 1972-73, perhaps due to the severe winter of 1971-72. It appears that productivity may approximately balance total mortality during years with a higher calf survival.

Management Summary and Recommendations

Harvests reported for the Mentasta herd during recent years do not correlate with observations indicating a nearly static herd size since 1969-70. It appears probable that harvests reported for the Mentasta herd prior to 1972-73 may be mainly attributed to the Nelchina herd. The 1972-73 harvest may be typical of past harvests and would appear to correlate better with a nearly constant herd size.

Mortality rates on adult female caribou were estimated to have been 2.0 percent for harvesting, 6.5 percent for wolf predation, and 4.0 percent for "other" mortality. The low productivity (7.2 percent) following the severe winter of 1971-72 resulted in an estimated adult female recruitment rate of -5.3 percent.

For management purposes, an annual tally (calculation of annual recruitment) should be a standard procedure. It is evident that many assumptions must be made to obtain a final estimate. Some of the benefits derived from "forcing" a result are: (1) it indicates where research can contribute most to management; (2) it provides an assessment of mortality factors and prevents overlooking a major mortality factor because of difficulty in quantifying its impact; and (3) it is essential to knowledgeable manipulation of factors (management).

No change in seasons or bag limits is recommended.

Submitted by: Carl McIlroy, Game Biologist III

APPENDIX I

Seasons, bag limits, harvests, sex composition of the harvests, and abundance estimates, Mentasta herd, 1968-69 to 1972-73.

<u>Year</u>	<u>Season</u>	<u>Bag Limit</u>	<u>Harvest</u>		<u>Adult Males in Harvest, Number (%) (b)</u>	<u>Estimated Total Adult Caribou Population (c)</u>
			<u>Known</u>	<u>Estimated (a)</u>		
1968-69	Aug. 10 - Mar. 31	3 Caribou	304	----	122 (74%)	----
1969-70	Aug. 10 - Mar. 31	3 Caribou	288	414	203 (71%)	1892
1970-71	Aug. 10 - Sep. 30	3 Caribou	846	1317	519 (62)	2047
	Nov. 1 - Mar. 31					
1971-72	Aug. 10 - Mar. 31	3 Caribou	1693	2006	742 (45%)	----
1972-73	Aug. 10 - Sep. 20	1 Caribou	89	----	60 (69%)	1995

(a) Estimated harvests were based on Hemming's extrapolation formula.

(b) Male percentage in the harvest during 1968-69 was based on a sample size of 164.

(c) Lentfer (1965) estimated the Mentasta herd at 5000. Maximum total estimates made during post-calving aggregations of subsequent years are listed. Abundance estimates during 1970 and 1971 were accumulated estimates of group sizes made from a fixed wing aircraft. The 1973 value of 1995 is a preliminary census estimate obtained from direct summer counts without extrapolation.

Submitted by: Carl McIlroy, Game Biologist III

APPENDIX II

A comparison of percentage of resident hunters, hunter success, and transportation means for the Mentasta herd, 1969-70 through 1972-73.

Year	Resident Hunters,	Caribou Kill per Hunter,			Average Kill Per Hunter	Transportation Means of Successful Hunters, Percent (b)						
	Number (%) (a)	0	1	2+		A	H	B	S	O	F	Sample
1969-70	114 (68%)	102 (35%)	122 (42%)	67 (23%)	0.99	-----Not Available-----						
1970-71	389 (81%)	118 (19%)	250 (41%)	241 (40%)	1.39	-----Not Available-----						
1971-72	827 (89%)	457 (32%)	474 (33%)	492 (35%)	1.19	-----Not Available-----						
1972-73	50 (69%)	342 (82%)	63 (15%)	11 (3%)	0.21	31%	7%	2%	17%	25%	18%	102

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

(b) Symbols for transportation means: A = airplane, H = horse, B = boat, S = snowmachine, O = off-road vehicles (including trailbikes) and F = afoot and/or highway vehicle, Sample = sample size.

Submitted by: Carl McIlroy, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 13 - Nelchina Basin (Nelchina herd)

Seasons and Bag Limits

Aug. 10 - Sept. 20

One caribou

Seasons and bag limits during the period of 1948 to 1972 are listed in Appendix I.

Abundance and Mortality

Estimated caribou harvests, percentages of males in the harvests, and estimates of population size during the period 1948 through 1972 are presented in Appendix I. The Nelchina caribou were at a low population level in the late 1930's but were increasing by the late 1940's (Skoog, 1968). Seasons and bag limits were liberalized as the caribou became increasingly abundant. The abrupt increase in harvest levels after 1954-55 was probably a result of increased access (the Lake Louise Road and the Denali Highway were opened during 1954-55) and increased season length. By the early 1960's, as the caribou reached peak abundance, there was increasing concern that the population had exceeded the carrying capacity of the range. However they gradually changed their winter feeding habits. These caribou usually wintered in the Lake Louise Flats, sedentarily, in only a few wintering groups for several years prior to 1956-57. Increasingly, as these caribou reached high population levels the herd shifted its major wintering grounds to areas previously little used for many years (from the Lake Louise Flats vicinity to the southern Talkeetna Mountains, the northwest quarter of Unit 13, and Nabesna Road vicinity), their movements were more continual throughout the winter and the herd split into several separate wintering groups (Skoog, 1968). These changes tended to reduce usage of range deteriorated by trampling and grazing.

A census during 1962 revealed 64,100 caribou when adjusted to exclude calves and to exclude the Mentasta caribou herd (Bos, In press). Harvests fluctuated at a high level but without apparent trend during the 1960's. A census in the summer of 1967 revealed a reduced herd (45,700) when calves were excluded to increase comparability with earlier mid-winter censuses. A recent reassessment of extrapolation ratios used for the 1967 census suggested that an estimate of 32,800 adult caribou may be more accurate (Bos, personal communication). An accelerating decline of the herd coincided with high harvest levels during the period of 1967-68 through 1971-72 (Bos, In press). A reduced season, timed to allow hunting when caribou were least accessible, and a reduced bag limit were instituted following the summer 1972 census. The resulting low harvest halted the rapid decline in herd numbers. Percentages of bulls in the harvests generally declined until 1972-73 when conditions of the hunt allowed greater selectivity of bulls by hunters.

The suggested impacts of hunting, wolf predation, and "other" mortality on the Nelchina caribou herd are indicated in Appendix II. The impact of harvesting is expressed as the average annual harvest rate for female caribou during sequential time periods. Wolf numbers may have been low during the late 1940's but were further lowered by a wolf control program in the Nelchina Basin during 1948 through 1953. Subsequently, wolf control was discontinued, and there was no legal aerial hunting of wolves from 1957 until 1968. Appendix II shows the increase in wolf numbers and the estimated predation rate on adult female caribou since 1948. Natural mortality on adult caribou, exclusive of wolf predation and hunting, was assumed to be 4 percent based on an assessment by Skoog (1968) and an assessment by Bos (In press). Generally there have been relatively few observations of mortality or serious debilitation that would be indicative of substantial natural mortality.

Methods of transportation used by successful caribou hunters are shown in Appendix III. A comparison of past harvests with caribou movements indicated that methods of transportation used by successful hunters were largely a function of the time and place of caribou availability. An exception occurred after 1964 when the increasing improvement and use of snow machines by hunters made this form of transportation a major one. The short, early season of 1972-73 combined with the distribution of caribou in less accessible areas largely eliminated the use of snow machines and reinstated off-road vehicles and aircraft as the major transportation means of successful hunters.

Composition and Productivity

Composition data from ground and helicopter based classification counts are tabulated in Appendix IV. These data reveal a trend of decreasing bull:cow ratios. Spring classifications during 1959-60 and 1966-67 were suspected of being nonrepresentative by field investigators. Spring classifications since 1969-70 have probably been representative. The severe winter of 1971-72 may have been responsible for the low spring calf:cow ratio of 16 percent.

The procedures used to derive annual productivity estimates are shown in Appendix V. The combined mean annual mortality rates (wolf predation, harvests, and "other") are subtracted from mean annual productivity rates for females in Appendix II to obtain mean annual recruitment rates of female caribou.

The calculated mean recruitment rate during 1948-55 is considerably less than the rate necessary to account for a herd increase from 5,000 to 40,000. However, estimates of caribou abundance made during the 1940's were probably gross underestimates. Correlations between calculated annual increments and changes in herd size were reasonably

close for the periods 1955-62, 1967-72, and 1972-73. The change in herd size during 1962-67 from 64,100 to 32,800 does not correlate with a calculated annual increment of +0.8 percent. Emigration was suspected of reducing herd abundance during 1961-63 and again during 1965-66, and this could account for the disparity. This information suggests that the initial herd decline during the early 1960's may have been due to emigration, but the decline since 1967 was largely due to harvesting and wolf predation. In addition, there may have been a gradual reduction in productivity since the 1955-62 period.

Age and sex ratios of harvested caribou may provide insight about population structure where population composition data are incomplete. Sex and age classes of annual harvests and the mean age of harvested caribou are illustrated in Fig. 1. In addition, fall composition ratios are shown so that changes in harvests can be compared with changes in availability of the population. Tooth wear and replacement techniques used prior to 1969 for aging caribou probably underestimated older age classes (Bos, personal communication).

From 1954 until the late 1950's, harvests fluctuated at a moderately high level, the herd was expanding, bull:cow ratios in the population and in the harvests were high, the mean age of harvested bulls and cows was low, and ratios of 3 plus year old bulls in the harvests decreased while ratios of young animals increased. A population model that fits this composite picture is that of an increasing herd with large annual increments diluting old age classes.

From the late 1950's until the mid-1960's, harvests roughly doubled, the herd declined substantially, ratios of bulls and calves in the population showed no apparent trend, the mean age of harvested bulls and cows decreased, and ratios of 3 plus year old bulls in the harvests increased while ratios of young animals decreased. This composite picture may be a result of low annual increments in the mid-1960's, maturation of the large annual increments of the late 1950's and early 1960's, and relatively large harvests which resulted in a herd composed mainly of young adults. No spring composition counts were made between 1963 and 1967 to check this hypothesis of low annual increments, and the spring, 1967 calf survival was so low that its representativeness was questioned. Therefore, the mean productivity value indicated for 1962-67 in Appendix II (which was based solely on a spring 1963 classification) may be too high.

From the mid-1960's until 1971, harvests increased to peak levels, the herd probably declined at an exponential rate, bull:cow ratios in the harvests and population decreased, the mean age of harvested cows increased while the mean age of harvested bulls fluctuated at a lower level, and ratios of 3 plus year old bulls in the harvests decreased while ratios of 3 plus year old cows and 2 year old caribou increased.

A population and harvest concept that fits this composite picture is that of large bulls becoming scarce enough that hunters increasingly selected for cows and 2 year old caribou - the largest animals usually available. In addition, competition between roadside hunters and the use of snow machines in late season hunts may have made hunters less selective. The decreasing ratio of yearlings and high mean age of cows in the harvests indicate that annual increments were declining and this supposition is borne out by fall composition data that showed a decreasing calf survival (Appendix IV).

During 1972-73, the low harvest, absence of road hunting, and one caribou bag limit all tended to increase hunter selection for large bulls. The increased ratio of 3 plus year old bulls and total bulls in the harvest with reciprocal reduction of 3 plus year old cows and younger age classes are a result of this relative availability of, and selection for, larger bulls.

Management Summary and Conclusions

In this report, productivity and mortality estimates (for harvests and wolf predation) were derived for sequential time periods. The resulting annual increments indicate that some unaccounted factor, perhaps emigration, was mainly responsible for the herd's decline in the early 1960's, but the decline in the late 1960's through 1971 was mainly due to excessive harvesting and wolf predation. In addition productivity apparently declined during the 1960's. Analysis of sex and age classes in the harvest data indicate that the decline in productivity may have been substantial during the mid-1960's. While Pegau (1972) showed that winter range has deteriorated under high caribou usage, a brief review of caribou movements revealed that caribou were dispersing and continuing to utilize new winter range during the 1960's. A correlation of deteriorated winter range and decreased productivity can not be clearly made. Gaps in annual productivity determinations made correlations between lingering snow depths and productivity inconclusive. Wolf predation that is proportionally greater on young caribou could cause a decreased productivity, but I know of no data that clearly show a greater predation rate on young caribou. Therefore, no specific cause can be assigned to the decreased productivity.

Census data of 1972, as compared to the summer of 1973, indicate that the herd has not substantially changed in abundance. Data in Appendix II indicate that mortality may have exceeded productivity during 1972-73. Productivity was exceptionally low however, but the data indicate that annual increments will probably not substantially increase until total mortality is substantially reduced.

Recommendations

Caribou harvests could have been reduced prior to 1972 had the true status of the herd been understood. Reasons for misunderstanding the herd's status were excessively long periods between census and composition counts (especially spring composition counts) and, apparently no assessments of annual increments since the early 1960's. Information

about heavily exploited populations should be obtained regularly. In addition, a full accountability of procedures, results, and interpretations of data should be a standard operating procedure for field investigators.

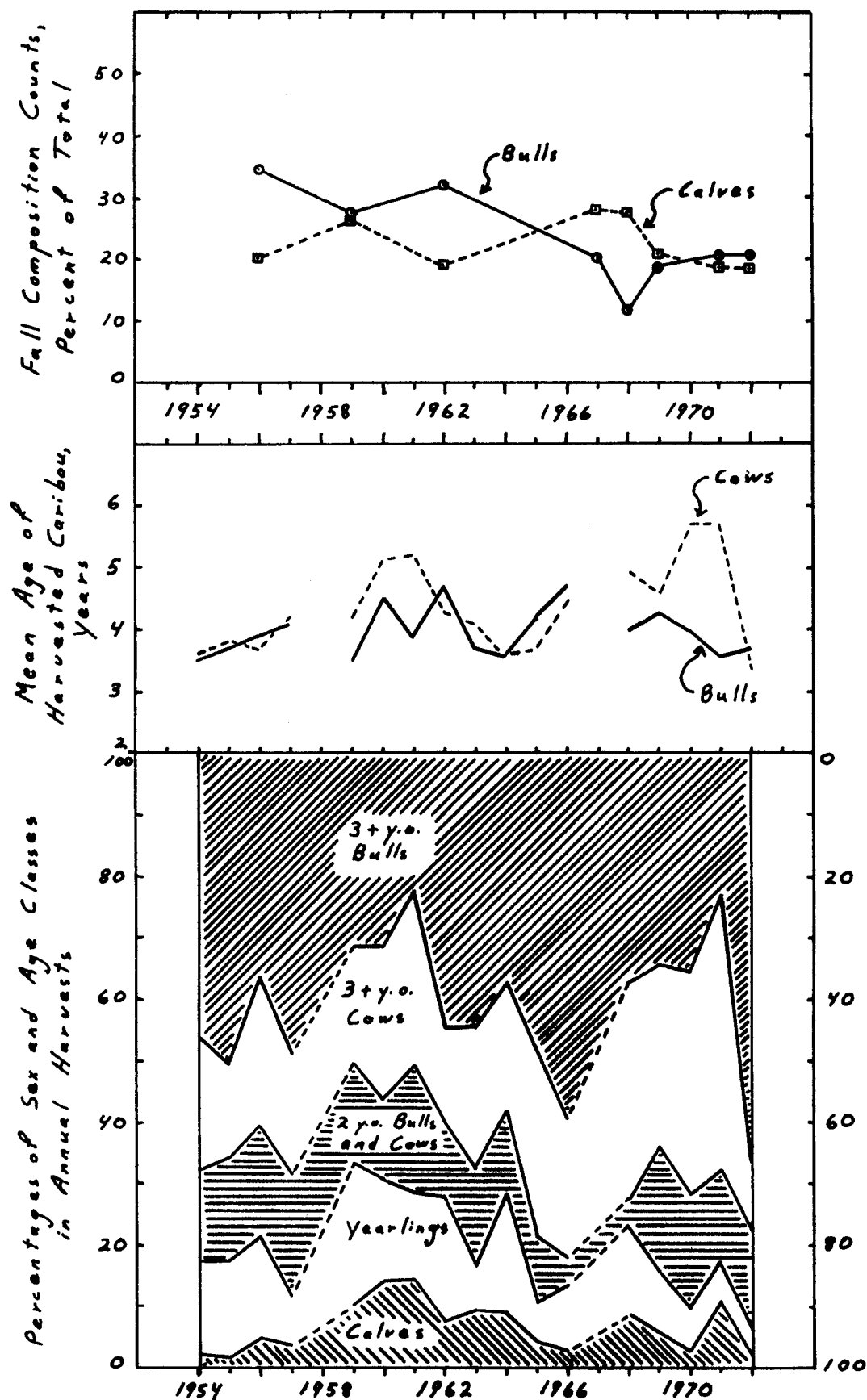
Assessments of the 1972-73 recruitment suggest that rapid expansion of the herd may not occur even if hunting were entirely eliminated. Wolf predation should be recognized as a significant mortality agent on caribou and should be regarded as a manageable factor. It is believed that current techniques and abilities, existing or quickly learned, provide a capability of controlling wolf numbers in the Nelchina Basin at approximately predetermined levels. It is believed that proper management of annual harvests and wolf numbers will allow replenishment of caribou in the Nelchina Basin and maintenance of caribou at levels approaching their range carrying capacity. With big game populations at a relatively high level, a substantial wolf population could be supported in addition to substantial harvests. No change in hunting seasons or bag limits are recommended at this time.

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Submitted by: Carl McIlroy, Game Biologist III

Figure 1. A comparison of fall composition counts, mean age of harvested caribou, and sex/age classes in annual harvests of Nelchina caribou during 1954 to 1972.



APPENDIX I

Seasons, bag limits, harvests, and abundance estimates, Nelchina herd, 1946 - 1972. (a)

<u>Year</u>	<u>Season</u>	<u>Caribou Bag Limit</u>	<u>Estimated Harvest</u>	<u>Adult Males in Harvest</u> <u>Number</u> %	<u>Estimated Adult Caribou Population (b)</u>
1946-47	Aug 20-Sep 30	Resident - 2 caribou } except	200		
	Dec 1-Dec 15	Non resident-1 caribou } calves			
1947-48	(Same)	(Same)	200		
1948-49	Aug 10-Sep 30	(Same)	300	175 (97%)	4500-5000
	Dec 1-Dec 15				
1949-50	(Same)	1 caribou except calves	350		
1950-51	(Same)	(Same)	500		5000-5500
1951-52	(Same)	(Same)	525		
1952-53	(Same)	1 branch-antlered male only	450	291 (93%)	7600
1953-54	(Same)	(Same)	700	445 (85%)	13200
1954-55	Aug 10-Sep 30	1 caribou except calves	2000	1271 (72%)	40000
	Nov 20-Nov 30				
1955-56	(Same)	2 caribou	4000	1076 (73%)	36000
1956-57	Aug 10-Dec 31	2 caribou	3500	844 (72%)	
1957-58	(Same)	3 caribou	2500	1125 (75%)	
1958-59	(Same)	3 caribou	3500		
1959-60	(Same)	3 caribou	4000	922 (70%)	
1960-61	(Same)	3 caribou	5500	2535 (66%)	
1961-62	(Same)	3 caribou	8000	3923 (58%)	64100
1962-63	(Same)	3 caribou	3500	2640 (69%)	
1963-64	Aug 10-Mar 31	3 caribou	6300	3709 (61%)	
1964-65	(Same)	4 caribou	8000	1850 (66%)	
1965-66	(Same)	3 caribou	7100	1222 (67%)	
1966-67	(Same)	3 caribou	5500	849 (71%)	
1967-68	(Same)	3 caribou	4000	740 (65%)	45700
1968-69	(Same)	3 caribou	6000	2334 (60%)	
1969-70	(Same)	3 caribou	7800	5332 (49%)	
1970-71	Aug 10-Sep 30	3 caribou	7247 (c)	4018 (63%)	
	Nov 1-Mar 31				
1971-72	Aug 10-Mar 31	3 caribou	10131 (c)	6743 (47%)	
1972-73	Aug 10-Sep 20	1 caribou	555	388 (72%)	6628

(a) Data from Bos (unpublished material) and from unpublished material in the caribou files.

(b) Census data based on extrapolated total counts in mid-winter censuses and on adult only counts in summer censuses. Estimates prior to 1954-55 may be low by a factor of 2 or more.

(c) Harvest figures include half of the harvest coded to the Mentasta herd.

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX II

Suggested impact of annual harvests and wolf predation on the Nelchina caribou population during 1948 to 1972. (a)

Period	Estimated Adult Caribou Population, (Starting-Ending)		Calculated Median Adult Female Caribou Population		Average of Estimated Annual Adult Harvests			Average Annual Harvest Rate for Female Caribou	
	Median		Number	Percent	Total	Adjusted (b)	Female %		
1948-55	17,500	(5,000-40,000)	9,975	(57%)	689	792	127 (16%)		1.3%
1955-62	52,050	(40,000-64,100)	30,710	(59%)	4,116	4,733	1,562 (33%)		5.1%
1962-67	48,450	(64,100-32,800)	31,008	(64%)	5,652	6,500	2,210 (34%)		7.1%
1967-72	19,714	(32,800-6,628)	13,997	(71%)	7,036	8,091	3,641 (45%)		26.0%
1972-73	6,441	(6,628-6,254)	4,960	(77%)	555	638	179 (28%)		3.6%

Period	Estimated Wolf Population, (Starting-Ending) (c)		Average Annual Adult Female Consumption (d)		Calculated Median Female Caribou Population (from above)	Average Annual Wolf Predation Rate for Female Caribou
	Median		Per Wolf	Total		
1948-55	23	(12-35)	3.6	83	9,975	0.8%
1955-62	98	(35-160)	3.6	353	30,710	1.1%
1962-67	293	(160-425)	3.6	1055	31,008	3.4%
1967-72	400	(425- --)	3.5	1400	13,997	10.0%
1972-73	200	(-- - --)	1.6	320	4,960	6.5%

(Continued)

APPENDIX II (continued)

Period	Average Yrlg. per 100 Cows	Mean Annual Productivity of Females (e)	Annual Mortality Rates for Adult Female Caribou				Mean Annual Recruitment Rat.
			Hunter Harvest	Wolf Predation	Other (f)	Total	
1948-55	30.3%	13.6%	1.3%	0.8%	4.0%	6.1%	+7.5%
1955-62	35.0%	15.8%	5.1%	1.1%	4.0%	10.2%	+5.6%
1962-67	34.0%	15.3%	7.1%	3.4%	4.0%	14.5%	+0.8%
1967-72	26.3%	11.8%	26.0%	10.0%	4.0%	40.0%	-28.2%
1972-73	25.0%	11.3%	3.6%	6.5%	4.0%	14.1%	-2.8%

- (a) Caribou population data are from a summary by Bos (unpublished material), from Skoog (1968), and from unpublished data in the caribou files.
- (b) Harvests were arbitrarily increased 15 percent to compensate for unreported losses due to cripple-kills and illegal harvesting.
- (c) Wolf abundance values are from Rausch (1969) and from speculative estimates based on recent relative changes in abundance.
- (d) Ratios of caribou: moose: small game (57: 33: 10) in wolf diets are from Burkholder (1959) and from unpublished material in the files on wolf summer food habits with generally supporting observations by Skoog (1968). The ratios were adjusted for changing proportions of prey availability and caribou population structure during 1967-71 (45: 45: 10) and 1972 (20: 70: 10). Prey selection between moose and caribou and among caribou sex-age classes was assumed to be proportional to abundance. Trends in moose seen per hour of aerial survey were the basis for proportional changes in moose availability. Small game was assigned a constant proportion. A prey consumption rate of 8 lbs./wolf/day with 100% utilization was assumed. A mean female caribou weight of 230 lbs. was used based on data from Skoog (1968). Generally, values used in calculations were median selections from the range of values found in the available literature.
- (e) A male:female ratio of 55:45 was assumed for yearlings (Skoog, 1968).
- (f) An adult natural mortality rate of 4 percent was estimated by Skoog (1968).

APPENDIX III

Reported Methods of Transportation by Successful Nelchina Caribou Hunters. (a)

Year	Methods of Transportation, Percent (b)					
	A	H	B	S	O	F
1952-53	12%	<1%	<1%		59%	28%
1953-54	23%		6%		37%	33%
1954-55	21%		8%		39%	32%
1960-61	10%	<1%	10%		24%	55%
1969-70	34%	<1%	4%	26%	12%	23%
1970-71	28%	<1%	4%	35%	13%	20%
1971-72	15%	<1%	2%	37%	10%	36%
1972-73	44%	3%	5%	<1%	33%	14%

(a) Data from Bos (unpublished material) and from unpublished material in the caribou files.

(b) Methods of transportation used by successful caribou hunters.

A - airplane

S - snowmachine

H - horse

O - off-road vehicle, motorbike

B - boat

F - highway vehicle, afoot

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX IV

Selected composition data from Nelchina caribou herd. (a)

Year	Fall Composition				Spring Composition		
	Bulls per 100 Cows	Calves per 100 Cows	Percent Survival (b)	Sample Size	Calves per 100 Cows	Percent Survival (c)	Sample Size
1956-57	76	45	75%	276			
1959-60	58	56	93%	299	11	20%	241
1960-61	43	39	65%	482			
1962-63	65	39	65%	2057			
1966-67					5	--	699
1967-68	38	53	88%	4219			
1968-69	19	45	75%	3242			
1969-70	21	39	65%	3007	29	74%	3388
1970-71					34	--	3446
1971-72	34	30	50%	3540	16	53%	1761
1972-73	34	30	50%	2381	25	83%	3456

(a) Based on classifications from the ground or helicopter only.

(b) A natality rate of 60 calves/100 cows is assumed.

(c) Refers to over-winter survival, from fall to subsequent spring.

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX V

Estimated percentages of yearlings among Nelchina caribou - 1951 to 1972.

Year	No. in Spring Classifications (a)			Yrlg./100 Cows	Average
	Yrlg.	Adults	Cows		Yrlg. per 100 Cows
1950-51	110	747	501	22	30.3
1951-52	157	843	565	28	
1954-55	364	1336	895	41	

1955-56	287	983	628	42	35.0
1956-57	899	3603	2240	37	
1957-58	60	272	158	35	
1958-59	204	665	485	39	
1959-60	346	1783	1202	26	
1960-61	536	1840	1354	36	
1961-62	150	636	443	30	

1962-63	217	945	633	34	34

1969-70	654	---	2243	29	26.3
1970-71	696	---	2069	34	
1971-72	199	---	1280	16	

1972-73	575	---	2289	25	25.0

(a) The mean cow:adult ratio from 1955-56 through 1961-62 was .67 (range, .58 to .74). Values for adults from 1950-51, 1951-52, and 1962-63 were multiplied by 0.67 to obtain estimates of cows.

Submitted by Carl McIlroy, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 14 - Upper Cook Inlet (Nelchina Herd)

Seasons and Bag Limits:

Aug. 10 - March 31

Three Caribou

An emergency regulation dated July 28, 1972 changed the previously announced season and bag limit to:

Aug. 10 - Sept. 20

One Caribou

Harvest and Hunting Pressure:

Twenty-one caribou were reported taken by 92 hunters in GMU 14, for a 22.8 percent success ratio (Appendix I). All successful hunters reported taking only one caribou. Unit 14 caribou harvests since 1969-70 have varied from 14 in 1969-70 to 55 in 1971-72. Both harvests and hunting pressure have been low and variable during this period. The fact that hunters did not take more than one caribou during the 1972-73 season reflects compliance with the emergency regulation.

Composition and Productivity:

No data were obtained during this reporting period.

Management Summary and Conclusions:

Caribou are not an important big game species in Unit 14, because the unit is located on the fringes of the Nelchina caribou herd's range. Incidental observations of small groups of caribou have been made in scattered areas of Subunits 14A and 14B during the past several years with either caribou or their tracks having been observed annually during moose sex and age composition counts in the area between Little Willow Creek and the North Fork of the Kashwitna River.

Harvests in Unit 14 have been variable since 1969-70. The low harvest in 1972-73 is probably the result of a shortened season combined with a reduced bag limit.

Recommendations:

Because Alaska's caribou are managed by herds rather than game management units, it is recommended that the season and bag limits for caribou in Unit 14 remain the same as for Unit 13.

Submitted by: Jack C. Didrickson, Game Biologist III
Donald A. Cornelius, Game Biologist II

Appendix I. Caribou Hunter Distribution of Success from IBM Harvest Returns for Alaska's Game Management Unit 14, 1969-70 through 1972-73.

Year	<u>Killed None</u>		<u>Killed One</u>		<u>Killed Two</u>		<u>Killed Three</u>		<u>Total</u>
	No.	%	No.	%	No.	%	No.	%	Harvest No.
1969-70	41	80.3	7	13.7	2	3.9	1	1.9	14
1970-71	19	44.1	12	27.9	10	23.2	2	4.6	38
1971-72	85	68.5	26	20.9	10	8.0	3	2.4	55
1972-73	71	77.2	21	22.9	0	0.0	0	0.0	21

Submitted by: Jack C. Didrickson, Game Biologist III
Jerome J. Sexton, Game Biologist II

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 17 - Bristol Bay (Mulchatna Herd)

Seasons and Bag Limits

Aug. 10 - March 31

Three Caribou

Harvest and Hunting Pressure

The Mulchatna herd experiences only light hunting pressure in Unit 17. The herd is relatively inaccessible for much of the year and harvest is primarily by unit residents seeking meat. Trophy hunting is limited but becoming of increasing importance. The estimated harvest based on interviews with knowledgeable residents in Unit 17 is 150-175 animals.

Composition and Productivity

No work accomplished.

Management Summary and Conclusions

Although no investigations were made on the Mulchatna herd in 1972, residents of the area and air charter operators claim the herd is growing. During the winter, a group of animals wintered in the hills east of New Stuyahok and were available to villagers. This was the first occurrence of animals in this area in the memory of local residents. In 1971, part of the Mulchatna herd wintered below Igiugig in Unit 9 for the first time since prior to 1890. It appears the herd is showing a dispersal pattern into new areas; this adds substance to the opinion of continued growth.

Recommendations

The caribou season in Unit 17 could be more liberal than it is presently. The most desirable liberalization would allow unit residents to harvest animals for meat whenever caribou are available. A twelve-month season would coincide with the present season in neighboring Unit 9. No change in the bag limit is recommended at this time.

Submitted by: James B. Faro, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 18, 19, 21 (Including portions of the Mulchatna Herd, the Beaver Mountains Herd, other groups found in the Kuskokwim Mountains and the north slope of the Alaska Range.)

Season and Bag Limit

The portions of Units 18 & 21 south of the Yukon River, and Unit 19	Aug. 10 - March 30	Five caribou
The portions of Units 18 & 21 north of the Yukon River	No closed season	No limit

MULCHATNA AND BEAVER MOUNTAINS HERDS

Harvest and Hunting Pressure

Patterns of hunting activity in Unit 18 and western Unit 19 (western Kuskokwim Mountains, Kilbuck Mountains, Holitna-Stoney River area) have changed considerably since the last reporting period. Sport hunting activity has increased, especially in the Holitna-Swift-Stoney-Mulchatna areas, largely with the aid of float or ski equipped aircraft. There has also been a noticeable expansion of subsistence hunting activity by boat in the fall on the Holitna and Hoholitna Rivers, and by dog team and snow machine on the upper Stoney and Mulchatna Rivers. Unfortunately, there is no accurate means of measuring this harvest at present. However, from conversations with several hunters and pilots I would estimate a harvest of close to 300 animals annually from this area.

Seasonal Distribution, Migration and Concentrations

Little additional information has been gathered in regards to the distribution of caribou in Units 18, 19, and 21 since the last reporting period. Supplementary data to the 1971 report are listed below.

In May of 1972 herds of up to 500 caribou were found in the Lime Village area, these are probably part of the Mulchatna Herd. Several small groups of caribou were noted in November 1972 traveling from the head of Katlitna River southeast towards the Tatlawiksuk River, suggesting that this group may not be part of the Mulchatna Herd. However, the exact limits of the Mulchatna Herd's northern distribution are difficult to establish.

Sightings of two small groups of caribou (16-20) were made on Granite Mountain (between George River and the Waldren Fork of the Takotna River) in April 1972. Another group of about 50-60 caribou was found about 10 miles east of the main Waldren Fork of the Takotna in March of the same year. These observations tend to substantiate previous distribution

records, but fail to prove if these scattered groups are part of the Beaver Mountains Herd.

The movement of a larger herd of caribou into the Dalbi River and Galena area during the winter of 1971-72 may be noteworthy. This herd was hunted from December of 1971 through April of 1972 by Galena and Huslia residents. About 150 caribou were seen on the upper Dalbi on May 11, 1972. Signs in the vicinity of this group suggested that many more caribou were in the vicinity, especially to the east in the Kokrines Hills.

BEAVER MOUNTAINS HERD

Harvest and Hunting Pressure

Hunting pressure on the Beaver Mountains Herd (Units 19 and 21) continues to be light during the fall months, but has increased in the late winter and spring. Most of this activity originates from Holy Cross and Bethel through ski equipped aircraft. It is estimated that 40-50 caribou were taken from the Beaver Mountain area during February and March 1972.

Seasonal Distribution, Migration and Concentrations

May 1972 surveys of the Beaver Mountains caribou herd revealed at least 1200 animals were present on the calving grounds early in the month. Several newly-born calves were seen on May 8, 1972. These caribou were scattered over the northern slopes of Beaver Mountain.

Fall observations suggest these caribou range from Bonanza Creek north and west along the Iditarod to Dikeman and throughout the Dishna and Tolstoi River areas. Groups of 50 to 100 caribou are occasionally seen in this general area. The eastern limits of this herd are poorly known, although the Nixon and Cloudy-Sunshine Mountain groups may be part of the Beaver Mountains Herd.

KUSKOKWIM MOUNTAINS GROUP (CLOUDY-SUNSHINE MOUNTAINS, NIXON FLATS, UNIT 19)

Harvest and Hunting Pressure

Hunting pressure on the Nixon Herd was heavy during 1972 in relation to the number of animals available for harvest. Early snow and suitable landing conditions prompted considerable local aircraft hunting as well as some outside (Anchorage) hunters during November and December. Approximately 40-50 animals were taken during this period.

Composition and Productivity

Aerial counts of adults and calves on the Nixon Flats in 1972 suggested poor production and/or calf survival. Only 16 calves were located in a group of 170 adults. Another count a few days later found 95 adults with 6 calves. Surveys of scattered groups of nearly 200 other caribou in the same general area failed to reveal a single calf.

BIG RIVER-FAREWELL-TELIDA GROUP, UNIT 19

Harvest and Hunting Pressure

Hunting pressure in these areas was slightly heavier than during the previous reporting period. Thirty or forty caribou were harvested by Nikolai residents during the early winter. An unknown number were shot by hunters from Fairbanks and Anchorage. McGrath hunters took about 12 caribou by ski equipped aircraft.

Composition, Productivity and Distribution

Caribou were not found to be as abundant in this area as in past years. Calves were nearly absent from those groups that wintered in the Blackwater-Big River Flats area.

Management Summary and Conclusions

The harvest of caribou in these units is changing each year. Seasonal harvest by local hunters has changed considerably as transportation means change. Restrictions on caribou seasons in other areas has encouraged hunters from other areas to hunt in Units 19 and 21. The seasons are longer and bag limits are larger in Units 19 and 21. Shortening the season would work a hardship on local hunters as caribou are usually taken when they become available in the late fall and early winter. Reducing the bag limit may help to discourage additional pressure in this area where so little is known about the caribou herds. It is recommended that the bag limit be reduced from five to three. It is further recommended that the season remain the same but that local areas be closed by emergency regulation when it appears that the kill may become excessive.

PREPARED BY:

Peter E. K. Shepherd
Game Biologist III

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 12, 20 and Yukon Territory, Canada (Fortymile Herd)

Seasons and Bag Limits

Aug. 10 - March 31

Three caribou

Harvest and Hunting Pressure

Migrating caribou first became available to hunters during the 1972 hunting season along the Taylor Highway in the vicinity of 100 Mile in the first week in October. A check station, established at 35 Mile on October 6, was operated thereafter on a 24-hour basis in order to closely monitor the harvest, interview incoming and outgoing hunters, and to collect caribou jaws. By October 23 the bulk of the herd, then estimated to number about 10,000 animals, had circled back and was moving west at a rapid pace away from the Taylor Highway and therefore was less available to hunters. Only a few hundred animals crossed the highway. The check station was discontinued on October 23.

Check station data revealed that 2,793 hunters in 1,178 vehicles harvested 1,192 caribou during the period October 6 - 23. Most caribou were taken prior to October 13. An estimated 150 caribou were taken along the Taylor Highway later in the season, bringing the total 1972-73 harvest to approximately 1,330 animals. No estimate was made of losses caused by crippling or waste, however such losses for the 1972-73 season are believed to have been small.

Harvest ticket data indicated a kill of only 1,028 animals (77% of the estimated harvest), suggesting that an extrapolation factor is probably necessary to obtain reasonably accurate harvest ticket data.

Hunting pressure along the Taylor Highway appeared about average when compared with hunting pressure for the past several years.

Composition and Productivity

Initial calf production was not determined for 1972. A sex and age composition count, using standard methods, was conducted on October 5 and 6 on the alpine ridges approximately 20 miles south of Glacier Mountain. Those data are presented below.

Bulls/ 100 cows	Yrlgs/ 100 cows	Calves/ 100 cows	Yrlgs %	Calf %	Cow %	Bull %	Sample size
30.5	16.5	21.0	9.8	12.5	59.5	18.2	672

Approximately 1,000 caribou jaws from the Fortymile Herd were collected during the 1972-73 hunting season, a sample of teeth was aged by the cementum layer method. The age classification of the harvest is as follows:

Age Class (Years	2	3	4	5	6	7	8	9	10	11	12	13	14	Sample Size
Number	71	80	58	40	41	17	28	21	14	13	9	3	3	398
Percent	17.8	20.1	14.6	10.1	10.3	4.3	7.0	5.3	3.5	3.3	2.3	0.8	0.8	

Jaws from calves and yearlings were separated prior to aging, therefore these age classes are not included here.

Management Summary and Recommendations

Because of hunter congestion in the hunting area and the sometimes large numbers of animals harvested in a relatively short time span and in a fairly limited area, an appearance of uncontrolled slaughter is sometimes conveyed to the public. This situation, combined with the littering problems associated with careless disposal of caribou offal, has helped give caribou hunting a reputation of waste, slaughter and unsportsmanlike hunter conduct. In an effort to combat this image, the ADF&G, USDI, BLM, and ADPS (Division of Fish and Wildlife Protection) cooperated in an effort to improve the situation during part of the 1972 hunting season. The BLM established refuse and offal disposal sites in several strategic locations along the Taylor Highway for the hunter's convenience. In addition to manning a game checking station at 35 Mile Taylor Highway, ADF&G biologists patrolled the road to: 1) collect caribou jaws from hunter-killed animals, 2) contact and talk with hunters afield, and 3) assist with law enforcement activities. The ADPS supplied two protection officers for needed enforcement work. "Operation Caribou" took place between October 5 and October 23, which corresponded with the time when most hunters were afield on the Taylor Highway and when most of the caribou harvest occurred.

The project was considered successful, as indicated by remarks made by the majority of hunters interviewed at the check station. Most people contacted felt that littering, waste, and regulation infractions were minimal. Many hunters termed it the cleanest roadside caribou hunt they had ever

experienced. In view of the apparent success of "Operation Caribou," such cooperative efforts should be continued in future years when similar problems appear imminent.

Based on estimated herd size, probable production and calf survival, a harvest quota of a maximum of 1500 animals was placed on the caribou herd, with the season to be closed by field announcement when the quota was reached. The quota was not achieved. In the future the bag limit should be reduced to one animal in order to more equally divide the harvest among hunters, particularly if a harvest quota is imposed.

Efforts should be made to census the Fortymile Herd and to determine the initial calf production and survival. Sex and age composition counts should be continued. Studies should be initiated to identify winter ranges and annual movement patterns. Calf and adult mortality should be investigated.

Some areas of the Taylor Highway should be zoned for non-vehicular use during the caribou season. Excessive snowmachine activity was a major complaint made by caribou hunters contacted during "Operation Caribou" in 1972. The use of such machines should be regulated more closely to lessen conflicts between users and non-users.

PREPARED BY:

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SUBMITTED BY:

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20 - Fairbanks, Central Tanana Valley (Delta Herd)

Season and Bag Limit

Aug. 10 - March 31

Three caribou

Harvest and Hunting Pressure

Based on harvest ticket returns, the legally reported kill in the Delta Herd for the 1972-73 season consisted of 517 animals (372 M, 132 F, and 13 sex unknown), representing a 17 percent reduction in harvest over the 1971-72 season when 624 caribou were taken.

Excluding the harvest from areas east of the Delta River (Ft. Greely, Gerstle River, and Macomb Plateau) which consisted of 40 males, 16 females and one sex unknown, the take from areas normally occupied by the Delta Herd consisted of 332 males, 116 females and 12 sex unknown for a total of 460. Similar adjustments for the 1971-72 season indicate a harvest of 22 caribou (14 M, 8 F) east of the Delta River, reducing the kill between the Delta and Nenana Rivers to 602 (373 M, 217 F and 12 sex unknown).

The bull portion of the harvest in 1972-73 (74%) increased from 63 percent the previous season, but corresponded to the sex composition of the harvest in 1969-70 and 1970-71 when 75 percent and 72 percent, respectively, consisted of bulls.

Appendix I summarizes the successful hunters by residence the past three seasons, and reflects the increasing proportion of residents in the composition of successful hunters. Although overall success declined by 10 percent over the past three seasons, the average caribou per successful hunter fluctuated from 1.43 to 1.58 to 1.53 for the same period.

Appendix II lists the herd harvest by residency of hunter and reflects the high proportion of the harvest taken by resident hunters. Corresponding to the lower harvest and decrease in total hunters from 1971-72 is a reduction in the resident harvest during the 1972-73 season. Nevertheless, the percentage of the harvest taken by residents remained essentially the same the past two seasons (75% in 1972 vs. 74% in 1971).

Appendix III summarizes the distribution of success for the past three seasons, indicating a downward trend in success for those hunters who took one and two caribou, while the percentage of unsuccessful hunters continued to increase.

Appendix IV presents harvest chronology data by month for the 1972-73 season. Sixty percent of the known date bull harvest occurred before October 2 (compared to 64% in 1971-72), while 57 percent of the cow harvest was taken during the same period (compared to 29% in 1971-72). Weather and snow conditions during the last month of the season provided easy access into areas inhabited by

caribou (specifically Gold King and Little Delta River) with the result that 23 percent of the known date harvest of both sexes occurred from February 26-March 31.

Composition and Productivity

Fall composition counts were conducted on the Delta Herd on October 27, 30 and 31, 1972, along the Little Delta River, Dry Creek, Wood River, Tatlanika Creek, and Totatlanika River. Results of the classification of 1184 caribou indicated a bull:cow ratio of 32:100, yearling:cow ratio of 6:100, and calf:cow ratio of 11:100. Bulls comprised 22 percent of the sample, cows 67 percent, yearlings 4 percent and calves 7 percent. Yearling and calf percentages both decreased by three percent from the previous fall surveys.

Spring composition counts in conjunction with an aerial photo census were conducted on June 19, 1973, near the headwaters of Delta Creek in the vicinity of McGinnis, Trident and Hayes Glaciers. Results of this survey, which classified 1,124 caribou, indicated extremely low calf production (25 calves:100 females), with calves comprising 18 percent of the sample. Yearling survival was also poor, as indicated by 8 yearlings:100 females, with yearlings comprising 6 percent of the sample.

Management Summary and Recommendations

Composition counts which will be completed in fall 1973 will provide the necessary information for determining total number of animals in the Delta Herd. Revised estimates of a herd size of some 2000-2500 animals seem reasonable. If this is the case, an overharvest may have occurred during the 1972-73 season. In order to sustain a harvest which occurred during the 1972-73 season, this herd would have to number some 11,000 animals for recruitment at the four percent level to replace hunting mortality. Management goals for this herd should be a stabilization of herd numbers at the current level, resulting in continued conservative seasons and bag limits. The field announcement closing the caribou season on September 29, 1973, will reduce the potential for overharvest during the 1973 season.

Reasons for the continued decline in production and survival in this herd are unknown. Despite the disproportionate harvest of bulls the past four seasons, sex ratios are still adequate to insure conception. If 70 percent of the harvest continues to come from a relatively small portion of the population (approximately 20%), bull:cow ratios will eventually decline below an optimum level for production.

Several factors probably contributed to the reduction in harvest during the 1972-73 season compared to the previous season when the highest reported harvest for this herd occurred. A continued decline in herd numbers reduced the chances for success, as indicated by an increasing proportion of unsuccessful hunters. In addition, the total number of caribou hunters (successful and unsuccessful) declined by seven percent from the 1971-72 season. Despite a decrease in total numbers of successful resident hunters, resident hunters continued to take a larger percentage of the kill.

The hunter harvest should be further reduced by shortening the season or other restrictions until the kill is in line with the recruitment.

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Appendix I. Delta Caribou Herd, summary of successful hunters by residence, 1970-71, 1971-72, 1972-73 seasons.

	Total reporting hunters (successful & unsuccessful)	Total successful hunters	Percent success	Average caribou per successful hunter	No. of successful residents	% of successful hunters	No. successful non-residents	% of successful hunters	No. of successful hunters (residency unk.)	% of successful hunters
1970-71	293	192	66	1.43	112	58	74	38	6	3
1971-72	644	395	61	1.58	266	67	117	30	12	3
1972-73	602	338	56	1.53	232	69	98	29	8	2

Appendix II. Delta Caribou Herd harvest by residency of hunter, 1970-71, 1971-72, 1972-73 seasons.

	Total reported kill	No. of animals taken by residents	% of harvest taken by residents	No. of animals taken by non-residents	% of harvest taken by non-residents	No. of animals taken by unspecified residency	% of harvest by hunters of unknown residency
1970-71	275	182	66	85	31	8	3
1971-72	624	464	74	143	23	17	3
1972-73	517	390	75	113	22	14	3

Appendix III. Delta Caribou Herd, distribution of success, 1970-71, 1971-72, 1972-73 seasons.

	<u>Killed none</u>		<u>Killed one</u>		<u>Killed two</u>		<u>Killed three</u>	
	No. of hunters	%	No. of hunters	%	No. of hunters	%	No. of hunters	%
1970-71	101	34	129	44	43	15	20	7
1971-72	249	39	237	37	87	14	71	11
1972-73	265	44	213	35	71	12	54	9

Appendix IV. Delta Caribou Herd, hunter harvest chronology 1972-73 season.

Time Period	Females	% of known date female harvest	Males	% of known date male harvest	Number of both sexes harvested	Percent of known date harvest of both sexes
Aug, 10-27	29	27	82	27	111	27
Aug, 28-Oct. 1	32	30	99	33	131	32
Oct. 2-Oct. 29	10	9	6	2	16	4
Oct. 30-Nov. 26	7	7	29	9	36	9
Nov, 27-Dec. 31	0	0	8	3	8	2
Jan. 1-Jan. 28	0	0	2	1	2	1
Jan. 29-Feb. 25	4	4	6	2	10	2
Feb. 26-March 31	25	23	71	23	96	23
Total Known date Harvest	107	100	303	100	410	100

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20 - McKinley Park, Lake Minchumina (McKinley-Minchumina Herd)

Seasons and Bag Limits

Aug. 10 - March 31

Three caribou

Harvest and Hunting Pressure

Reported hunter harvest on the McKinley Herd increased from a total of 21 in 1970-71 to 85 in 1971-72, then decreased to 22 in 1972-73. In recent years previous to 1970-71, the reported harvest was in the magnitude of about 20 animals.

Appendix I shows the reported harvest by sex from McKinley Herd in 1970-71 through 1972-73.

Appendix II breaks down the 1971-72 McKinley herd harvest as reported by area. The Stampede Trail and Otto Lake vicinity reported the heaviest harvest with a total of 63 animals or 76.4 percent. The 12 caribou from Lake Minchumina comprised 14.1 percent of the total reported harvest.

Appendix III shows the 1971-72 chronology of harvest reported for the McKinley Herd. Only 6 of the 85 animals harvested (10.5%) were taken prior to October 2, 1971.

At least two major factors complicate an accurate reporting of harvest from the McKinley Herd.

- 1) Not all hunter kills are reported. The standard extrapolation formula (the reported harvest equals 88% of the actual harvest) applied to the reported harvest of 85 animals for the 1971-72 season, indicates a possible harvest of 100 caribou for the McKinley Herd. Illegal kills are not accounted for in the formula.
- 2) An unknown number of McKinley Herd animals are probably listed in the harvest of the Nelchina and Delta Herd totals and perhaps even the Beaver Herd. Conversely, some of the animals from those herds may be listed in the McKinley harvest.

It is probable that the 1971-72 McKinley Herd harvest was higher than usual because of availability of caribou to hunters along the Stampede Trail. On November 3, 1971 I observed about 150 caribou traveling east just after they crossed the East Fork of the Toklat River within a mile or two of the Stampede Trail. Behind this group was about 210 animals traveling in the same direction on the same path.

The 1972-73 harvest of 22 caribou is more in line with reported harvest prior to 1971-72.

Composition and Productivity

No recent reliable data on composition and productivity are available at this time for the McKinley Herd. All recent attempts known to me to determine sex and age composition and productivity have been casual and imprecise in nature.

On June 16, 1972 I counted 630 adult and yearling caribou and 13 calves in McKinley Park. Most of these animals were on the West Fork of Windy Creek, the Cantwell River and Bull River.

On June 13, 1972 Harry and Pat Reynolds, U.S.N.P.S. Park Ranger-Naturalists, identified 222 adults or yearlings, 9 yearlings and 21 calves moving east past Eielson Visitor Center to the Toklat River.

Based on the observations in McKinley Park in summer 1972, and observations of both Chalon Harris, owner of McKinley Flying Service, and Bob Piorkowski, who wintered at Kantishna, it is possible that calf survival was poor.

Seasonal Distribution, Migrations and Concentrations

Between November 3, 1971 and June 17, 1972 I made seven survey flights (20.8 hours) in and immediately north of Mt. McKinley National Park to determine the distribution of caribou in that area. Bob Piorkowski, supported by ADF&G, wintered in the Travers cabin at Kantishna, and attempted to collect caribou observations and specimens.

On November 3, 1971, 74 caribou were near Kantishna (Camp Denali) and 360 caribou were moving northeast out of the Kantishna Hills. On November 9, 1971, 52 caribou were seen near Bearpaw and 89 animals were seen on the Foraker River and near Lake Minchumina. The total number seen on these flights was 575 animals.

On June 16, 1972 about 613 of 643 caribou seen in all of McKinley Park were observed on a traditional summer area on the south side of the Alaska Range primarily between the Cantwell and Bull Rivers. Piorkowski reported that park rangers saw perhaps as many as 900 caribou moving east past Eielson Visitor Center during the second week in June 1972 toward this traditional summering area. In the third week in July the same observers saw about 700-900 caribou moving west again.

Population Trends

Numbers of caribou seen during the November 1971 aerial observations, the June 1972 aerial observations, and the June-July 1972 migration observations from the ground are all of a roughly comparable magnitude. Based largely on these sources there is some evidence that about 1,000 and probably no more than 2,000 caribou wintered (1971-72)

and summered in and around Mt. McKinley National Park. Far fewer than 10,000 caribou utilized the Mt. McKinley National Park area between 1971-1972.

Certainly a significant change in numbers of caribou utilizing the Mt. McKinley National Park-Minchumina area has occurred since 1960. At that time Frank Jones, Alaska Department of Fish and Game, estimated the herd to total at least 10,000.

Management Summary and Recommendations

Before intelligent decisions relative to protecting and managing the McKinley-Minchumina caribou can be made, reliable data are needed; specifically, information on production, survival, composition, distribution and movements. Research to define, at least to some degree, the relationship of the McKinley-Minchumina, Beaver, Delta and Nelchina Herds to each other is highly recommended.

Until more is known about the status of McKinley-Minchumina caribou and their relationship to adjacent herds, increased hunting on that herd should not be encouraged. Continued harvest at the level sustained in 1971-72 could conceivably be excessive on a maximum sustained yield basis. The 1972-73 harvest and harvests prior to 1971-72 were probably insignificant relative to the population of the McKinley Herd. At this time, no special regulations are necessary for this herd under normal conditions. Should the herd distribution result in unusual availability during the hunting season an emergency closure should be initiated.

Acknowledgment

This work was carried out with the knowledge and cooperation of the U.S. National Park Service staff at the U.S.N.P. Anchorage field office and Mt. McKinley National Park.

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Appendix I. Total reported harvest - McKinley Herd 1970-71, 1971-72.

Year	Male	Percent	Female	Percent	Sex unspec.	Percent	Total
1970-71	13	61.9	8	38.1	0	0	21
1971-72	46	54.1	38	44.7	1	1.2	85
1972-73	19	86.4	3	13.6	0	0	22

Appendix II. Reported harvest by area, McKinley Herd 1971-72.

Area	Male	Percent	Female	Percent	Unspec.	Total
Stampede	24	55.8	19	44.2	-	43
Otto Lake	9	45.0	11	55.0	-	20
Lake Minchumina	10	83.3	2	16.7	-	12
Moose Creek	3	60.0	2	40.0	-	3
Chisana	-	-	2	100.0	-	2
Foraker	-	-	1	100.0	-	1
Rex Dome	-	-	1	100.0	-	1
Unknown	-	-	-	-	1	<u>1</u>
						85

Appendix III. Kill chronology, McKinley Herd 1971-72.

Females - known date kills 29, total kill 38

Aug. 10 - Oct. 1	1	(3.4% of known date kills)
Oct. 2 - Jan. 14	20	(69.0% of known date kills)
Jan. 15 - Mar. 31	8	(27.6% of known date kills)

Males - known date kills 28, total kill 46

Aug. 10 - Oct. 1	5	(17.8% of known date kills)
Oct. 2 - Jan. 14	12	(42.8% of known date kills)
Jan. 15 - Mar. 31	11	(39.3% of known date kills)

Both sexes - known date kills 57, total kill 85

Aug. 10 - Oct. 1	6	(10.5% of known date kills)
Oct. 2 - Jan. 14	32	(56.1% of known date kills)
Jan. 15 - Mar. 31	19	(33.3% of known date kills)

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 20 - Macomb Plateau (Delta Herd east of the Delta River)

Seasons and Bag Limits

Aug. 10 - March 31

Three caribou

Harvest and Hunting Pressure

This small group of caribou, numbering about 350-400 animals, occupies parts of the Alaska Range between the Gerstle and Robertson Rivers. Relatively unknown to most people until recently, the herd sustained little sport harvest prior to about 1972. At this time restrictions were imposed on the Fortymile, Nelchina and Mentasta Herds which closed the season when caribou were available along the road system. These restrictions encouraged hunters to seek relatively unknown and less accessible herds that previously were lightly hunted. According to harvest ticket reports 57 caribou were taken between the Delta River and Robertson River during the 1972 season. The harvest consisted of 40 males, 16 females and 1 sex unknown.

Hunter access into the area is primarily by horse, motor bike and foot. Fish Lake allows float plane access to within three to five miles of the caribou. A marginally safe landing area on one of the ridges east of Macomb Plateau is usable only for supercub type aircraft and then only under certain wind conditions.

Hunters utilizing snow machines found a route into the Plateau during late winter 1973.

Range, Habitat and Population Trends

In recent years the herd has been centered in the Macomb Plateau area and no major range extensions are known. The relative condition of the range has not been evaluated, however it is unlikely the present area the herd occupies will support a large number of caribou. There has been no accurate measure of population trends. Without composition information it is difficult to even speculate on short term population changes.

Harvest data indicate that during the 1972-73 season hunters took about 15 percent of the caribou herd (estimated herd size of 400). This may exceed the safe maximum harvest that should be taken without better information on herd size, population trends, habitat and other mortality.

Management Summary and Recommendations

A small group of caribou has been identified as residing in the Macomb Plateau area of the Alaska Range. The herd is estimated to number about 350 to 400 head. There is very little information available which is needed for management of this herd. The present harvest (57 animals)

exceeds 10 percent of the estimated herd size. Ten percent hunter harvest is considered a safe maximum for an average caribou herd. Hunting pressure has increased on this herd and is expected to continue to increase in the near future. Season restrictions have been recommended for other herds which would effectively reduce the season in this area if adopted.

It is recommended that the bag limit be reduced to one caribou and that motorized vehicles be prohibited from using the area occupied by this herd during the hunting season. These restrictions should help insure against an excessive harvest and still provide for recreational utilization.

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Regional Management Coordinator

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 23, 24 and 26 (Arctic Herd)

Seasons and Bag Limits

No Closed Season

No Limit

Harvest and Hunting Pressure

The northward migration in the spring was late. Caribou passed near most villages during breakup and consequently the harvest was low because of their inaccessibility. During the fall a major portion of the herd passed near Kotzebue, Kiana, Noatak, Noorvik and Selawik which are some of the larger villages in the area and thus the fall harvest was high in those villages. Off-setting this harvest, however, was the extremely low harvest in villages of the upper Kobuk and Koyukuk Rivers. During the winter a major portion of the herd wintered southeast of Buckland and a limited number were taken by residents of Buckland, Koyuk and Elim. A smaller segment (less than 5,000) wintered between Noatak and Selawik and this group was heavily hunted by residents of Noatak, Kotzebue, Kiana, Noorvik and Selawik. Another group wintered near the coast between Barrow and Pt. Lay and were harvested by hunters from Barrow and Wainwright. During 1972 the harvest was above normal at Barrow, Wainwright, Kotzebue, Noorvik, Kiana, Selawik and Buckland. It was average at Noatak, Anaktuvuk Pass, Koyuk, Elim, Shaktoolik and Unalakleet. It was below normal at Pt. Hope, Kivalina, Ambler, Shungnak, Kobuk, Allakaket, Hughes and Huslia.

Composition and Productivity

No composition counts were accomplished in 1972. Due to a very late breakup several cows calved far south of their normal calving area and calf mortality due to drowning while attempting to cross rivers was high.

Management Summary and Recommendations

The overall harvest in 1972 was higher than normal as the caribou were accessible to hunters in several of the larger villages. The present harvest level has little affect on the large Arctic caribou herd. It is recommended that the liberal seasons and bag limits remain unchanged.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 24, 25, 26 and Yukon Territory, Canada (Porcupine Herd)

Seasons and Bag Limits

No Closed Season

No Limit

Harvest and Hunting Pressure

Estimated harvests from the Porcupine Herd from spring 1972 through spring 1973 are:

Alaska:

Arctic Village	1,000
Kaktovik	300
Venetie, Chalkyitsik,	
Ft. Yukon	100
Other	<u>100</u>
	1,500

Canada:

Aklavik, Inuvik, Ft. MacPherson,	
Arctic Red River	2,000
Old Crow	600
Dempster Highway & misc.	<u>75</u>
	2,675

Total Alaska and Canada	4,175
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These are very crude estimates derived from personal observations and interviews with resident hunters, biologists and others. Distribution of kill during this period was unusual due to the fact that most of the herd wintered near Arctic Village rather than near the Dempster Highway in the Richardson and Ogilvie Mountains. Kill in the MacKenzie Delta region (Aklavik, etc.) was probably a little above normal.

Composition and Productivity

Initial calf production, estimated from a helicopter survey of 2,532 animals on the calving grounds on 8 June 1972 was 897 calves/1635 cows and yearlings, for a minimum calf production of 55 calves:100 cows. Calf-cow ratio on 4 July was 50:100, from a sample of 9,209 cows and calves classified from the ground. Autumn calf proportion in the herd was 14.8 percent, from a sample of 2997 animals classified by Interdisciplinary Systems, Ltd.

These data suggest moderately good production and indicate a stable or perhaps slightly increasing herd.

The same autumn composition count cited above indicated 9 percent yearlings, 28 percent bulls, and 49 percent adult females in the herd. Bull:cow and yearling:cow ratios are thus 57:100 and 18:100, and fall within the expected range for lightly or moderately hunted caribou herds.

Population Trends

Minimum herd size was estimated as 100,000 (including calves) in autumn 1972 by the aerial photograph direct-count extrapolation technique. On the photographs 82,680 animals were counted, and the post calving concentration was estimated to contain 92,760 animals, including 10,080 not photographed. This census is discussed at length in LeResche 1974, The Porcupine Caribou Herd (P-R Final Report).

Seasonal Distribution, Migration and Concentrations

The herd wintered (1971-72) in four major groups, all in Canada. Most of the herd wintered south of the Peel River in the Ogilvie, Knorr and Trevor Mountains. Another large group wintered in the southwest and west-central Richardson Mountains (and Caribou Mountain area), and a smaller group used the Eagle Plains. A few caribou from the Porcupine Herd were also scattered in Alaska south of the Brooks Range from the border as far west as the eastern Kanuti Flats.

Beginning in late April, caribou migrated northward along the Richardson Mountains and across the Old Crow Flats. Most reached the coastal plain in Canada, but many traversed the Brooks Range through passes in Alaska. Animals from as far west as Dieterich Pass turned east to the calving grounds of the Porcupine Herd.

Calving occurred in the Brooks Range foothills at elevations from 1000-3500 feet, from the Babbage River on the east to the Hulahula River on the west. Most calving occurred east of the Jago River. Peak of calving probably occurred on 5-7 June. Post-calving concentrations formed in late June, and by 4 July the entire post-calving group was in one mass, moving eastward on the coastal plain just east of Jago River. About 30 percent of the herd entered Canada in early July, and the rest swung back northwestward along the Alaska coastal plain as far as Camden Bay, then proceeded southeast to enter Canada in August.

The herd crossed the Porcupine River near Driftwood River in late September. By the first week of November, the vanguard had reached the Dempster Highway and Ogilvie River, and about two-thirds of the herd had turned northwest, recrossed the Porcupine near the mouth of the Coleen, and proceeded northwest as far as Sheenjek Lake. About 60,000-65,000 caribou wintered in Alaska, primarily in the south foothills of the Brooks Range between the Coleen and Chandalar Rivers. Major concentrations used the East Fork Chandalar River throughout the winter of 1972-73.

The remainder of the herd (30-35,000 animals) remained just north of the Yukon River in the western Ogilvie Mountains, using the upper Tatonduk and nearby drainages.

Management Summary and Recommendations

The present liberal seasons and bag limits in Alaska remain appropriate to this large and usually isolated herd. There is no conflict between present levels of subsistence use and sustaining the resource. The herd should be formally censused at least once each 5 years (next in 1977), and the post-calving concentration should be observed at least every second year to detect any great changes in numbers. Harvest should be monitored at least generally during winters when significant numbers of caribou are available near points of access (i.e. Arctic Village, Dempster Highway). Legal "commercial" utilization of this herd within Game Management Units 22-26 has been negligible to date, but several hundred caribou were used as barter currency or gifts by people in the Arctic Village-Fort Yukon area. This use is appropriate at present levels, but should be watched closely in the future if caribou numbers or level of "commercial" use change.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 4 - Admiralty, Baranof and Chichagof Islands

Seasons and Bag Limits

Aug. 1 - Jan. 31

Two goats

Harvest and Hunting Pressure

Goat hunters were interviewed in conjunction with the annual deer hunter interview. Only seven persons reported hunting goats in 1972 and only one of those was successful. No goats were reported taken from Unit 4 in a preliminary harvest ticket analysis. Therefore, it appears that the sport harvest of goats from this unit was minimal, probably no more than ten animals. There were 879 licensed hunters in Sitka in 1972. Using the seven interviewed goat hunters as a base, a crude estimate of total goat hunters from Sitka would be in the neighborhood of fifty.

Composition and Productivity

No formal goat surveys were conducted by Department personnel during this reporting period. However, on January 26, 1973, I accompanied a private pilot on a reconnaissance of Baranof Island between Blue Lake and Fish Bay. There was good snow cover and observation conditions were good. No goats were seen and only 4 sets of tracks were observed. This suggests: 1) goats are very difficult to observe in winter on Baranof Island from a Cessna 172 or 2) goats do not winter in the area surveyed. There is some opinion by local citizens that the 1971-72 winter caused some loss of goats.

Management Summary and Conclusions

Most people who hunt goats on Baranof Island are Sitka residents. All indications are that the annual kill of goats is very low. Hunting does not appear to have a significant impact on the goat population.

Recommendations

No recent effort has been made to determine the status of goats on Chichagof Island following the transplant there in 1953. This should be done. Annual aerial surveys should be conducted over goat ranges on Baranof Island to make population assessments and to monitor dispersal to new ranges.

No changes in seasons or bag limits are recommended.

Submitted by: Loyal Johnson, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 6 - Prince William Sound

Season and Bag Limits

August 1 - January 31

2 Goats

Harvest and Hunting Pressure

Goat harvest reports were required for the first time during the 1972-73 season. Results of the harvest report data indicate a Unit 6 harvest of 77 mountain goats (63.6% males) by 185 reporting hunters (Appendix I). The area from Valdez Arm to Nelson Bay produced the largest harvest followed by the area from Nelson Bay to the Copper River. The area from Valdez Arm to Columbia Glacier was a popular hunting area but few goats were taken.

The total harvest, as indicated by the harvest report data, was probably considerably less than the actual harvest. An example, four goats were reported taken off Ragged Mountain by the harvest report data whereas a local pilot knows of 13 taken.

Composition and Productivity

On August 25, 1972, the goat habitat from Rudd River to Port Fidalgo was flown and 235 goats were observed. The kid ratio was 17.3 kids per 100 adults.

On September 20, 1972, 55 goats were observed on Don Miller Hills but their composition was not determined.

Management Summary and Conclusions

Based on the harvest report data, about 50 percent of the hunting pressure on mountain goats in Unit 6 occurs in the area from Columbia Glacier to the Copper River. When aerial surveys on goat abundance and distribution are compared with the harvest data, it appears the present hunting pressure is not adversely affecting the Unit 6 goat population.

Recommendations

Retain the present season and bag limit.

Submitted by: Julius Reynolds, Game Biologist III

APPENDIX I

Mountain Goat Harvest Data** - Unit 6

1972 - 1973

<u>IBM Harvest Area</u>	<u>Number of Goats</u>	<u>Number of Hunters</u>
6 - 01	0	2
6 - 02	7	9
6 - 03	0	0
6 - 04	4	9
6 - 05	0	0
6 - 06	16	29
6 - 07	29	43
6 - 08	5	26
6 - 09	1	1
6 - 10	8	38
6 - 11	0	7
6 - 12	7	17
6 - 13	0	4
Totals	77*	185

* 49 males (63.6%), 27 females (35.1%), 1 unknown sex (1.3%)

** From I.B.M. Run

Submitted by: Julius Reynolds, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 7 - Seward

Seasons and Bag Limits

Unit 7, that portion draining into salt water south and east of Fourth of July Creek.	Aug. 10 - Dec. 31	Two Goats
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Unit 7, that portion west of a line from the mouth of Sixmile Creek near Hope to the Seward Highway and along the Seward Highway to Ptarmigan Creek: north of a straight line from the Ptarmigan Creek bridge to Porcupine Island in Kenai Lake and a straight line from Porcupine Island to the head of Upper Russian Lake; east of the Russian River from Upper Russian Lake to the Kenai River; and north of the Kenai River from the confluence of the Russian River to the Unit 15 boundary	No open season
--	----------------

Remainder of Unit 7	Aug. 10 - Nov. 15	One Goat
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Harvest and Hunting Pressure

Harvest report returns indicate that 127 goats were taken by 305 hunters during the 1972-73 season for a hunter success ratio of 40.2 percent. The harvest was composed of 68 males, 57 females and 2 sex unknown. Since 1972-73 was the first year of the goat harvest report, no previous data are available for comparison. Harvest statistics for count areas surveyed in 1972 are presented in Appendix I.

Numbers, Composition and Productivity

Age composition and population trend counts have been conducted on two selected trend count areas since 1968 with a third area added in 1970. Data from the combined count areas (Appendix II) show a decline in both numbers and productivity from 1968 through 1971.

In 1972, 316 goats were observed in the combined trend count areas. Kids/100 adult ratios increased 8.4 percent from 23.9 in 1971 to 25.9 in 1972 but were 10.7 percent below the 1968-72 average of 29.0 (Appendix II). Total number of goats observed was up 5 percent from 301 in 1971 to 316 in 1972 but was 17.5 percent below the 1968-72 average of 383.

In addition to the trend count areas, four other goat count areas were surveyed in 1972 (Appendix III).

The number of goats surveyed in all 7 areas was down 24.4 percent from 648 in 1968 to 490 in 1972. Kids/100 adults was down 14.8 percent from 29.1 in 1968 to 24.8 in 1972.

Management Summary and Conclusions

It was noted in the 1971 survey and inventory report that data from the combined trend count areas reflect almost the same changes that occurred in the aggregate of all areas surveyed. Comparing the data from the combined trend count areas with the aggregated data of all areas surveyed in 1972 shows the same close correlation, substantiating the idea that monitoring selected trend areas may reflect unit wide changes.

In the 3 trend count areas total number of goats observed in 1972 increased by 5 percent over 1971 but was 17.5 percent below the 1968-72 average. Although the 5 percent change is not statistically significant, it is perhaps a good indication that goat numbers have begun to recover.

Thirty-five goats were reported harvested from the three trend count areas in 1972. The reported harvest is 11.1 percent of the number of goats observed in the trend count areas. The number of goats observed on surveys is believed to be less than 75 percent of the total goats present, therefore this figure is somewhat inflated. However, this is an average for only the trend count areas and some areas may be approaching their maximum sustained yield harvest level.

Since hunting pressure can be expected to increase, goat numbers and harvest levels should be monitored closely.

Recommendations

No changes are recommended.

Submitted by: Paul A. LeRoux, Game Biologist III

Mountain Goat - GMU 7 - Seward

Appendix I

Goat Harvest - Unit 7 Total

<u>Males</u>	<u>%</u>	<u>Females</u>	<u>%</u>	<u>Unk.</u>	<u>%</u>	<u>Total</u>
68	(53.5)	57	(44.9)	2	(1.6)	127

Goat harvest by count areas surveyed in 1972, Unit 7, 1972.

<u>Goat Count Area</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
4	4	1	5
5	4	6	10
6	1	1	2
8	11	9	20
9	2	2	4
10	2	1	3
20*	0	0	0
	24	20	44

* No open season.

Submitted by: Paul A. LeRoux, Game Biologist III

Mountain Goat - GMU 7 - Seward

Appendix II

Goat numbers and age ratios, Unit 7, 1968-72

Year	Count area 4 Trend area 1		Count area 5 Trend area 2		Count area 8 Trend area 3		Combined Trend areas 1, 2 & 3	
	Kids/ 100 Ad	Total Animals	Kids/ 100 Ad	Total Animals	Kids/ 100 Ad	Total Animals	Kids/ 100 Ad	Total Animals
1968	35.2	207	22.5	60	38.2	170	34.5	437
1969	28.5	144	37.8	120	*	*	32.3	246
1970	27.0	155	23.5	105	22.3	217	28.5	476
1971	26.8	90	30.6	64	19.5	147	23.9	301
1972	17.8	86	37.9	80	25.0	150	25.9	316
1968-72	$\bar{x}=27.1$	$\bar{x}=136.4$	$\bar{x}=30.5$	$\bar{x}=82.2$	$\bar{x}=26.3$	$\bar{x}=171.0$	$\bar{x}=29.0$	$\bar{x}=383.0$

* No survey conducted

1 1969 data excluded because area 8 not surveyed.

Submitted by: Paul A. LeRoux, Game Biologist III

Mountain Goat - GMU 7 - Seward

Appendix III

Goat numbers and age ratios, Unit 7, 1968 & 1972

	<u>Count area 6</u>		<u>Count area 9</u>		<u>Count area 10</u>		<u>Count area 20</u>	
	<u>1968</u>	<u>1972</u>	<u>1968</u>	<u>1972</u>	<u>1968</u>	<u>1972</u>	<u>1968</u>	<u>1972</u>
Kids/100 Ad	*	28.6	28.9	34.8	33.3	26.4	16.7	2.5
Total Animals	48	36	58	62	84	67	21	9

* Kid production unknown since 42 goats were unclassified.

Submitted by: Paul A. LeRoux, Game Biologist III

Mountain Goat - GMU 7 - Seward

Appendix IV

Goat numbers and age ratios, Cooper Mountain, Unit 7

<u>Year</u>	<u>Kids/100 Adults</u>	<u>Total Animals</u>
1963	34.7	66
1964	30.1	39
1968	16.7	21
1969	0	7
6/14/71	0	9
8/10/71	20.0	6
9/8/72	12.5	9

Submitted by: Paul A. LeRoux, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 8 - Kodiak and Adjacent Islands

Seasons and Bag Limits

Sept. 1 - Oct. 30

15 goats by permit only.
Conditions of the hunt to
be described by Commissioner's
announcement.

Harvest and Hunting Pressure

The 1972 harvest consisted of ten animals: three males, four females and three of unknown sex (Appendix I). The three animals of unknown sex were taken by hunters who were unable to recover their kills. Six animals were taken from the Crown Mountain vicinity, three from the Terror Lake area, and one was taken on Barometer Mountain, within about six miles of Kodiak. The 1972 harvest was the largest yet recorded for the hunt which began in 1968.

Four of the kills were aged by tooth replacement and wear, or horn growth increments (Appendix II). Four were adults and one was a kid.

Twenty-one of the 40 permit holders actually hunted (Appendix I). Hunter success was 48 percent. Hunting pressure was nearly double that of the 1971 season when 11 hunters went afield. Aircraft transportation was used by all but one successful hunter, who used an automobile.

Composition and Productivity

Examination of herd composition data for the years 1956-1972 (Appendix III) shows that the 91 goats counted in 1972 is the recorded high. The highest number of kids (27) was also recorded in 1972. The kid-adult ratio (42.1) is the highest recorded since 1967. There may be some bias in counts as adult males may not have been represented proportionally in late summer when counts are usually conducted. It appears that the herd is at least maintaining itself and may be increasing.

Management Summary and Recommendations

Despite an increase in hunters going afield from 1971 to 1972, only two-thirds of the recommended harvest of 15 animals was achieved. Annual composition counts conducted since 1956 indicate that goat numbers are gradually increasing on Kodiak (Appendix II). It is recommended that seasons and bag limits remain unchanged.

Submitted by: Roger B. Smith, Game Biologist III

APPENDIX I

Unit 8 - Mountain Goat Harvest Statistics, 1972*

	<u>No.</u>	<u>Percent</u>
Permits issued	40	
Permit holders reporting	37	93%
Reporting permit holders who hunted	21	57%
Successful hunters	10	48%
Mean days hunted by successful hunters	2.85	
Goats harvested	10	
Males in harvest	3	30%
Females in harvest	4	40%
Unknown sex in harvest	3	30%

* These data are from hunter interviews conducted in the Kodiak office during the hunt.

APPENDIX II

Unit 8 - Mountain Goat Harvest Age Composition, 1972

<u>Accession No.</u>	<u>Sex</u>	<u>Kill Date</u>	<u>Age Criteria</u>	<u>Estimated Age</u>
01-72	♂	9-5-72	four horn growth rings	5 yr.+
02-72	♂	9-4-72	four pairs permanent incisors; outer pair show only slight wear	5 yr.+
03-72	♂	9-10-72	four pairs permanent incisors; outer pair shows some wear	6 yr.+
06-72	♀	10-5-72	three pairs fully-erupted permanent incisors; mesial pair incisors lacking; no wear on outer incisors; anterior two pairs premolars lacking	4 yr.+
07-72	♀	10-5-72	first molar not fully erupted	4 mo.

Submitted by: Roger B. Smith, Game Biologist III

APPENDIX III

Unit 8 - Mountain Goat Sex and Age Composition Counts, 1952-1972.

Date	Adult (may include sub-adults)	Kid	Total	Kid/100 Adult	% Kids in Total Count	Observer	Flight Time (Hrs.)
1952-1953	7 males and 11 females, total 18 animals transplanted to Crown Mountain.						
1954			Zero Data				
1955			Zero Data				
1956	-	-	5			Unsigned, undated report.	
1957	2	2	4	100.0	50.0	"	
1958	4	2	6	50.0	33.3	"	
9-19-1959	5	2	7	40.0	28.6	Will Troyer	--
1960			Zero Data				
1961			Zero Data				
1962	14	8	22	57.1	36.3	Will Troyer	--
1963	18	8	26	44.4	30.7	Will Troyer	--
1964	13	13	26	100.0	50.0	Will Troyer	--
1965	22	13	35	59.0	37.1	Will Troyer	--
9-20-1966	38	16	54	42.1	29.6	B. Ballenger	--
9-05-1967	39	19	58	48.8	32.7	B. Ballenger	--
12-20-1968	57	14	71	24.5	19.7	B. Ballenger	2.2
8-05-1969	73	15	88	20.5	17.0	B. Ballenger	2.4
8-22-1970	61	20	81*	32.7	24.7	B. Ballenger	--
1971			Zero Data*				
7-27-1972	64	27	91	42.1	29.7	B. Ballenger	2.3

Submitted by: Roger B. Smith, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 11 - South side of Wrangell Mountains and eastern portion of Chugach Mountains

Seasons and Bag Limits:

August 10 - December 31

Two Goats

Harvest and Hunting Pressure:

Harvest reports were required for mountain goats for the first time during the 1972-73 season; these data are shown in Appendix I. Sixty-four reporting hunters harvested 37 goats; 27 successful hunters took one goat each and 5 took 2 goats. Thirteen goats were male (35%) and 24 were female (65%).

The chronology of the harvest is presented in Appendix II.

The distribution of the goat harvest correlated more with areas receiving heavy sheep hunting pressure than they did with areas of heavy goat abundance, which reinforces an assumption that goat hunting was frequently secondary to sheep hunting. If such were the case, it is possible that some hunters, unsuccessful in taking a goat, did not report having hunted goats.

Composition and Productivity:

A combined sheep and goat survey was made during June, 1973 of portions of the Chugach and Wrangell Mountains within Unit 11. Data from this survey pertaining to mountain goat populations are shown in Appendix III.

There have been no previous goat composition counts within the same area for comparison. MacColl Ridge has been selected as a trend count area. Twenty-eight goats were counted on MacColl Ridge in August 1970, compared to 43 goats counted on the same area in June 1973.

Management Summary and Conclusions:

Overall, the goat harvest is light for the large area in which goats can be found in Unit 11. Goat populations are relatively small in certain areas within the Wrangell Mountains, however, and there is a possibility that certain of these may be overhunted by hunters who are primarily after sheep. This possibility is suggested by the fact that most of the goat harvest occurred in areas of heavy sheep hunting rather than in areas of greater goat abundance.

Recommendations:

1. A goat trend count area should be established in one or more heavily-hunted drainages in the western Wrangell Mountains, and this area should be surveyed annually to assess effects of hunting.
2. No changes in seasons or bag limits are recommended.

Submitted by: Carl W. McIlroy, Game Biologist III

Mountain Goat - GMU 11 - South side of Wrangell Mountains and eastern portion of Chugach Mts.

APPENDIX I

1972 Mountain Goat Harvest as Reported from IBM Harvest Report Returns.

<u>Total Hunters - 64</u>			<u>Mean Days Hunted</u>
Successful	32	(50%)	3.2
Unsuccessful	32	(50%)	5.2
Hunters killing 1 goat -	27	(84.4%)	
Hunters killing 2 goats -	5	(15.6%)	

GMU 11 Harvest Location and Sex of Harvest

<u>Subunit Code Name</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
Tana River		1	1
MacColl Ridge	1	1	2
Chitina Glacier	1	2	3
Chitina River (Upper)		2	2
Chitina River	2	2	4
Goat Creek	1		1
Logan Glacier		1	1
Hawkins Glacier	2		2
Barnard Glacier		1	1
Tebay Lake	1		1
Kennicott Glacier	2	4	6
Hidden Creek		1	1
Blackburn	1		1
Donoho Peak	1		1
McCarthy		1	1
Bonanza Ridge & Peak		2	2
Green Butte		1	1
11-03-010		1	1
Nizina River	1		1
Nizina Glacier		2	2
Chitistone Mountain		1	1
Unknown Area in Unit		1	1
TOTAL	13(35.1%)	24(64.9%)	37

Submitted by: Carl W. McIlroy, Game Biologist III
 Raymond J. Kramer, Game Biologist III

Mountain Goat - GMU 11

South side of Wrangell Mountains and eastern portion of Chugach Mountains

APPENDIX II

GMU 11 Mountain Goat Harvest Chronology

<u>Period</u>	<u>Harvest</u>	
	<u>Number</u>	<u>Percent</u>
Aug. 10-20	13	35.1
Aug. 21-31	10	27.0
Sept. 1-10	8	21.6
Sept. 11-20	4	10.8
Sept. 21-30	0	0
After Sept. 30	<u>2</u>	<u>5.4</u>
	37	99.9

Submitted by: Carl W. McIlroy, Game Biologist III

APPENDIX III

A Comparison of Goat Composition Data Obtained from Various Areas in the Chugach Mountains and Wrangell Mountains During the June, 1973 Survey.

	<u>Date</u>	<u>Area</u>	<u>Adult</u>	<u>Kid</u>	<u>Total</u>	<u>No. Kids</u>	<u>Percent</u>
						<u>Per 100 Adults</u>	<u>Kids</u>
	6/16-17/73	#3-4; Mt. Sanford	0	0	0	--	--
	6/16/73	#5; Mt. Drum	0	0	0	--	--
	6/16-17-73	#6; Mt. Wrangell	0	0	0	--	--
	6/16-17-73	#7; Iron Mtn.-Kotsina R.	1	0	1	--	--
	6/22/73	#8; Mt. Blackburn-Kuskulana Pass	0	0	0	--	--
	6/16/73	#9; Fireweed Mtn.-Hidden Lake	43	10	53	23.1/100	18.9%
	6/17-19/73	#11; Nikola:Butte-Pyramid Peak	0	0	0	--	--
	6/18/73	#12; MacColl Ridge	33	10	43	30.3/100	23.2%
	6/21-22/73	#13; Chitistone Mtn.	7	3	10	42.9/100	30.0%
	6/17/73	#14; Crystalline Hills	0	0	0	--	--
		Total, Wrangell Mtns. excluding Area #5	84	23	107	27.4/100	21.5%
240	6/20-21/73	A; Tebay River to Copper R.	44	12	56	27.3/100	21.4%
	6/19-20/73	B; Hanagita Ridge-Nelson Mtn.	0	0	0	--	--
	6/21-22/73	C-D; Klu R.-E. Fork Bremner R.	51	15	66	29.4/100	22.7%
	6/21-22/73	E; Goodlata Peak	47	16	63	34.0/100	25.4%
	6/21-22/73	F; Tana R. to Canada	88	23	111	26.1/100	20.7%
		Total, Chugach Mtns. excluding Area A	230	66	296	28.7/100	22.3%

Submitted by: Carl W. McIlroy, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 13 - Nelchina Basin

Seasons and Bag Limits

Aug. 10 - Dec. 31

Two Goats

Harvest and Hunting Pressure

Harvest data from harvest report returns are available for mountain goats for the 1972-73 season (Appendix I).

The harvest of goats appears small and is well-dispersed over the goat habitat. The low hunter success is expected because past inventory surveys have shown the goats to be dispersed and not abundant in the Chugach Mountains and scarce in the Talkeetna Mountains. The high percentage of males in the harvest may be indicative of hunter selection and lightly-hunted goat populations in which males are available to hunters. It should be noted, however, that the sample size is very small.

Composition and Productivity

No recent goat composition counts have been made in Unit 13. Past inventory counts are summarized below.

<u>Area</u>	<u>Date of Survey</u>	<u>Adults</u>	<u>Kid</u>	<u>Total</u>
Tazlina to Klutina Lakes	Aug., 1959	14	1	15
	Aug., 1969	--	-	71
Nelchina Glacier to Chitina	Aug., 1969	100	10	110
Coal Creek to Nelchina Glacier	July-Aug., 1968	--	-	23

These data illustrate the low goat density in the Chugach Mountains.

Management Summary and Conclusions

Harvest data for 1972 indicate that mountain goats in Unit 13 are lightly hunted. The harvest appears low and well dispersed. Although goat populations are greater in the Chugach than in the Talkeetna Mountains, and do serve as an alternate game species to the sheep hunter, the relatively low densities of both species that are found cohabiting the same areas probably results in a low harvest of goats by sheep hunters. It is anticipated that goat populations will not be greatly influenced by continued hunting at the present level.

Recommendations

No changes in seasons and bag limits are recommended.

Submitted by: Carl McIlroy, Game Biologist III

MOUNTAIN GOAT - GMU 13 - NELCHINA BASIN

APPENDIX I

1972 Harvest Data, Nelchina Basin

Total hunters - 43; Successful hunters - 16 (37.2%); Unsuccessful hunters - 27 (62.8%)

Mean Days Hunted: Successful - 2.7; Unsuccessful - 3.4

Goats Killed: Males - 13 (72.2%); Females - 5 (27.7%); Total - 18

Successful Hunters Who Killed Two Goats - 2 (12.5%)

Harvest Chronology:

<u>Period</u>	<u>Harvest</u>		<u>Period</u>	<u>Harvest</u>	
	<u>Number</u>	<u>Percent</u>		<u>Number</u>	<u>Percent</u>
Aug. 10-20	8	44.4	Sept. 11-20	3	16.7
Aug. 21-31	2	11.1	Sept. 21-30	1	5.5
Sept. 1-10	1	5.5	After Sept. 30	0	0.0
			Unk. Date	3	16.7
			Total	18	99.9

<u>Harvest Location (when specified)*</u>	<u>Harvest Within Area</u>	
	<u>Number</u>	<u>Percent</u>
Chugach Mountains		
Tiekel River-Kimball Pass Vic.	2	12.5
Klutina-Tonsina Vic.	2	12.5
Tazlina-Nelchina Vic.	6	37.5
S. Fork Matanuska to Coal Cr.	6	37.5
Talkeetna Mountains	0	0.0
Chulitna Hills	0	0.0

*Two goats (11.1 percent of the total harvest) did not have specific kill locations described.

Submitted by: Carl McIlroy, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 14 - Upper Cook Inlet

Seasons and Bag Limits

Subunits 14A and 14B	Aug. 10 - Nov. 15	One goat
Subunit 14C	Sept. 21 - Nov. 15	One goat

Harvest and Hunting Pressure

As noted in Appendix I, very few goats were harvested in Unit 14 during 1972. A total of 6 goats were reported harvested in the entire unit. Four of the goats were taken in Subunit 14C, and one each in Subunits 14A and 14B. Of the 4 goats harvested in 14C, 3 were males and one was a female. In 14A, the goat taken was a female and a male was taken in 14B.

The hunting pressure, in the respective subunits in Unit 14, is represented in Appendix II. The highest pressure is generated in Subunit 14C, with the Eklutna River and Knik River drainages sustaining nearly one-half of the total hunting pressure in Subunit 14C. The Eklutna River drainage is readily accessible by road into Chugach State Park, while most hunters in the Knik River area would be required to use aircraft. The remaining areas hunted in 14A and 14B received minimal hunting pressure.

Composition and Productivity

The first goat sex and age composition counts to be conducted in Unit 14 in a comprehensive manner took place on June 26 and 27, 1972. Five areas were outlined that totally encompassed the existing goat habitat in Game Management Subunit 14C. Map areas 4 and 5 were further classified to 4A, 4B, 5A and 5B to enable observers to delineate count areas with natural boundaries. Previous goat counts were conducted in Subunit 14C as time and funds permitted in 1959, 1967, 1968 and 1970 as noted in Appendix III.

A goat survey in 1959 in the Eagle River - Eklutna area resulted in 41 goats located, 34 adults and 7 kids. A comparative area flown in 1972 revealed 1 goat seen between Eagle River and Eklutna (area #2 on map). Although the count areas were not exactly comparable, the inclusion of areas 1 and 3 in 1972 would still bring the total goats seen in those areas to 29. Movement and harvest may account for some of the discrepancy. Goat surveys in 1967 and 1970 in the same area yielded no goats (Appendix III).

One other isolated count on goats was conducted in Game Management Unit 14 in 1968. A July aerial survey revealed 25 goats, including 19 adults and 6 kids, between the Knik River and the Nelchina Glacier (Appendix III).

The comprehensive survey conducted in 1972 revealed a total of 183 goats seen by aerial survey in all of Game Management Subunit 14C. One hundred forty-four adults and 39 kids were tabulated. With the 1972 annual increment of

39 (21.3% of the total population) and the 1972 harvest in Subunit 14C of 4 goats, it would appear a relaxation of regulations is advisable in certain areas such as 4A and 5A. Of the 4 goats taken in Subunit 14C, only one was taken in count area 4A. The remaining goats were harvested in areas 1 and 2 where only 11 goats were seen on the 1972 survey.

Count areas 1, 4A, 4B, 5A and 5B were reflowed on August 7 and 8, 1972. Count area 1 revealed a decrease from 10 adults seen on June 26 to 3 adults seen on August 8, 1972. No kids were seen on either flight.

Count area 4A revealed a decrease from a total of 87 goats on June 26 to 54 goats on August 7, 1972, while count area 4B rose from 0 goats seen on June 26 to 13 goats on August 7, 1972. Presumably, some movement had occurred and the theory was supported by tracks noted heading from 4A to 4B through the snow. Count area 5A also noted a decrease in numbers of goats seen (51) on June 26 and 27 to 35 on August 7, 1972. Count area 5B on the other hand, revealed an increase of 17 goats from June 27 (6 goats seen) to 23 on August 7, 1972. It would appear that the fluctuations in numbers in repetitive counts in 1972 could be attributed to movement.

Management Summary and Conclusions

A definite decline in the goat population has occurred in areas easily accessible to the hunting public, particularly areas 1, 2 and 3 as noted on the survey map. This is substantiated by counts in 1959, 1967, 1970 and 1972. The goat populations in the remaining areas, 4A, 4B, 5A and 5B, which are less accessible, appear to be in good condition with a good annual increment.

Recommendations

It is recommended that consideration be given to a goat closure in the western one-half of Game Management Subunit 14C and that a relaxation of seasons appears in order in the eastern one-half of Game Management Subunit 14C.

Submitted by: Jack C. Didrickson, Game Biologist III

MOUNTAIN GOAT

GAME MANAGEMENT UNIT 14 - ANCHORAGE

Appendix I. Mountain Goat Harvest in Alaska's Game Management Unit 14, Subunits 14A, 14B and 14C by sex, 1972.

	<u>Male (%)</u>	<u>Female (%)</u>	<u>Unspecified Sex</u>	<u>Total</u>
Subunit 14A	0	1 (100%)	0	1
Subunit 14B	1 (100%)	0	0	1
Subunit 14C	3 (75%)	1 (25%)	0	4
Total Unit 14	4 (66.7%)	2 (33.3%)	0	6

Submitted by: Jack C. Didrickson, Game Biologist III

MOUNTAIN GOAT
GAME MANAGEMENT UNIT 14 - ANCHORAGE

Appendix II. Goat Hunting Pressure in Alaska's Game Management Unit 14 by Subunit and Drainages, 1972.

14 A		14 B		14 C	
Matanuska River	2	Sheep River	2*	Eklutna River	8*
Metall Creek	1*			Knik River	6*
Jim Creek	1			Bird Creek	4*
King River	2			Hunter Creek	2
Grasshopper Valley	2			Peters Creek	1
				Eagle River	1*
				Unknown Drainage	8
—		—		—	
Sub-Total	8		2		39
				Unknown Subunit	10
				—	
				TOTAL HUNTERS	59

* One Successful Hunter.

Submitted by: Jack C. Didrickson, Game Biologist III

MOUNTAIN GOAT

GAME MANAGEMENT UNIT 14 - ANCHORAGE

Appendix III. Goat Age Ratios from Surveys Conducted in Alaska's Game Management Unit 14, 1959 to 1972.

<u>Area</u>	<u>Date</u>	<u>Adults</u>	<u>Kids</u>	<u>Total</u>	<u>Kids/100 Adults</u>	<u>% Kids in Total Population</u>
Eagle River to Eklutna	Aug. 1959	34	7	41	20.6	17.1%
Eagle River to Eklutna	July 1967 through March 1970	0	0	0	0	0.0%
Knik River to Melchiana Glacier	July 1968	19	6	25	31.6	24.0%
<u>Count Areas</u>						
Area 1	6/26/72	10	0	10	0.0	0.0%
Area 1	8/8/72	3	0	3	0.0	0.0%
Area 2	6/26/72	1	0	1	0.0	0.0%
Area 3	6/26/62	12	6	18	50.0	33.3%
Area 4A	6/26/72	75	12	87	16.0	13.8%
Area 4A	8/7/72	54	7	61	13.0	11.5%
Area 4B	6/26/72	0	0	0	0.0	0.0%
Area 4B	8/7/72	42	13	55	31.0	23.6%
Area 5A	6/26/72	41	10	51	24.4	19.6%
Area 5A	8/7/72	29	6	35	20.7	17.1%
Area 5B	6/26/72	5	1	6	20.0	16.7%
Area 5B	8/7/72	16	7	23	43.8	30.4%
4 and 5 Only	8/7/72	141	33	174	23.4	19.0%
Game Management Subunit 14C	6/26-27/72	144	39	183	27.1	21.3%

Submitted by: Jack C. Didrickson, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 15 - Western Kenai Peninsula

Seasons and Bag Limits:

Aug. 10 - Dec. 31

Two Goats

Harvest and Hunting Pressure:

The Alaska Board of Fish and Game adopted a regulation in 1972 that required a goat harvest report for goat hunting throughout the state. These report returns provided the Department with goat harvest and hunting pressure data for the first time since 1969. In 1969 and 1970 a goat harvest report was included in the harvest report packet, but poor returns in 1970 precluded data tabulation.

The reported harvest in 1972 was 96 animals which was a 146 percent increase over the 39 goats reported harvested in 1969 (Appendix I). The 1969 harvest was not broken down by Subunit. Subunit harvest during 1972 was 16 in 15B, 79 in 15C, none in 15A and one location unknown.

In 1969 males comprised 79.5 percent (31/39) of the harvest and females 20.5 percent (8/39). The 1972 harvest contained 54.2 percent (52/96) males and 45.8 percent (44/96) females. In 1969 six hunters took the full bag limit of two goats compared to sixteen hunters taking two goats in 1972. Data on the number of hunters in 1969 and percent success are not available. Fifty percent of the 160 goat hunters in 15 (C) were successful in taking at least one goat. The percent of successful hunters that took two goats was essentially unchanged between the two years: 18.2 percent (6/33) in 1969 and 20 percent (16/80) in 1972.

Comparison of reported harvest to the known minimum goat populations by count area, i.e., the number of goats observed during the most recent survey, shows areas where overharvest potentials exist (Appendix II). This approach does not consider the percent of goats that are not observed on the surveys and the movement of goats between count areas. Comparison of reported harvest to the number of kids observed should indicate how harvest mortality compares to the annual increment if survival rate from kids to yearlings is known. These data are unavailable from the area. Review of available literature shows that an average survival rate for kids to yearlings in 10 established populations in Washington, South Dakota, Montana and Idaho is about 40 percent (Brandborg 1955). Assuming even an annual increment of 50 percent of the observed number of kids, our data suggest that hunting mortality is approaching or exceeding the annual increment in some count areas (Appendix II).

Chronology of the harvest is presented in Appendix III.

Composition and Productivity

Surveys were conducted in four count areas for the first time since 1968 and one additional count area was established and surveyed: count area 29 (Appendix IV). Comparison of the number of goats observed in 1968 to the number observed in 1972 suggests that the goat population in this portion of the Kenai Peninsula may not have suffered the substantial decline during the 1970-71 winter that occurred in goat populations in Unit 7. Goat numbers decreased 27.7 percent in the Unit 7 trend count areas from 1968 to 1972. In contrast, goats counted in Unit 15 increased 27.7 percent during the period.

Data obtained from aerial surveys allow only classification as kids or older with no way of accurately obtaining sex ratios. Consequently productivity data are only available in terms of kids/100 adults. This makes between year comparisons meaningful only if adult sex ratios remain constant. It is quite probable that adult sex ratios do not remain constant as evidenced by almost invariable greater harvests of males than females in reported harvests. So unless there is compensatory increased natural survival of males (no evidence exists for this) it is likely that in exploited populations the sex ratio may be progressively imbalanced up to some point where hunters must be less selective. For comparison purposes the kid/100 adult ratios in the count areas aggregated was 45.7:100 in 1968 compared to 35.6:100 in 1972 (Appendix V). These data indicate lowered productivity and if male proportions in the population have changed they reflect even lower productivity.

Management Summary and Conclusions

It appears that hunting pressure on goats has increased greatly from 1968 to the present and there is nothing to suggest the trend will reverse. The Kenai Peninsula supports a substantial portion of the state-wide harvest of goats: 20.0 percent in 1972. Goat management in the area is based on trend surveys of areas suspected to have fairly discrete goat population, i.e., little movement between areas is suspected. Because of the extensiveness of the area inhabited by goats, budget considerations, inclement flying weather, and hitherto suspected light hunting pressure, only one aerial survey at most, is usually flown every several years in most count areas. Some areas have never been surveyed. With the possibility of overharvest occurring in some areas and no firm basis for knowing what percentage of the goats in an area being surveyed are observed and how much movement of goats occurs within or between areas, it appears that it is time for a greatly intensified goat research and management program to be initiated.

Creation of Kachemak Bay State Park and Kachemak Bay Wilderness Park may greatly influence goat hunting in much of Unit 15. If it is determined the hunting pressure is equaling annual increments or exceeding them, elimination of the two goat limit could reduce the kill substantially as 16/96 or 16.7 percent of the total harvest was accounted for by second goats. Delaying opening dates to August 20 to coincide with opening dates for many other big game seasons may substantially decrease harvest as 21.9 percent of the 1972 harvest occurred from August 10 - August 20. Thirty three percent (33.4%) of the total harvest occurred in the month of August.

From available data it is not possible to accurately know how harvest levels are influencing populations. As shown in Appendix II harvest may be approaching or exceeding annual increment in some count areas.

On the other hand goat numbers appear to have increased in areas where data were available from 1968. The increase may be more apparent than real. Different observers flew the areas and more time and effort may have been exerted in 1972. Also the count areas where data exist for 1968 and 1972 comparisons apparently do not receive heavy harvest. In contrast areas that receive heavy harvest have no 1968 "baseline" data for comparison.

Recommendations

It is recommended that a concerted effort be made to survey all areas that have never been surveyed to at least gain a possible baseline with which to compare future changes and to inventory what resource is available.

Close coordination between the Division of State Parks and the Department of Fish and Game will be necessary to insure perpetuation of goat hunting in much of the area.

It is imperative that an index to the number of goats in an area to those seen on a survey be gained. Also it is imperative to determine movements between count areas.

Literature Cited

Brandberg, S.M. 1955. Life history and management of the mountain goat in Idaho. Idaho Dept. of Fish and Game, Wildl. Bul. No. 2. 142pp.

Submitted by: James L. Davis, Game Biologist II

MOUNTAIN GOAT - GMU 15 - WESTERN KENAI PENINSULA

APPENDIX I

Goat harvest and hunting pressure by Subunit for 1969 and 1972, GMU 15.

Year	15 (A)		15 (B)		15 (C)		Total		Number of Hunters	Percent Success
	MM	FF	MM	FF	MM	FF	MM	FF		
1969	*	*	*	*	*	*	31	8	*	*
1972***	0	0	11	5	41	38	52	44	160**	50**

* Data not available

** 16 hunters reported taking two goats each.

*** Total harvest reports issued in state - 11,757 - outstanding 3,123
Total goat hunters - 1586.

MOUNTAIN GOAT - GMU 15 - WESTERN KENAI PENINSULA

APPENDIX II

Reported harvest for 1972, date of latest survey, number of adult goats observed and number of kids observed by count area.

<u>Count Area</u>	<u>Survey Date</u>	<u>Goats Observed</u>		<u>Reported harvest 1972</u>
		<u>Adults</u>	<u>Kids</u>	
16	1968	14	4	2
21	1968	0	0	1
22	1972	12	2	7
23	1972	117	44	16
24	1968	134	54	27
25	No Surveys	*	*	2
29	1972	146	47	27
Total of above count areas		423	151	82
Remainder Unit 15		*	*	14

* No data available

** A small portion of this count area is in Unit 7 so the number of goats observed in the Unit 15 portion where the 27 goats were reported harvested is slightly less than the figure presented.

Submitted by: James L. Davis, Game Biologist II

MOUNTAIN GOAT - GMU 15 - WESTERN KENAI PENINSULA

APPENDIX III

Chronology of the 1972 goat harvest.

	Period								
	<u>8/10</u> <u>8/19</u>	<u>8/20</u> <u>8/31</u>	<u>9/ 1</u> <u>9/10</u>	<u>9/11</u> <u>9/20</u>	<u>9/21</u> <u>9/30</u>	<u>10/ 1</u> <u>10/31</u>	<u>11/ 1</u> <u>11/31</u>	<u>12/ 1</u> <u>12/31</u>	<u>Unk</u>
Number of goats harvested	21	11	11	7	15	14	3	--	14
Percent of total harvest occurring during period	21.9	11.5	11.5	7.3	15.6	14.5	3.1	--	14.6

Submitted by: James L. Davis, Game Biologist II

MOUNTAIN GOAT - GMU - 15

APPENDIX IV

Description of count areas surveyed in 1968 and 1972.

Count Area

- | | |
|------------|---|
| Number 22 | The area lying within the boundary formed by the Harding Ice Field, Killey River, Killey Glacier, Tustumena Glacier and Glacier Creek. |
| Number 23a | The area draining to the west between Tustumena Glacier and Fox River. |
| Number 23b | The area draining to the west between Fox River and Sheep Creek. |
| Number 23c | The area draining to the west between Sheep Creek and Kachemak Glacier, Bradley Lake and Bradley River. |
| Number 29 | The area south of Petrof Glacier, Wosnesenski Glacier and the creek flowing from the terminus of Wosnesenski Glacier and north of Jackalof Creek and Rocky River. |

Submitted by: James L. Davis, Game Biologist II

MOUNTAIN GOAT - GMU - 15

APPENDIX V

Goat Numbers and Age Ratios, Unit 15, 1968-72.

<u>Year</u>	<u>Count Area 22</u>		<u>Count Area 23a</u>		<u>Count Area 23b</u>		<u>Count Area 23c</u>		<u>Total</u>
	<u>Kids/</u> <u>100 Ad.</u>	<u>Total</u> <u>Animals</u>	<u>Kids/</u> <u>100 Ad.</u>	<u>Total</u> <u>Animals</u>	<u>Kids/</u> <u>100 Ad.</u>	<u>Total</u> <u>Animals</u>	<u>Kids/</u> <u>100 Ad.</u>	<u>Total</u> <u>Animals</u>	
1968	57.1	11	38.9	25	58.3	38	40.0	63	137
1972	16.7	14	42.4	47	38.1	58	33.3	56	175

Submitted by: James L. Davis, Game Biologist II

HARBOR SEAL

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 1-16 - Coastal Waters

Seasons and Bag Limits

June 20 - July 31	No limit
Oct. 15 - April 30	

Note: On December 21, 1972 the Marine Mammals Protection Act went into effect. This act nullified all state laws relating to the taking of all marine mammals including seals and placed the authority for regulating the take of seals under the Secretary of Commerce of the United States. Indians, Aleuts, and Eskimos are permitted to take seals however, without any limit provided it is not done in a wasteful manner.

Harvest and Hunting Pressure

Harvest information collected from fur buyers and seal hunters in selected locations indicates that the seal harvest was up slightly in 1972. The estimated kill for Game Management Units 1-16 is 10,000 to 12,000 seals. Hunting pressure in traditional high use areas, I.E. Tugidak Island and Port Heiden, was normal and the harvest about average. Tugidak Island was closed by field announcement on July 25, when the harvest reached approximately 1,100 seals. The summer hunting season at Port Heiden remained open throughout July and 1,900 seals were reported taken from that area. No commercial harvest operations were reported for Port Moller. The increased seal harvest occurred primarily late in the year after the October 15 opening and before the Marine Mammals Protection Act of 1972 took effect on December 21, 1972. Kodiak Island, the Kenai Peninsula and Prince William Sound were known to have received above normal hunting pressure during the late season.

Composition and Productivity

Aerial surveys of seal populations at Tugidak Island and Port Heiden indicate that they are stable. Little data exist for other areas but incidental observations by Department personnel indicate that seal populations in Southeast Alaska, Prince William Sound and the Kenai Peninsula are increasing.

Management Summary and Conclusions

The annual harvest of harbor seals increased slightly in 1972. It is estimated that 10,000 to 12,000 seals were harvested. In the three preceding years, the annual harvest was 8,000 to 10,000 seals. It is felt that the increase in harvest was the direct result of Congress passing the Marine Mammals Protection Act of 1972. Hunters, anticipating a closure of the seal season with passage of the act, put more effort into hunting and went afield in greater numbers than in previous years. Hunting pressure is still low in most areas however, and many seal populations are under harvested or not harvested at all.

Recommendations

Seal populations in Game Management Units 9 and 10 are under harvested or not hunted at all. The summer hunting season in that area should be lengthened to allow for a greater harvest.

Submitted by: John Vania, Game Biologist IV

SEA LION

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 1-26 - Coastal Waters

Seasons and Bag Limits

No closed season

No limit*

*Provided that the taking of sea lions for commercial purposes in excess of 10 is permitted only under the terms of a permit that may be issued by the Commissioner in consideration of conservation requirements.

Note: On December 21, 1972 the Marine Mammals Protection Act of 1972 went into effect. This act nullified all state laws relating to the taking of all marine mammals including sea lions and placed the authority for regulating the take of sea lions under the Secretary of Commerce of the United States. Indians, Aleuts and Eskimos are permitted to take sea lions however, without any limit provided it is not done in a wasteful manner.

Harvest and Hunting Pressure

Commercial operators harvested 6,924 sea lion pups from rookeries in Alaska in 1972. Hunters took 1,627 from Akutan Island and 2,184 from Uganak Island in GMU 10, from GMU 9; 379 were taken at Atkins Island and 556 from Jude Island; in GMU 8; hunters took 2,178 from Marmot Island. Total harvest of sea lions in previous years was 3,314 in 1971; 6,075 in 1970; 5,208 in 1969; 4,118 in 1968; 4,855 in 1967; 3,050 in 1966; 3,029 in 1965 and 1,500 in 1964. No adult animals were reported taken for commercial purposes. Harvestable surpluses of sea lions exist on many rookeries in Alaska but the demand for raw pelts is not sufficient to stimulate a greater harvest.

For the third consecutive year no harvesting occurred on Sugarloaf Island.

Composition and Productivity

The Steller sea lion population in Alaska is probably at the carrying capacity of its habitat. Occasional reconnaissance flights of selected rookeries indicate little change in the general abundance and distribution of the animals.

Management Summary and Conclusions

Anticipating passage of the Marine Mammals Protection Act of 1972, sea lion hunters expended more effort on harvesting pups than in previous years. Sea lions at Atkins Island and Jude Island in Game Management Unit 9 were harvested by hunters for the first time since 1965. Marmot Island, Ugamak Island and Akutan Island received about the usual amount of hunting pressure. Many rookeries with harvestable surpluses still remained untouched however.

Fishermen's complaints of sea lion depredations were more frequently voiced particularly in the area of False Pass. Japanese longline fishermen who fish for black cod on the high seas in the Gulf of Alaska have also expressed their concern for the loss of fish to the animals. If harvesting

of sea lions is not resumed, it is anticipated that fishermen will push for some type of control measure on certain sea lion populations.

Recommendations

Harvesting of selected sea lion rookeries should be continued. All harvest operations should continue to be controlled by the present permit system and all field operations should be closely monitored.

Submitted by: John Vania, Game Biologist IV

SEA OTTER

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Units 1-16 - Coastal Waters

Seasons and Bag Limits:

Units 1 - 26

No open season.

5 AAC 84.290 TAKING OR CAPTURING OF SEA OTTER. The Commissioner or his authorized representatives may take or attempt to take, kill, possess, capture or pursue sea otter on the waters or lands of the state.

Note: On December 21, 1972 the Marine Mammal Protection Act of 1972 went into effect. This act nullified all state laws relating to the taking of sea otters and placed the authority for regulating take under the Secretary of Interior of the United States. Until regulations to the contrary are issued this act prohibits the taking of sea otters by most U. S. citizens. Depending on how the act is interpreted, it may allow Eskimos, Indians and Aleuts, dwelling on the coast of the North Pacific Ocean or the Arctic Ocean, to take sea otters without limit, provided it is not done in a wasteful manner.

Harvest and Hunting Pressure:

No sea otters were harvested in 1972. Fifty-seven were removed from the Green Island-Port Chalmers area of Prince William Sound for transplant to British Columbia.

Composition and Productivity:

An intensive series of counts from shore and a helicopter were conducted at Amchitka Island. These counts confirmed that previously used aerial counting techniques are inadequate for censusing sea otter populations and that sea otter numbers are greater than previously estimated.

On the basis of these counts, the Amchitka Island population was estimated at a minimum of 7000 sea otters and is believed to have exceeded 8000 in August 1972. About 60 percent of the population is on the Pacific side of the island. Based on the information on sea otter densities, gathered at Amchitka, and last year's analysis of survey information, the statewide estimate of sea otters was revised from 100,000 to 125,000.

The entire coast of Amchitka Island has been classified into male and female

areas. Male areas are located at East Cape, Crown Reefer Point, Sea Otter Point, Aleut Point, Juxta Point and St. Makarius Point East. These areas comprise less than 8 percent of the total shoreline. Female areas make up the remainder of the area except for a few small areas of marginal habitat which are used primarily by young, nonbreeding animals.

Sea otters have been repopulating the area where the nuclear explosion "Cannikin" reduced numbers significantly on November 6, 1971 (Table 1). There was a rapid increase in the two male areas (count areas 3 and 9) before March but little change after that. The female area in count areas 4 through 8 was repopulated by animals entering the fringe areas on both sides during the winter and eventually filling in the center during the summer. A large portion of the increase in this area was due to births of pups (28 per 100 adults). The high percentage of females with pups indicates that a large portion of the immigrating otters were adults. There was no obvious change in numbers in adjacent areas during this period. The number of otters in the area remained about 700 below the "pre-Cannikin" level in November, 1972.

For the second year in a row, sea ice advanced into sea otter habitat in Bristol Bay. The ice advanced more slowly than in 1971, allowing most of the sea otters to move southwestward with the pack edge until they were concentrated north of Izembek Lagoon and Unimak Island. A few animals remained in leads near Port Moller. While the ice persisted in sea otter habitat for over two months, known mortality was low compared to 1971. The distribution of sea otters was radically altered with very few animals remaining northeast of Moffet Point in May. However, by the end of November at least a few animals had returned to the Port Heiden area and in December four were sighted at Egegik.

Management Summary and Conclusions:

Approximately 15 percent of the adults and subadults counted on Amchitka Island in late May and early June were known to be accompanied by pups ($n = 1062$ adults and subadults). Because pups are difficult to see, even under good conditions, and large pups are likely to be classified as adults, this percentage probably is a minimal estimate of the number of pups born since the first of the year. Somewhat smaller numbers can be expected to be born during the last half of the year. It appears that the annual pup production exceeds 15 percent by a considerable margin. Assuming a "pre-Cannikin" summer population of 9000 sea otters, at least 1200 and perhaps 2000 pups would be born at Amchitka Island annually. This would explain why the removal of 1,426 sea otters over a four-year period had little effect on the Amchitka population.

The reduction in numbers by "Cannikin" was measurable only because it was concentrated in a small area. At the present rate of immigration into the affected area, it may take two more years before the population has completely recovered.

Recommendations:

If safe harvest levels for sea otter populations are to be determined through experimental removal at Amchitka, it will be necessary to increase the annual removal there to at least 800 to 1000. This number should be carefully regulated as to sex, age and location in order to avoid excessive pressure on any segment of the population.

Any large scale harvests should still be limited to the islands between Kiska and Kagalaska. Populations in other parts of Alaska are either still increasing or expanding into unpopulated areas. Removal of animals from these populations should be limited to that necessary for scientific studies and transplants.

Submitted by: John Vania, Game Biologist IV

BROWN/GRIZZLY BEAR

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 16 - West Side of Cook Inlet

Seasons and Bag Limits

May 15 - June 10

Sept. 10 - Oct. 10

One bear every four regulatory years; provided that the taking of cubs or females accompanied by cubs is prohibited.

Harvest and Hunting Pressure

The brown/grizzly sport hunting bear harvest in Unit 16 was 23 animals (Appendix I), representing a reduction of 19 animals from the 1971 harvests. The probable cause of the reduction was a decrease in the fall season of 10 days. The 11-year average harvest in Unit 16 from 1961 through 1971 was 29.7. Eleven, or 47.8 percent of the bears harvested, were taken in the spring. One brown bear was taken in defense of life or property in Unit 16.

As shown in Appendix I, the percentage of nonresidents participating in the harvest (48%) is the same as 1971 (48%) and is comparable to the period 1963-1966 when the percentage of nonresidents taking brown/grizzly bears in Unit 16 ranged from 41 to 52 percent.

Composition and Productivity

The percentage of male bears taken during the 1972 season rose from 53 percent in 1971 to 59 percent in 1972. Skull sizes and hide sizes also increased in 1972 from 21.0 (1971) to 23.6, and 12.7 (1971) to 13.7, respectively. The mean cementum age of 12 males taken in 1972 (9.3 years) was the highest since record keeping began in 1967. It is possible that the selection of large animals and thus older bears by hunters is the reason for the improvement in age structure, hide size, and skull size in 1972, but it must be noted that the sample size (12) is small.

Management Summary and Conclusions

For the first year since 1968, when the take was 23, the number of brown/grizzly bears harvested in Unit 16 has decreased; however, if the hide, skull and age measurements continue to increase, there exists little reason for more restrictive seasons or bag limits.

Recommendations

No season or bag limit changes are recommended at this time.

Submitted by: Jack C. Didrickson, Game Biologist III

Appendix 1. Brown/Grizzly Bear Sport Harvest, Calendar Years 1961 through 1972. Participation by Non-residents in the Bear Harvest with Mean Hide, Skull Size and Cementum Age of Male Bears Presented for Sealing, in Alaska's Game Management Unit 16.

Calendar Year	Total Kill	No. Males	% Males <u>1/</u>	No. Nonres.	% Nonres.	Mean Hide Size Male <u>2/</u>	Mean Skull Size Male <u>3/</u>	Mean Cem. Age Male <u>4/</u>	Calendar Year Seasons
1961	28	12	43	18	64	13.0	-	-	5/15-6/15 9/1-12/31
1962	18	9	50	10	83	12.1	-	-	Same
1963	27	18	60	11	41	13.0	-	-	Same
1964	20	13	65	9	45	12.7	-	-	Same
1965	37	22	73	19	51	13.5	-	-	Same
1966	27	11	42	14	52	13.3	-	-	Same
1967	28	13	50	19	68	14.4	23.1	8.1 (10)(Fall)	Same
1968	23	16	70	16	70	14.5	23.3	8.1 (14)	Same
1969	37	23	62	17	46	14.2	22.7	7.0 (21)	5/15-6/15 9/1-10/15
1970	40	31	79	27	68	13.6	22.6	7.5 (28)	5/15-6/10 9/1-10/15
1971	42	21	53	20	48	12.7	21.0	5.1 (18)	5/15-6/10 9/1-10/15
1972	23	13	59	11	48	13.7	23.6	9.3 (12)	5/15-6/10 9/10-10/10

1. All male % based on known-sex bears.
2. Length plus width given in feet.
3. Length plus width given in inches.
4. Tooth sample size in parenthesis.

Submitted by: Jack C. Didrickson, Game Biologist III
Leo H. Miller, Game Technician V

SHEEP

SURVEY-INVENTORY PROGRESS REPORT - 1972

Game Management Unit 7 - Seward - Kenai Mountains

Seasons and Bag Limits

Unit 7, that portion bounded Aug. 10 - Sept. 20 on the northwest by the Sterling Highway, on the north-east and east by the Seward Highway, and on the south and southwest by Kenai Lake

One sheep with 1/2 or less curl; 100 sheep of either sex may be taken by permit only; dates and conditions of the hunt will be described by Commissioner's announcement.

Remainder of Unit 7

Aug. 10 - Sept. 20

One ram with 3/4 curl horns or larger.

Harvest and Hunting Pressure

Based on harvest report returns the harvest of rams since 1962 has been as follows:

1962 - 15*	1968 - 52
1963 - 25	1969 - 42
1964 - 8	1970 - 25**
1965 - 22	1971 - 9
1966 - 18	1972 - 18
1967 - 21	

* 1962 was the first year of the harvest ticket regulation. Coverage is known to have been incomplete.

** Includes 2 sheep taken in the Chugach Mountains.

One hundred hunters reported hunting sheep in the Kenai Mountains in Unit 7 during the 1972 season of whom 18 (17.3%) were successful (Appendix I). Hunters afield dropped 10.3 percent from 1971 and hunter success increased by 9.6 percent. The number of hunters afield has been declining since 1967 and has declined 61 percent between 1969 and 1972.

Composition and Productivity

The results of trend counts conducted on 3 selected areas are presented in Appendix II.

Sheep numbers on Cooper Mountain increased during the years 1956 to 1968 and then declined by 30 percent between 1968 and 1972.

In the Crescent Lake Mountains sheep numbers increased during the period 1956 to 1968 then declined slightly between 1968 and 1970. The decline between 1970 and 1971 was produced intentionally through the hunter harvest of 1/2 curl or less sheep plus a winter collection conducted as part of a research program. Between 1971 and 1972 numbers again increased.

In the Grant Lake Mountains sheep numbers have fluctuated with no apparent trends.

Management Summary and Conclusions

Hunting effort in Unit 7 has declined sharply since 1969. Although the cause of this decline is not known, low hunter success and crowded hunting conditions may have been important factors.

Trend surveys indicate that sheep populations over most of Unit 7 increased steadily from the early 50's through 1968. Since 1968 most populations have ceased to expand and one (on Cooper Mountain) declined significantly.

These data indicate that Unit 7 sheep populations have peaked and that further growth is unlikely in the near future. Experience **indicates that** more population declines can be expected in the future.

Recommendations

No changes are recommended at this time. The experimental ewe sheep hunt and the annual evaluation of sheep populations on Crescent Mountain should be continued. Surveys of selected areas should be conducted annually to monitor trends.

Submitted by: Paul A. LeRoux, Game Biologist III.

APPENDIX I

Harvest and Hunter Success, Unit 7 - Kenai Mountains

<u>Year</u>	<u>Mountain Range</u>	<u>Number Successful</u>	<u>Percent Successful</u>	<u>Number Unsuccessful</u>	<u>Percent Unsuccessful</u>	<u>Total Sample*</u>
1969	Kenai	42	15.6	226	84.3	268
	Chugach	0	0	18	100.0	18
1970	Kenai	23	13.8	143	86.1	166
	Chugach	2	15.3	11	84.6	13
1971	Kenai	9	7.7	107	92.2	116
	Chugach	0	0	13	100.0	13
1972	Kenai	18	17.3	86	82.6	104
	Chugach	0	0	9	100.0	9

* Total sample does not include hunters who did not give zip code.

Submitted by: Paul A. LeRoux, Game Biologist III

APPENDIX II

Sheep trend count data, portions of Unit 7 - Kenai Mountains

COOPER MOUNTAIN

<u>Date</u>	<u>Total Adults</u>	<u>Lambs</u>	<u>Total sheen</u>
7/56	39	11	50
6/63	47	10	57
5/68	97	20	117
9/72	70	12	82

CRESCENT LAKE MOUNTAINS

<u>Date</u>	<u>Total Adults</u>	<u>Lambs</u>	<u>Total sheen</u>
6/56	101	35	136
6/68	128	68	296
7/70	243	44	287
6/71	188	20	208*
6/72	194	30	224

GRANT LAKE MOUNTAINS

<u>Date</u>	<u>Total Adults</u>	<u>Lambs</u>	<u>Total sheen</u>
8/68	30	13	43
8/69	41	16	57
8/70	48	14	62
9/71	43	8	51
7/72	49	4	53

* Reduction from 1970 due to the combination of experimental 1/2 curl or less hunt, winter collection and poor lamb crop.

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