ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
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MOOSE REPORT

by
Robert A. Rausch

Volume XI
Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-1, Work Plan K,
Jobs 1, 2, 3, 4, 5, 6 and 7

(Printed June, 1971)

WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job No.: 1, 3 and 7 Title: 1. Publications
3. Moose Range Inventories
7. Moose Range, Productivity Relationships

Period Covered: July 1, 1968 to June 30, 1969

OBJECTIVES

K-1

To prepare for publication significant findings obtained from past moose studies (not active).

K-3

To prepare vegetation type maps of the important moose ranges in the Lower Susitna and Matanuska Valleys and Tanana Valley.

To evaluate factors affecting seasonal distribution patterns of moose.

To assist the Bureau of Land Management, on a joint venture in producing a base map showing the location of fires that have burned some 25,000,000 acres throughout Alaska in the past 25 years (not active).

K-7

1. To test several aerial moose census techniques.

2. To test the feasibility of pellet counts as an index to the abundance of moose.

3. To evaluate blood and milk constituents as a technique for measuring physiological condition of moose.

4. To test radio-telemetry equipment as a means for locating animals within the enclosure and to pretest equipment that will be used on nonrestrained animals on other ranges.

5. To establish planes of surgical anesthesia on moose for some of the common anesthetics.

6. To measure initial production of calves within the enclosures and to access the mortality of calves and adults if mortality occurs.

Data from this reporting period were summarized by Robert LeResche in Vol. XI, Proj. W-17-2, Jobs 1.1R, 1.2R and 1.3R, October, 1970. The studies were inactive during much of the reporting period as a result of a fatal aircraft accident involving Art Bratlie and Dr. John Frank.

The information presented was prepared by Alaska Department of Fish and Game staff biologists including the following:

Southeastern Alaska

Don Strode
Harry Merriam

Southcentral Alaska

Loyal Johnson
Jack Didrickson
Julius Reynolds
Royce Perkins
Pat Crow (Statistics Section)

Interior-Arctic Alaska

Robert A. Rausch
Richard H. Bishop
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Jean Ernest
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APPROVED BY:

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Acting Director, Division of Game

WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State:	Alaska		
Project No.:	W-17-1	Title:	Big Game Investigations
Work Plan:	K	Title:	Moose
Job No.:	2	Title:	Moose Harvest Statistics
Period Covered:	July 1, 1968 to June 30, 1969		

ABSTRACT

Statistical information from the 1968-69 hunting season indicates nearly 33,000 persons obtained moose harvest tickets and harvested 6,791 moose. Approximately 15 percent of the harvest was comprised of antlerless animals.

WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job No.: 2 Title: Moose Harvest Statistics

Period Covered: July 1, 1968 to June 30, 1969

OBJECTIVES

To obtain information on trends in hunting pressure in selected areas of Alaska and on the age composition of moose harvested in Alaska.

To assess the magnitude of the annual harvest.

PROCEDURES

Data on the incidence of hunter use of selected areas were obtained from moose harvest ticket report cards which are designed to show where hunters hunted and whether or not they were successful.

Moose jaws were collected from hunter kills to obtain incisiform teeth for age determination. An informational program was used to enlist the cooperation of hunters in collecting jaws from their kills (done in conjunction with Job K-5).

FINDINGS

Statistical data on the magnitude of the kill for 1968 are presented in Table 1. Comparisons with the kill from previous years are also presented. A considerable amount of detailed information on methods and means used by moose hunters in specific areas is contained in the printout of the information obtained from the hunter report cards. These data are available for management deliberations in each regional office and at the central office in Juneau.

The material on population age composition is reported with Job K-5.

Table 1. Moose Harvest Data, From Harvest Tickets 1963-1968

UNIT	1963				1964				1965			
	M	F	0	TOTAL	M	F	0	TOTAL	M	F	0	TOTAL
1	149	1	-	150	158	65	-	223	128	35	4	167
2	2	-	-	2	-	-	-	0	-	-	-	0
3	4	-	-	4	-	-	-	0	-	-	-	0
4	1	2	-	3	-	-	-	0	-	-	-	0
5	189	111	2	302	154	111	-	265	153	125	4	282
6	15	2	-	17	15	-	-	15	24	-	-	24
7	251	174	2	427	163	206	-	369	60	-	1	61
8	-	-	-	0	-	-	-	0	-	-	-	0
9	179	46	2	227	185	64	-	249	213	68	4	285
10	1	-	-	1	-	-	-	0	-	-	-	0
11	86	37	-	123	89	38	-	127	116	70	2	188
12	138	22	1	161	145	16	-	161	151	33	6	190
13	1385	343	7	1735	1213	394	-	1607	1318	3	10	1331
14	925	557	4	1486	795	525	-	1320	1127	1125	10	2262
15	1021	417	2	1440	1212	858	-	2070	841	731	12	1584
16	344	27	2	373	262	61	-	323	333	52	7	392
17	61	-	-	61	31	1	-	32	41	1	-	42
18	75	3	-	78	39	-	-	39	28	-	2	30
19	144	24	-	168	96	33	-	129	121	28	1	150
20	1324	131	2	1457	1034	242	-	1276	1050	140	33	1223
21	168	72	7	247	137	49	-	186	96	31	1	128

Table 1. (cont.) Moose Harvest Data, From Harvest Tickets 1963-1968

UNIT	1963 M	1963 F	1963 0	1963 TOTAL	1964 M	1964 F	1964 0	1964 TOTAL	1965 M	1965 F	1965 0	1965 TOTAL
22	68	1	-	69	57	-	-	57	55	3	2	60
23	76	1	-	77	73	-	-	73	44	-	1	45
24	92	4	-	96	84	18	-	102	66	14	4	84
25	77	2	-	79	55	2	-	57	52	1	-	53
26	13	-	-	13	13	-	-	13	-	-	1	1
UNK.	59	4	1	64	6	1	70	77	32	9	-	41
TOTAL BY SEX	6847	1981	32		6016	2684	70		6017	2426	104	
TOTAL BY YEAR		8,860				8,770				8,591		
TICKETS ISSUED		32,412				29,904				32,924		
UNSUCCESSFUL		16,287				12,365)				22,244		
DIDN'T HUNT		5,415				6,380)						
NO INFO.												
COULD NOT CONTACT										862		
NO REPLY		1,849*				2,173*				1,198*		
LOST TICKETS												

*One only reminder letter sent.

Table 1. (cont.) Moose Harvest Data, From Harvest Tickets 1963-1968

UNIT	1966				1967				1968			
	M	F	0	TOTAL	M	F	0	TOTAL	M	F	0	TOTAL
1	168	60	2	230	174	48	2	224	157	62	4	223
2	-	-	-	0	-	-	-	0	-	-	-	0
3	-	-	-	0	-	-	-	0	-	-	-	0
4	-	-	-	0	-	-	-	0	-	-	-	0
5	116	90	6	212	154	108	1	263	177	133	3	313
6	23	1	-	24	37	-	-	37	45	9	0	54
7	112	1	-	113	123	1	1	125	160	1	3	164
8	2	-	-	2	-	-	-	0	-	-	-	0
9	240	75	8	323	301	68	9	378	366	72	5	443
10	-	-	-	0	-	-	-	0	1	-	-	1
11	89	69	5	163	108	70	2	180	99	34	8	141
12	156	19	7	182	136	42	4	182	132	30	2	164
13	1336	181	36	1553	1217	319	16	1552	1240	243	29	1512
14	565	202	9	776	482	4	9	495	680	38	5	723
15	819	307	18	1144	641	-	6	647	855	27	13	895
16	393	144	18	555	281	-	1	282	432	46	9	487
17	25	1	-	26	37	-	1	38	45	0	1	46
18	31	1	1	33	19	4	1	24	15	2	1	18
19	136	43	4	183	93	40	5	138	111	29	3	143
20	814	157	23	994	658	187	11	856	818	177	12	1007
21	114	50	2	166	111	42	2	155	125	40	3	168

Table 1. (cont.) Moose Harvest Data, From Harvest Tickets 1963-1968

UNIT	1966 M	1966 F	1966 0	1966 TOTAL	1967 M	1967 F	1967 0	1967 TOTAL	1968 M	1968 F	1968 0	1968 TOTAL
22	52	1	1	54	56	-	1	57	33	1	1	35
23	68	-	1	69	65	10	1	75	30	4	0	34
24	52	17	3	72	61	21	-	82	39	4	1	44
25	70	12	1	83	38	15	1	54	50	21	1	72
26	12	-	-	12	5	-	-	5	15	4	1	20
UNK.	57	13	9	79	59	13	-	72	67	14	3	84
TOTAL BY SEX	5450	1444	154		4856	993	73		5692	991	108	
TOTAL BY YEAR		7,048				5,922				6,791		
TICKETS ISSUED		31,549				31,941				35,705		
UNSUCCESSFUL		14,741				14,160				15,624		
DIDN'T HUNT		5,915				7,539				9,449		
NO INFO.		456				300				346		
COULD NOT CONTACT		637				947						
NO REPLY		2,702*				2,894*				3,273		
LOST TICKETS		257				179				222		

* One only reminder letter sent.

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WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job No.: 4 Title: Moose Sex and Age Composition Counts

Period Covered: July 1, 1968 to June 30, 1969

OBJECTIVES

To measure relative abundance, productivity and distribution of selected moose populations in Alaska with indices to population status.

PROCEDURES

The procedures used in gathering information on sex and age composition of moose populations have been reported in several previous segment reports (Rausch and Bishop, 1968 and Bishop, 1969). Maps and narrative descriptions of most of the count areas are also included in the aforementioned reports. The procedures, maps and descriptions are not repeated in this report as there have been few changes of substance.

FINDINGS

The findings are presented by management region and by game management unit in numerical sequence whenever possible. Comments on the meaning of the information are limited to those prepared by the individuals who collected the data. In some instances the data are merely cumulative and narrative description is not considered meaningful. The raw data are stored in the respective regional offices.

Sex and Age Composition Counts - Southeast Region

Sex and Age Composition - Unit 5: Sex and age composition counts were conducted in the same manner and over the same area as have been reported in previous annual reports. The survey results have been remarkably consistent since intensive surveys of the Yakutat area began in 1964. The 1968 surveys showed a slight increase in calf representation in the total herd (15.4 percent of total herd in 1968 as compared with an average of 13.1 percent for the three previous years) in fall surveys.

Surveys conducted in early May prior to calving showed that the calf crop was reduced by upwards of 60 percent, presumably by the severe snow conditions of the winters of 1968-69. Summary sheets for the fall and spring composition counts are attached as Tables 1 and 3. Sex and age ratios are given in Table 2. Yearling survival data are given in Table 4.

Sex and Age Composition - Unit 6: Composition counts which began on an annual basis in 1964 have shown a steady increase in total moose seen. Intensive surveys of the total area are possible and it is believed that west of the Copper River perhaps 80+ percent of the animals are observed. East of the Copper River, in the Martin River Valley which is more heavily timbered, a smaller percentage of the moose are seen. It is also in the Martin River area that an extremely rapid build-up of moose has occurred. The summary sheet and sex and age ratios are attached as Tables 5 and 6, respectively.

A flight was made on April 2, 1969 to observe the effects of the deep snow conditions on calf survival. A sample of 91 animals showed 21 calves or 23 percent which was good in view of the severity of the winter. Physical condition of the animals was very poor.

It will be interesting to follow the development of moose numbers in the Bering River area. The area is quite extensive and appears to be favorable moose habitat. Nineteen moose were observed there in the fall of 1968.

A potential conflict with man's interests developed last fall when a large group of moose was in the vicinity of the airport. One adult cow was struck by a 727 jet resulting in approximately $250,000 damage to the aircraft. Plans are underway to fence the airport area to prevent future collisions.

Sex and Age Composition Counts - Southcentral Region

Sex and Age Composition - Unit 7: Since the 1965 count was made after most of the bulls had dropped their antlers, and the sample size of the 1967 count was small, it is best to compare most statistics using the 1966 and 1968 data. In so doing, we see that the bull:cow ratio has declined slightly but remains relatively good (Tables 7 and 8). Calf production has not changed significantly and remains only fair.

Sex and Age Composition - Unit 15: An extensive count over much of Subunit 15A was conducted in December 1968 by the Kenai National Moose Range staff. Even though many of the bulls were losing their antlers by then, a fairly high bull:cow ratio was noted. Calf production was quite high.

No counts were made in Subunit 15B. They are planned for 1969, however.

In Subunit 15C, the lower Kenai, the bull:cow ratio shows a general decline since 1963 when the first sizable sample was counted. This is to be expected, since this area is relatively accessible, except for the portion lying within the Kenai National Moose Range. The small bull: large bull ratio has not shown the increase expected in a heavily hunted area. Distinguishing the antlers of the yearling bulls is difficult when the snow cover is insufficient, as was the case this year. Obviously, this error would also cause the bull:cow ratio to appear lower than it actually is. Calf production remains quite good in Subunit 15C as a whole and very good in the Homer area.

The statistical data from Unit 15 are presented in Tables 9 through 12.

Sex and Age Composition - Unit 13: In Unit 13 the bull:cow ratio continues to decline even though the annual harvest is fairly stable. The Oshetna Rivers, Little Nelchina River, Tyone Creek, Sanona Creek and Lake Louise areas are showing the effects of heavy hunting pressure and may warrant special consideration in the near future. Reproduction appears to be "good" in the unit as a whole, but survival appears on a downward trend. Statistical data are presented in Tables 13 through 17.

Sex and Age Composition - Units 14 and 16: The statistical data on sex and age composition for Units 14 and 16 are presented in Tables 18 through 23.

Sex and Age Composition Counts - Interior/Arctic Region

Tok Area: Aerial composition counts were made in parts of Units 12, 13 and 20C by Larry Jennings, Game Biologist at Tok (Tables 24 and 25).

In Unit 12 composition counts were made in several drainages where moose hunting has been consistently good over the years. In the Tok River drainage production of calves appears fair, however, the proportion of bulls seemed lower than one would expect in a relatively lightly hunted area. In the Dry Tok drainage the proportion of bulls was quite low, probably because most of the area covered was at lower elevations, where fewer bulls would be expected. The proportion of calves was high, which suggests that the sampling was biased toward the cow:calf segment of the population.

In the Little Tok drainage bulls were better represented although the proportion still seems somewhat low. The combined data for the Tok, Little Tok and Dry Tok drainages suggest poor to fair calf production, a lower proportion of bulls than one would expect for the types of area involved, and a low proportion of calves in the herd. Jennings pointed out that due to counting conditions the data on small males are not reliable, and therefore should not be given any significance.

The general status of the moose in the portion of Unit 12 covered appears fair in terms of productivity, but it is apparent that much more intensive sex and age composition surveys are required before we will have reliable indices to productivity and sex ratios.

Unit 13: Survey conditions in the Upper Slana River were unsatisfactory when the work was attempted and the data are not reliable.

Unit 20C, Taylor Highway Area: Population composition data from the Taylor Highway, or 40-Mile Country, seem to confirm the trend toward low productivity in that general area in 1967 and 1968. The proportion of bulls in that general area is holding up well in the face of consistent annual harvests of about 100 males and a few females. There is a possibility that bulls are sampled out of proportion to their true abundance in the population, but the counting effort was fairly intensive in 1968, therefore the samples should be representative of the general population. The reasons for the low productivity remain unknown. In view of the limited harvest from such a large area there seems to be no reason for altering regulations at this time.

Unit 19: Most of the composition counts made in Unit 19 were too late in the winter to catch the concentrations of moose along the major drainages. As a result, sample sizes are too small to be meaningful in most cases (Tables 26 and 27).

On the upper Kuskokwim, major concentrations of moose occurred around Big River, and from there downstream to Stewart Bend, and from Sterling (Candle) Landing to Deacon's Landing. Presumably moose were numerous around the Tatlawitsuk River and Stony River, but few were found at the time of the counts. There was a concentration of moose along the lower third of the Hoholitna River but it was not surveyed. No counts were attempted above Big River. It appears that counts along the Kuskokwim should be done in late January or early February. Snow depth may influence the timing of dispersion of moose from the main drainages, and there was relatively little snow in the upper Kuskokwim area in 1968-69 (less than 2 ft.).

Unit 21: Counts in the Upper Innoko-Iditarod drainages were also made late (Tables 28 and 29). Snow covering was deteriorating rapidly and moose were dispersing from the river valleys. Among the moose remaining along the major drainages calf production appeared poor. However, much more intensive surveys are needed before we can accurately assess the status of populations in these areas.

On the Yukon River counting conditions were ideal. Moose were still concentrated on the bars and islands supporting willows and were easily counted. The snow was 3 to 3.5 ft. deep (Tables 30 and 31).

The contrast in abundance of moose between the Holy Cross-Kaltag sector and the Kaltag-Koyukuk sector is striking. Although there are fewer bars and islands supporting willows in the latter area, I would have expected more moose than we saw, based on the availability of browse. The flats adjacent to the Kaltag-Koyukuk sector are essentially a black spruce swamp and probably contribute little to the support of moose, whereas downstream numerous meanders and oxbows supporting fringes of browse species are present.

Depending upon hunting practices and utilization of moose, it is possible that the relatively large human populations of Kaltag and Nulato, coupled with the poorer habitat, may have a depressing effect on the moose population, but this seems unlikely.

Productivity in the total sample was fair.

Counts made in the Tanana-Koyukuk sector of the Yukon River (Tables 32 and 33) indicate good production and survival of calves. More moose were observed in that sector in 1969 than in 1966, when the last meaningful count was made, but there is no way of knowing if this is related to population levels.

The Koyukuk drainage continues to support sizable moose populations; however, production is only poor to fair (Tables 34 and 35) and it may be that these moose populations, which have fluctuated dramatically in the past, are again approaching the capacity of their range.

Unit 20A: Composition counts in Unit 20A were limited to the Tanana Flats in 1968. Snow conditions were marginal for counting. In the Alaska Range snow conditions were too poor for counting until December and the counts there were not completed. Population composition data from the Tanana Flats for the last 9 to 13 years (depending upon their availability) have been summarized below in an effort to understand the relationships of population indices to production, survival, and relative abundance. Data from 1968 composition counts are shown in Tables 36 and 37. It is interesting to note that 26 tagged calves were observed in 1968 where 358 had been tagged 6 months previously.

Indices to production and survival obtained in the fall from 1956 through 1968 are summarized in Fig. 1. In the late '50's the population was considered to be fairly high and growing rapidly. Production, defined as calves:100 cows at age 5 to 6 months, was very high from 1956 through 1960.

Apparently the population was large enough to absorb the high production of calves without showing a marked rise in the relative proportion of calves, since the percentage of calves did not rise above 20 and 22 percent.

The proportion of small males (yearlings) varied more, but still remained between 5 and 11 percent of the population, and seemed to rise in parallel to production.

No data from the fall of 1961 are available, but in the spring of 1961 counts were made to assess yearling survival, initial production of calves and relative population abundance (Fig. 2). Survival of the 1960 calves to 1 year of age was very high as shown in the spring 1961 counts. The figure may be inflated through some unknown bias, but it seems survival was very good.

Production, as defined earlier, and survival to 1 year of age appear to have begun declining from 1961 following the severe winter of 1961-62. Spring counts in 1962 suggested a 50 percent decline in the proportion of calves reaching 1 year of age. Fall counts in 1962 confirmed the decline in the proportion of yearlings and in calves per 100 females, but the percentage of calves remained in the 20 to 22 percent range. These declines were probably related to the severe winter of 1961-62, when snow was deep and there were prolonged periods of extreme cold. That the percentage of calves in the sample did not decline may be due to heavy mortality among adult and yearling animals, on which this index to calf abundance is based.

In 1963 production rose again to a very high level, although the percentage of calves in the sample did not rise greatly. Some bias may again have inflated the 1963 production indices.

No data from 1964 are available, but from the 1965 indices it appears that the downward trend in survival to 1 year of age (spring 1965 indices) and in the proportion of calves (fall 1965) continued.

The effect of very deep snows on initial production and survival to 1 year of age seems very apparent in the 1966 data. Fig. 3 shows that after the severe winter of 1965-66, survival of moose to 1 year of age dropped drastically. From observations during moose tagging the spring of 1966, it was apparent that many calves died at or soon after birth or were stillborn, and that many adults and yearlings had died over the winter. Indices from fall 1966 counts do not reflect a decline in the proportion of calves; this is probably again due to the considerable winter loss of the adults and yearlings. Apparently the yearling class suffered proportionately more losses, because the percentage of small males dropped by over 50 percent from the fall 1965 levels.

Spring counts in 1967 suggested that the balance of recruitment and mortality was improving. The ratio of yearlings to cows rose considerably, although the percentage of yearlings declined slightly. Fall counts in 1967 suggested stable calf production, but a real increase may have occurred and been hidden by improved survival of other sex and age categories. Yearling survival, as indicated by the percentage of small males, made a slight gain.

The recovery of production and survival after the severe winter of 1965-66 becomes more apparent in the 1968 data. Spring counts show a definite rise in survival to 1 year of age, and fall counts at last reveal a decided rise in production as well as a further improvement in yearling survival. The trend is continued in the spring 1969 data on yearling survival.

Several tentative generalizations may be made on the basis of these data and associated observations. First, despite the various problems involved in obtaining and using aerial population composition data, the technique remains the only efficient means of acquiring large samples of population composition data. Although the data gathering process is subject to many variables which may render the data unusable for statistical

analyses, or unrepresentative of population characteristics, I believe that the data from the Tanana Flats show that if aerial composition data are gathered with consistent techniques from year to year, they will accurately reflect the major trends in sex and age ratio changes which occur. This proposition has been supported by R. A. Rausch for years.

Second, under the conditions of a large moose population and what appears to be a rather limited amount of winter range on the Tanana Flats, it appears that snow depth and perhaps hardness become a critical factor for moose survival. An analysis of actual snow data and moose population characteristics is needed to verify this hypothesis.

Third, it appears that, at least on the Tanana Flats, the proportion of calves in the fall population ranges between 19 and 23 percent when production and survival are high, and drops below 18 to 19 percent when production and survival are low. In general the variation in the proportion of calves in the population is very small compared to the variation in the number of calves per 100 females.

The percentage of calves in the sample may provide a more consistent index to production than calves per 100 females; it appears that when the percentage of calves is 16 or less in the fall, recruitment of yearlings will be low (10 percent or less) the next year. However, survival of yearlings may show an increase under favorable conditions even though calf production the preceding year was poor.

Finally, with a relatively high population on a limited range that we assumed existed in the late 1950's, percentage of yearlings did not exceed about 20-22 percent in the fall, assuming that twice the percentage of yearling males found in the fall represents the approximate percentage of yearlings in the population. Since the proportion of all yearlings in the population in the spring is usually about twice the proportion of yearling males in the following fall, the assumption is probably correct. I suspect that as the population rises again, the proportion of yearlings in the fall may again stabilize at between 10 and 15 percent, and that the percentage of calves will stabilize between 20 and 25 percent of the population.

The ranges for the various indices and their significance have been extracted from a specific set of data based on population changes in moose under particular conditions. It may well be that the range of values described will not fit any future situation, but we suspect they will, and we also believe that similar ranges of values relating to production and survival can be documented for other areas of the State. Of course, this has been done to some extent in the Matanuska Valley.

We believe the next logical step in an analysis of the Unit 20A - Tanana Flats data would be to compare the patterns of change in population indices with those from other areas where intensive work has been done, to see if there is some pattern in time and magnitude of fluctuations in these indices. If the relationships between indices are consistent, we may be in a position to estimate the annual increment of yearlings six or eight months ahead, based on knowledge of calf production and winter conditions.

Unit 20B: One count was made in midday in Goldstream Valley west of Fairbanks with poor success. Moose were bedded down in heavy cover. A count of the Fairbanks Wildlife Center and associated cover showed that a number of cows, over half with calves, were using the area, at least in November. Counting conditions there were good, with little interference from dense cover. Data for Goldstream and the Wildlife Center are given in Table 30.

No other counts were successfully completed in Unit 20B, although several attempts were made in the Chena River and Chatanika River drainages.

The discussion of the tagging program in Unit 20A should make it clear that more aerial survey work is needed in Unit 20B.

Unit 20C: Population composition counts in Unit 20C in the Taylor Highway country were discussed previously. Composition counts were made in several other areas in January through March by the Fairbanks staff with limited success. On the Yukon River between Circle City and the Canadian border few moose were found and it seems likely the moose had dispersed from the river by the time the count was done (Tables 39 and 40).

The Goodpaster River drainage and Nome Creek (Tables 41 and 42) posed a similar problem to that found in other western drainages of the Tanana Hills; it is difficult to hit the time when moose are in groups in the river bottoms. Counts at other times are very inefficient, because the moose are dispersed over a wide area, often in dense cover. To do an adequate survey is expensive and time consuming. Nevertheless, I feel plans should be made for such counts every two to three years in drainages of major interest in 20C, as well as in 20B. The limited data suggest good production and survival in the areas covered, but the sample sizes are too small to place much confidence in the indices.

Unit 23: Population composition indices shown in the data for the Kobuk River (Tables 43 and 44) suggest some interesting differences in production between the more heavily hunted lower part of the river, and the upper, lightly hunted portion. The lower portion appears to have strikingly better production, but also a much higher proportion of bulls. Sample sizes are not large, and the results may be misleading. However, in the lower Kobuk drainage there has been concern that moose are eliminated rapidly by hunters, and I wonder if selectivity for cows in hunting might not affect the age and sex ratios in a relatively small population. The lower Noatak area yielded indices similar to the lower Kobuk (Table 43), with even greater production and survival indicated. The consistent feature in both areas is the relatively low proportion of cows. It may be that subsequent surveys, perhaps earlier in the fall, will provide some insight into the significance of these ratios. The population does not seem to be very dense compared to interior and southcentral Alaska moose populations. Counts were made by Bob Pegau, Nome.

Table 1. Summary of Moose Population Composition Counts. Yakutat, 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Doame R. to Alsek R.	12/10	41	8	49	28	7	2	37	127	0	11	41	138	1.7	81.17
Alsek R. to Tanis R.	12/10	25	8	33	47	22	2	71	145	1	27	41	172	1.8	95.56
Tanis R. to Italio R.	12/11	8	3	11	37	32	0	69	133	0	32	53	165	1.6	103.12
Italio R. to Dangerous R.	12/11	11	6	17	44	15	1	60	102	0	17	25	119	1.3	91.53
Dangerous R. to Situk R.	12/12	30	13	43	34	21	2	57	126	1	26	26	152	1.7	89.41
Situk R. to Yakutat Bay	12/12	7	2	9	6	8	0	14	30	0	8	7	38	0.8	47.50
Total GMU 5		122	40	162	196	105	7	308	663	2	121	193	784	8.9	88.08

Table 2. Moose Sex and Age Ratios. Yakutat, 1968.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Doame R. to Alsek R.	12/10	132.43	21.62	19.51	5.80	123.08	35.13	22.22	9.40	81.17	138
Alsek R. to Tanis R.	12/10	46.48	11.27	32.00	4.60	59.26	38.03	8.25	15.70	95.56	172
Tanis R. to Italio R.	12/11	15.94	4.37	37.50	1.81	18.75	46.38	00.00	19.31	103.12	165
Italio R. to Dangerous R.	12/11	28.33	10.00	54.54	5.04	70.59	28.33	6.25	14.30	91.53	119
Dangerous R. to Situk R.	12/12	75.44	22.80	43.33	8.55	104.00	43.85	8.69	17.10	89.41	152
Situk R. to Yakutak Bay	12/12	61.43	14.29	28.57	5.27	50.00	57.14	00.00	21.05	47.51	38
Total GMU 5		52.60	12.99	32.79	5.35	66.12	39.28	6.25	15.48	88.08	784

Table 3. Summary of Moose Population Composition Counts. Yakutat, May 1969.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Doame R. to Alsek R.	5/12	27	(9*)	37	37	6	1	44	71	7	15	0	86		
Alsek R. to Tanis R.	5/12	12	(1*)	13	49	4	0	53	65	0	4	0	69		
Tanis R. to Italio R.	5/13	18	(5*)	23	62	7	0	69	87	5	12	0	99		
Italio R. to Dangerous R.	5/13	7	(4*)	11	53	7	0	60	67	0	7	0	74		
Dangerous R. to Situk R. and Situk R. to Yakutat Bay	5/13	10	(4*)	14	56	9	0	65	75	4	13	0	88		
Total GMU 5		74	(23*)	97	257	33	1	291	365	16	51	0	416		

* Yearling bulls also included as calves in F/1, lone calves, etc. do not include in total moose.

Table 4. Yearling Moose Survival, GMU-5. Yakutat, May, 1969.

Counting Area	Percent Calves December 1968	Sample Size	Percent Yearlings May 1969	Sample Size
Doame R. to Alsek R.	9.40	38	17.4	86
Alsek R. to Tanis R.	15.70	172	5.8	69
Tanis R. to Italio R.	19.31	165	12.1	99
Italio R. to Dangerous R.	14.20	119	9.5	74
Dangerous R. to Situk R.	17.10	152	14.8	88
Situk R. to Yakutat Bay	21.05	38		
Total for Unit 5	15.43		12.3	

Table 5. Summary of Moose Population Composition Counts, Unit 6, Cordova, January, 1969

Area	Date	Large MM	Small MM	Total MM	FF W/O	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Eyak River - Copper River	1/15 & 16 1969	2	2	4	-	25	7			1	40	76	152		
Bering River	1/17/69	3	3	6	-	1	2			0	6	5	19		
Martin River Valley	1/18/69	4	3	7	-	24	8(+1 w/3)			0	43	118	201		
Katalla River	1/18/69			0			0				0	2	2		
Suckling Hills-Icy Bay	1/19/69	No moose seen													
Total Unit 5		9	8	17		50	17(+1 w/3)			1	89	201	374		

Table 6. Moose Sex and Age Ratios, Unit 6, Cordova, January, 1969.

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	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Eyak River - Copper River	No ratios calculated						21.9	26.3		152
Bering River	As cows w/calves and those few bulls which had not shed antlers only sex and age classes recognizable.						66.7	26.3		19
Martin River Valley							25.0	21.4		201
Katalla River							--	--		2
Suckling Hills - Icy Bay							--	--		--
Total Unit 5							25.4	23.8		374

Table 7. Summary of Moose Population Composition Counts, 1968. Unit 7 - Kenai Peninsula.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
#1 Resurr. R.	12/10	4	0	4	19	6	0	25	29	0	6	0	35	1.1	31.8
#4 Johnson Cr.	12/9	1	0	1	10	7	1	18	19	0	9	0	28	0.6	46.7
Placer R. Skookum Cr. Portage Cr.	12/9	0	7	7	26	14	1	41	48	0	16	0	64	0.9	71.1
#6 Twenty Mi. & Glacier R.	11/30	1	3	4	42	22	4	68	72	1	30	0	103	1.0	103.0
#8 Little Indian Cr.	12/10	2	1	3	6	1	0	7	10	0	1	0	11	0.4	27.5
#9 Big Indian Cr.	12/10	3	8	11	47	6	0	53	64	0	6	0	70	1.8	38.9
#10 Resurr. Cr.	12/10 12/17	22	4	26	79	30	1	110	136	0	32	1	168	4.8	35.0
Quartz Cr. Keani Lake	12/9	3	0	3	28	15	0	43	46	1	16	0	62	0.7	88.6
#14 Quartz Cr. Up from Devil's Cr.	12/10	0	1	1	22	15	1	38	39	1	18	2	59	1.1	53.5
#20 Chickaloon River	12/10 12/23	9	3	12	67	29	0	96	108	0	29	5	137	2.0	69.0
Total		45	27	72	346	145	8	499	571	3	163	8	737	13.5	

Table 8. Moose Sex and Age Ratios, 1968. Unit 7 - Kenai Peninsula.

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	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
#1 Resurr. R.	16.0	0.0	0.0	0.0	0.0	24.0	0.0	17.1	31.8	35
#4 Johnson Cr. & Upper Trail Cr.	5.5	0.0	0.0	0.0	0.0	50.0	12.5	32.1	46.7	28
S. Placer R. Skookum Cr. Portage Cr.	17.1	0.0	0.0	10.9	87.5	39.0	6.7	25.0	71.1	64
#6 Twenty Mi. Glacier R.	5.9	4.4	300.0	2.9	19.3	45.6	15.4	30.1	103.0	103
#8 Little Indian Cr.	42.8	14.3	50.0	9.1	200.0	14.3	0.0	9.1	27.5	11
#9 Big Indian Cr.	20.8	15.1	266.7	11.4	266.7	11.4	0.0	8.6	38.9	70
Resurr. Cr.	23.6	3.6	18.1	2.4	25.0	29.0	3.2	19.0	35.0	168
#12							0.0	22.4	39.0	49
#13 Quartz Cr.-Kenai Lake	7.0	0.0	0.0	0.0	0.0	39.5	0.0	27.4	88.6	62
#14 Quartz Cr. Up from Devils Cr.	2.6	2.6	0.0	1.7	10.5	50.0	6.2	32.2	53.6	59
#20 Chickaloon R.	12.5	3.1	33.3	2.2	20.0	30.2	0.0	21.2	69.0	137
Total Unit 7	14.4	5.4	60.0	3.7	32.9	32.7	4.0	22.2	54.9	786

Table 9. Summary of Moose Population Composition Counts - 1968. Lower Kenai - Unit 15-C.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hrs.)	Moose per Hour
C	11/17,19	29	19	48	179	111	2	292	340	1	116	0	456	4.2	109
I	11/19,20	107	34	141	225	64	4	293	434	0	72	0	506	3.1	163
Homer	11/17,19	2	6	8	143	75	8	226	234	1	92	0	326	7.0	47
Anchor Pt.	11/19,21	1	1	2	76	42	8*	126	128	3	61	0	189	4.6	41
A	11/17	2	2	4	10	13	2	25	29	0	17	0	46	1.2	38
3	11/17	0	0	0	5	12	2	19	19	0	16	0	35	1.5	23
B	11/19,20,21	12	8	20	68	70	3	141	161	0	76	0	237	7.1	33
H	11/20,21	14	0	14	24	15	0	39	53	1	16	0	69	2.3	30
1	11/21	3	1	4	8	2	1	11	15	0	4	0	19	.1	190
Totals		170	71	241	738	404	30	1172	1413	6	470	0	1883	31.1	

* One cow w/3 calves; 3rd calf is included in Lone Calf column.

Table 10. Moose Sex and Age Ratios, 1968. Lower Kenai - Unit 15-C.

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	Incidence of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
C	16.4	6.5	65.50	4.20	32.8	39.7	1.8	25.4	109	456
I	48.1	11.6	31.80	6.70	94.4	24.6	5.9	14.2	163	506
Homer	3.5	2.7	300.00	1.80	13.0	40.7	9.6	28.2	47	326
Anchor Pt.	1.6	100.0	.79	.53	3.3	48.4	16.0	32.3	41	189
A	16.0	8.0	100.00	4.30	25.0	68.0	13.3	37.0	38	46
3	0.0	0.0	0.00	0.00	0.0	84.2	14.3	45.7	23	35
B	14.2	5.7	66.70	3.40	21.0	53.9	4.1	32.0	33	237
H	35.9	0.0	0.00	0.00	0.0	41.0	0.0	23.2	30	69
1	36.4	9.0	33.30	5.30	50.0	36.4	33.3	21.0	190	19
Total Lower Kenai	20.5	6.1	41.80	3.80	30.2	40.1	6.9	25.0	60.5	1883

Table 11. Summary of Moose Population Composition Counts. Kenai National Moose Range, 1968*, Unit 15.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hrs.)	Moose per Hour
Swan Lake Road Area	10/3-16	9	7	16	135	42	8	185	201	1	59	--	260	--	--
Skilak Pipeline Area	10/3-16	14	6	20	116	45	9	170	190	2	65	--	255	--	--
Misc. Areas Sunken I, Rd. Dabbler L.	10/3-16	6	4	10	29	9	1	39	49	0	11	--	60	--	--
Total, Lowland Area		29	17	46	280	96	18	394	440	3	135	--	575	--	--
Funny R. Bench Land	10/3-16	80	11	91	267	48	1	316	407	0	50	--	457	--	--

* Data from W. Troyer, Refuge Manager

Table 12. Moose Sex and Age Ratios, Kenai National Moose Range, 1968*, Unit 15.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
Swan L. Rd. area	10/3-16	8.0	3.5	77.8	2.7	23.7	31.9	16.0	22.7	--	260
Skilak Pipeline area	10/3-16	11.8	3.5	42.9	2.4	18.5	38.2	16.7	25.5	--	255
Misc. areas, Sunken I. Rd. Dabbler L.	10/3-16	25.6	10.3	66.7	6.7	72.7	28.2	2.6	18.3	--	60
Total, Lowland area	10/3-16	11.7	4.3	58.6	3.0	25.2	34.3	15.8	23.5	--	575
Funny R. Bench Land	10/3-16	28.8	3.5	13.8	2.4	44.0	15.8	2.0	10.9	--	457

* Computed from data from W. Troyer, Refuge Manager

Table 14. Moose Sex and Age Ratios, Nelchina Basin, Unit 13 - 1968.

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	Incidence of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
#2 East side of Maclaren R.	34.1	5.6	19.4	3.2	29.2	38.1	0	22.1	54	217
#5 Alphabet Hills	39.2	3.6	10.0	2.2	31.0	23.0	7.5	14.1	82	912
#6 Denali-Clearwater	29.7	4.9	20.0	3.2	37.6	26.3	2.4	16.9	59	504
#8 West of Richardson Hwy.	20.3	4.7	30.0	3.0	26.1	35.9	0	23.0	48	100
#9 East of Richardson Hwy.	24.3	13.5	125.0	8.6	83.3	32.4	0	20.7	53	58
#10 Gakona River	35.2	6.0	20.8	3.6	34.9	34.6	0	20.4	91	309
#12 Lake Louise	10.6	3.3	44.4	2.0	11.8	55.3	4.6	33.3	22	204
#13 Little Oshetna-Little Nelchina	12.4	2.7	28.6	1.7	12.0	45.7	7.3	28.9	73	460
#14 Oshetna River only	9.5	4.1	75.0	2.8	22.2	36.5	3.8	25.0	154	108
#16 Chistochina River	66.7	13.8	26.1	7.1	96.0	28.7	0	14.7	100	170
Total Unit 13	29.9	4.8	18.9	2.9	29.0	32.8	4.1	20.2	63	3,042

Table 13. Summary of Moose Population Composition Counts. Nelchina Basin, Unit 13 - 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hrs.)	Moose per Hour
#2 East side of Maclaren River	11/24-25	36	7	43	78	48	0	126	169	0	48	0	217	4.0	54
#5 Alphabet Hills	11/23-25	200	20	220	441	111	9	561	781	0	129	2	912	11.1	82
#6 Denali-Clearwater	11/25 12/5-6	80	16	96	240	81	2	323	419	0	85	0	504	8.5	59
#8 West of Richardson Highway	11/24	10	3	13	43	21	0	64	77	2	23	0	100	2.1	48
#9 East of Richardson Highway	11/24	4	5	9	26	11	0	37	46	1	12	0	58	1.1	53
#10 Gakona River	11/23-24 12/6	53	11	64	119	63	0	182	246	0	63	0	309	3.4	91
#12 Lake Louise	11/25-26 12/6	9	4	13	58	62	3	123	136	0	68	0	204	9.3	22
#13 Little Oshetna-Little Nelchina	11/23 12/5	28	8	36	167	115	9	291	327	0	133	0	460	6.3	73
#14 Oshetna River only	11/23	4	3	7	48	25	1	74	81	0	27	0	108	0.7	154
#16 Chistochina River	12/6	46	12	58	62	25	0	87	145	0	25	0	170	1.7	100
Total Unit 13	11/23 thru 12/6	470	89	559	1282	562	24	1868	2427	3	613	2	3042	48.2	63

Table 15. Summary of Moose Population Composition Counts. Unit 13, Area 13 and 14 by Drainage.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hrs.)	Moose per Hour
Oshetna River	11/23	7	4	11	72	37	1	110	121	0	39	0	160	1.6	100
Little Oshetna River	11/23	5	1	6	43	14	0	57	63	0	14	0	77	1.1	70
Sanona Creek	11/23	4	2	6	39	16	0	55	61	0	16	0	77	0.6	128
Little Nelchina-Tyone Creek	12/5	16	4	20	61	73	9	143	163	0	91	0	254	3.6	71
Total		32	11	43	215	140	10	365	408	0	160	0	568	6.9	82

Table 16. Moose Sex and Age Ratios. Unit 13, Areas 13 and 14 by Drainage.

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	Incidence of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
Oshetna River	10.0	3.6	57.1	2.5	20.5	32.2	2.6	24.4	100	160
Little Oshetna River	10.1	1.8	20.0	1.3	14.3	24.6	0.0	18.2	70	77
Sanona Creek	10.9	3.6	50.0	2.6	25.0	29.1	0.0	20.8	128	77
Little Nelchina-Tyone Creek	14.0	2.8	25.0	1.6	8.8	63.6	11.0	35.8	71	254
Total	11.8	3.0	34.4	1.9	13.7	43.8	6.7	28.2	82	568

Table 17. Moose Sex and Age Ratios, Total Nelchina Basin. Units 13 and 11, 1955 - 1968.

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 FF Calves	Calves per 100 FF	Incidence of Twins per 100 cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
1955	99.7	28.8	41.8	11.5	110.0	52.4	10.1	21.0	--	2,491
1956	66.3	12.5	23.3	6.5	94.9	26.4	1.9	13.7	38	1,154
1957	69.3	15.9	29.8	7.5	76.6	41.5	6.0	19.7	--	2,387
1958	70.6	11.3	19.1	5.4	60.6	37.4	8.5	18.0	--	3,781
1959	58.1	10.3	19.4	4.9	40.0	51.3	1.7	24.5	--	245
1960	85.2	20.4	31.5	8.2	73.8	55.3	11.6	22.4	55	1,467
1961	63.5	20.3	47.1	9.7	88.7	45.9	10.1	21.9	70	2,977
1962	64.0	17.7	45.0	9.2	125.8	28.1	5.5	14.6	87	2,357
1963	49.1	11.6	30.8	6.1	55.9	41.4	6.3	21.7	119	1,796
1964	--	--	--	--	--	--	4.5	17.0	73	1,514
1965	34.7	12.9	37.2	6.9	98.5	26.2	2.2	13.9	70	6,700
1966	34.1	6.4	18.8	3.8	48.3	26.6	2.2	15.9	63	4,534
1967	39.9	8.6	27.5	5.1	62.1	27.8	3.0	16.6	71	5,794
1968	29.9	4.8	18.9	2.9	29.0	32.8	4.1	20.2	63	3,042

Table 18. Game Management Unit 14, Matanuska Valley, 1968. Summary of Moose Population Composition Counts.

Count Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
#1	12/6/68	10	19	29	121	79	3+6	203	232	1	86	2	320	7:29	42.7
#2	12/4/68 12/5/68	27	14	41	60	60	3+6	123	164	1	67	1	232	6:35	35.2
#3	12/4/68 12/5/68	5	8	13	56	55	4+8	115	128	1	64	1	193	5:24	35.7
#4	12/4/68	8	5	13	38	39	3+6	80	93	0	45	1	139	2:50	49.0
#5	12/5/68 12/6/68	4	6	10	46	44	4+9*	94	104	2	55	3	162	4:12	38.5
#6	12/3/68	9	2	11	32	35	7+14	74	85	0	49	0	134	2:17	58.6
#7	12/4/68 12/5/68 12/6/68	39	27	66	183	120	6+12	309	375	2	134	0	509	6:59	72.8
#8	12/2/68 12/3/68 12/14/68	36	17	53	257	171	12+24	440	493	2	197	0	690	7:52	87.7
#9	12/14/68	4	8	12	103	32	1+2	136	148	0	34	0	182	3:55	46.4

* Female with triplets seen on 12/5/68.

Table 19. Moose Sex and Age Ratios, Matanuska Valley, 1968. Game Management Unit 14.

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	of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
#1	14.3	9.4	190.0	5.9	44.20	42.4	3.7	26.9	42.7	320
#2	33.3	11.4	51.9	6.0	41.20	54.5	4.8	28.9	35.2	232
#3	11.3	6.9	160.0	4.1	25.00	55.7	6.8	33.2	35.7	193
#4	16.3	6.3	62.5	3.6	22.70	56.3	7.1	32.4	49.0	139
#5	10.6	6.4	150.0	3.7	21.40	58.5	8.3	33.9	38.5	162
#6	14.9	2.7	22.2	1.5	8.33	66.2	16.6	36.6	58.6	134
#7	21.4	8.7	69.2	5.3	40.30	43.4	4.8	26.3	72.8	509
#8	12.0	3.9	47.2	2.5	17.30	44.8	6.6	28.6	87.7	690
#9	8.8	5.9	200.0	4.4	47.00	25.0	3.0	18.7	46.4	182
Total Moose Matanuska Valley										2,561

Table 20. Game Management Unit 14, Willow to Talkeetna, 1968. Summary of Moose Population Composition Counts.

Count Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Willow to L. Willow	11/26/68	4	9	13	80	22	4+8	106	119	0	30	0	149	2:32	58.8
L. Willow Kashwitna	11/26/68	20	4	24	51	55	10+20	116	140	1	76	0	216	3:18	65.4
Kashwitna Montana	11/26/68 11/27/68	119	58	117	269	149	11+22	429	608	3	174	0	780	11:31	67.7
Montana Talkeetna	11/27/68	47	14	61	98	36	6+12	140	201	0	48	0	249	7:34	32.9

Table 21. Game Management Unit 14, Willow to Talkeetna, 1968. Moose Sex and Age Ratios.

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	of Twins per 100 Cows w/calf	Calf % in Herd	Moose per Hour	Total Moose
Willow to L. Willow	12.3	8.5	225.0	6.0	60.0	28.3	15.4	20.1	58.8	149
L. Willow Kashwitna	20.7	3.4	20.0	1.9	10.5	65.5	15.4	35.2	65.4	216
Kashwitna Montana	41.3	13.1	48.7	7.4	66.6	40.5	6.9	22.3	67.7	780
Montana Talkeetna	43.6	10.0	29.8	5.6	58.3	34.3	14.3	19.3	32.9	249
Total Moose Willow - Talkeetna										1,394

Table 22. Summary of Moose Population Composition Counts. Unit 16 - 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hrs.)	Moose per Hour
Mt. Susitna-Mt. Beluga	12/12, 14, 17	105	19	124	191	64	3	258	382	0	70	5	457	8.5	60
Peters Hills	12/11&17	55	27	82	198	94	7	299	381	5	113	2	496	6.4	77
Petersville Road	12/9 & 20	5	5	10	27	21	3	51	61	0	27	3	91	3.7	25
Total	12/9-20	165	51	216	416	179	13	608	824	5	210	10	1044	18.6	56

Table 23. Moose Sex and Age Ratios. Unit 16 - 1968.

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	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Mt. Susitna - Mt. Beluga	48.1	7.4	18.1	4.2	54.3	18.3	4.5	15.3	60	457
Peters Hills	27.4	9.0	49.1	5.4	47.8	37.8	6.9	22.8	77	496
Petersville Road	19.6	9.8	100.0	5.5	37.0	52.9	12.5	29.7	25	91
Total Unit 16	35.5	8.4	30.9	4.9	48.6	34.5	6.8	20.1	56	1044

Table 24. Summary of Moose Population Composition Counts. Tok Area, Unit 20C & 12, 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Unit 20C - Taylor Highway															
Mosquito Fk (Chicken to Ketchumstuk Crk.)	10/24/68	43	4	47	78	10	0	88	135	0	10	0	145	2.55	57
Dennison Fk	10/27/68	14	0	14	16	1	0	17	31	0	1	0	32	2.00	16
W. Fork Dennison	10/27/68	17	0	17	34	4	0	38	55	0	4	0	59	1.20	49
Upper West Fk. Dennison	10/29/68	40	4	44	19	6	0	25	69	0	6	2	77	2.45	31
Mt. Fairplay	10/30/68	17	1	18	43	7	0	50	68	0	7	1	76	2.00	38
Tot. Unit 20C, Taylor Hwy.		131	9	140	190	28	0	218	358	0	28	3	389	10.10	38
Unit 12															
Tanana Flats*	10/30/68	11	3	14	33	3	0	36	50	2	5	0	57	1.45	39
Tok River	10/20/68	17	2	19	48	17	1	66	85	0	19	6	110	2.05	54
Dry Tok River	10/30/68	4	1	5	14	12	0	26	31	0	12	1	44	0.50	88
Little Tok River	10/31/68	32	1	33	86	12	0	98	131	0	12	8	151	1.33	113
Tot. Tok-Dry Tok-L. Tok		53	4	57	148	41	1	190	247	0	43	15	305	3.90	78
Upper Slana River	10/31/68	1	0	1	17	1	0	18	19	0	1	0	20	.45	44

* Included some of Alaska Range--see map.

Table 25. Moose Sex and Age Ratios. Tok Area, Units 20C and 12, 1968.

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	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Unit 20C - Taylor Highway										
Mosquito Fk.	53.0	4.5	9.3	2.8	80.0	11.3	0	7.3	57	145
Dennison Fk.	83.0	0	0	0	0	5.8	0	3.1	16	32
West Fork Dennison	45.0	0	0	0	0	10.5	0	6.7	49	59
Upper West Fk. Dennison	186.0	16.0	10.0	5.2	133	24.0	0	7.8	31	77
Mt. Fairplay	36.0	2.0	5.8	1.3	28.6	14.0	0	9.2	38	76
Tot. Taylor Hwy.	60.0	4.1	6.9	2.3	64.2	12.8	0	7.1	38	389
Unit 12										
Tanana Flats*	38.9	8.4	27.2	5.2	120	13.9	0	8.8	39	57
Tok River	28.7	3.0	11.7	1.8	22.2	28.8	5.5	17.0	54	110
Dry Tok River	15.3	19.2	20.0	2.5	16.7	46.1	0	27.3	88	44
Little Tok R.	33.6	1.0	3.1	0.6	16.6	12.2	0	7.9	113	151
Tot. Tok-Dry Tok-L. Tok	30.0	2.1	7.5	1.3	18.2	22.3	2.4	14.1	78	305
Upper Slana River	5.5	0	0	0	0	5.5	0	5.5	44	20

* Included some of Alaska Range--see map.

Table 26. Moose Sex and Age Ratios. Kuskokwim River, Unit 19, 1968-69.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Sterling Landing to Deacon's Landing	18 Feb.	-	-	-	-	-	-	9.1	25.9	45	54
Deacon's Island to Tatwawitsuk R.	2/18/69	-	-	-	-	-	-	0.0	20.0	25	15
Total		-	-	-	-	-	-	7.7	24.6	38	69

Table 27. Summary of Moose Population Composition Counts. Kuskokwim River, Unit 19, 1968-69.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Total Moose	Count Time (hr.)	Moose per Hour
Sterling Landing to Deacon's Landing	2/18/69	-	-	-	-	10	1	-	40	2	14	54	1.2	45
Deacon's Landing to Tatlawitsuk R.	2/18/69	-	-	-	-	3	0	-	12	0	3	15	0.6	25
Total		-	-	-	-	13	1	-	52	2	17	69	1.8	38

Table 28. Summary of Moose Population Composition Counts. Upper Innoko-Iditarod, 1968-69.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Total Moose	Count Time (hr.)	Moose per Hour
Tolstoi Cr.	4/10/69	-	-	-	-	0	0	-	6	0	0	6	0.9	7
Dishna R. from Tolstoi Cr. upstream to Porcupine Cr.	4/10/69	-	-	-	-	3	0	-	40	0	3	43	1.5	29
Iditarod R. Iditarod to 10 m. upstream from Pedro Cr.	4/10/69	-	-	-	-	1	0	-	39	0	1	40	1.0	40
Innoko R. Canadian Cr. to Rennie's Landing	4/8/69	-	-	-	-	15	0	-	115	1	16	131	2.9	45
Total		-	-	-	-	19	0	-	200	1	20	220	6.3	35

Table 29. Moose Sex and Age Ratios. Upper Innoko-Iditarod, 1968-69.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Tolstoi Cr.	4/10/69	-	-	-	-	-	-	0.0	0.0	7	6
Dishna R. from Tolstoi Cr. upstream to Porcupine Cr.	4/10/69	-	-	-	-	-	-	0.0	6.9	29	43
Iditarod R. Iditarod to 10 mi. upstream from Pedro Cr.	4/10/69	-	-	-	-	-	-	0.0	2.5	40	40
Innoko R. Canadian Cr. to Rennie's Landing	4/8/69	-	-	-	-	-	-	0.0	12.2	45	131
Total		-	-	-	-	-	-	0.0	10.0	35	220

Table 30. Summary of Moose Population Composition Counts. Yukon River, Holy Cross to Koyukuk, 1968-69.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Holy Cross to Kaltag	3/23/69	--	--	--	702	125	14	--	841	2	155	--	996	3.5	285
Kaltag to Koyukuk	3/23/69	--	--	--	3	2	0	--	5	1	3	--	8	0.8	10
Total, Holy Cross to Koyukuk		--	--	--	705	127	14	--	846	3	158	--	1004	4.3	258

Table 31. Moose Sex and Age Ratios. Yukon River, Holy Cross to Koyukuk, 1968-69.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Holy Cross - Kaltag	3/23/69	--	--	--	--	--	--	10.1	15.5	285	996
Kaltag - Koyukuk	3/23/69	--	--	--	--	--	--	0.0	37.5	10	8
Total, Holy Cross - Koyukuk		--	--	--	--	--	--	9.9	15.7	258	1004

Table 32. Summary of Moose Population Composition Counts. Yukon River Drainage, Tanana-Koyukuk, 1968-69.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Tozitna R., mouth to Tozimoron Cr.	3/3/69 -	--	--	--	--	3	1	--	16	0	5	--	21	0.5	42
Yukon R., Tozitna R. to 9 Mile Is.	3/3/69	--	4	--	--	20	0	--	99	0	20	--	119	2.1	57
Yukon R., Ruby to Koyukuk R.	3/5/69	--	3	--	--	32	2	--	171	0	36	--	207	2.5	83
Total, Tanana - Koyukuk R.		--	7	--	--	55	3	--	286	0	61	--	347	5.1	68

Table 33. Moose Sex and Age Ratios. Yukon River Drainage, Tanana-Koyukuk, 1968-69.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Tozitna R., mouth to Tozimoron Cr.	3/3/69	--	--	--	--	--	--	25.0	23.8	42	21
Yukon R., Tozitna R. to 9 Mile Is.	3/3/69	--	--	--	--	--	--	0.0	16.9	57	119
Yukon R., Ruby to Koyykuk R.	3/5/69	--	--	--	--	--	--	5.9	17.4	83	207
Total, Tanana to Koyukuk R.		--	--	--	--	--	--	5.2	17.6	68	347

Table 34. Summary of Moose Population Composition Counts. Koyukuk River, 1968-69.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Mouth to Roundabout Mt.	3/4/69	--	--	--	--	48	1	--	424	1	51	--	475	2.8	170

Table 35. Moose Sex and Age Ratios. Koyukuk River, 1968-69.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Mouth to Roundabout Mt.	3/4/69	--	--	--	--	--	--	2.2	10.7	170	475

Table 36. Summary of Moose Population Composition Counts. Tanana Flats, Unit 20A, 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
2	11/13	48	9	57	62	29	1	92	149	2	33	0	184	1.7	108
		Tagged calves: 1 male, 1 female													
3	11/12-12	2	7	9	25	25	0	50	59	1	25	0	84	2.1	40
		Tagged calves: 2 females													
4	11/14	51	8	59	71	32	3	106	165	2	40	0	205	3.0	68
		Tagged calves: 7 males, 5 females, 1 unknown sex													
5	11/12	23	13	36	69	23	1	93	129	0	25	0	154	3.3	47
		Tagged calves: 5 females													
6	11/13	20	7	27	18	7	0	25	52	0	7	0	59	1.4	42
		Tagged calves: 1 female													
7	11/15	10	2	12	19	2	0	21	34	0	2	1	36	2.2	16
		Tagged calves: None													
8	11/17	7	0	7	4	14	0	18	27	0	14	2	41	2.4	17
		Tagged calves: 1 male													
9	11/14	15	4	19	39	32	4	75	94	0	40	0	134	2.3	58
		Tagged calves: 2 males													
Total		176	50	226	307	164	9	480	709	5	186	3	897	18.4	49
		Tagged calves: 11 males, 14 females, 1 unknown sex; Total = 26													

Table 37. Moose Sex and Age Ratios. Tanana Flats, Unit 20A, 1968.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
2	11/13	62.0	9.8	18.8	4.9	54.5	35.9	3.3	17.9	108	184
3	11/12-13	8.0	14.0	350.0	8.3	56.0	50.0	0.0	29.8	40	84
4	11/14	55.7	7.5	15.7	3.9	40.0	37.7	8.6	19.5	68	205
5	11/12	38.7	14.0	56.5	8.4	104.0	26.9	4.2	16.2	47	154
6	11/13	108.0	28.0	35.0	11.9	200.0	28.0	0.0	11.9	42	59
7	11/15	57.1	9.5	20.0	4.9	28.6	9.5	0.0	5.6	16	36
8	11/17	38.9	0	0	0	0	77.8	0.0	34.1	17	41
9	11/14	25.3	5.3	26.7	3.0	20.0	53.3	11.1	29.9	58	134
Total		47.1	10.4	28.4	5.6	53.8	38.8	5.2	20.1	49	897

Table 38. Summary of Moose Population Composition Counts. Tanana Valley, Unit 20, 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Fairbanks Wildlife Center	11/18	0	0	0	4	6	0	10	10	1	7	0	17	0.5	34
Goldstream (Martin Siding to Steese Hwy)	11/17	0	0	0	1	4	0	5	5	0	4	0	9	1.7	5

Table 39. Moose Sex and Age Ratios. Yukon River, 1969.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Yukon R. 20 mi. downriver from Circle City to Canadian Border	3/25/69							33.3	17.4	13.8	46

Table 40. Summary of Moose Population Composition Counts. Yukon River, 1969.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Adult Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Yukon R. 20 mi. downriver from Circle City to Canadian Border	3/25/69					4	2		38	0	8	32	46	3.33	13.8

Table 41. Summary of Moose Population Composition Counts.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Adult Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
Goodpaster	3/18/69					12	6		35	1	11	27	46	4	11.5
													6 hr. 45 min. Total Time		
Nome Creek drainage headwaters to confluence w/Beaver Creek	11/15/68	2	2	4	7	6	0	13	17	0	6	0	23	1.25	184

Table 42. Moose Sex and Age Ratios.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
Goodpaster	3/19/69							33	24	11.5	46
Nome Cr. Drainage	11/25/68	31	15	100	8.7		46	0	26	18.4	23

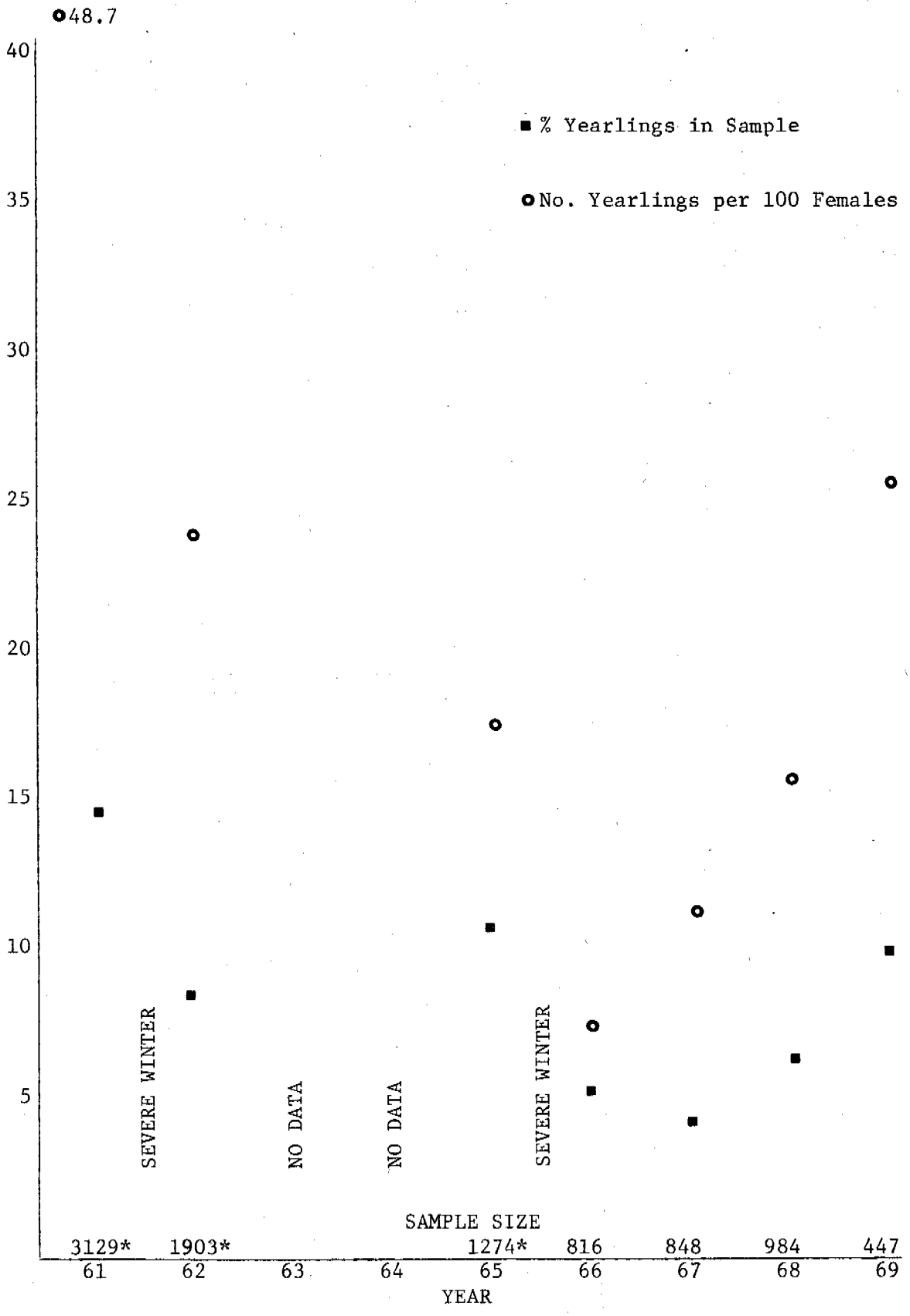
Table 43. Summary of Moose Population Composition Counts. Kobuk and Noatak Draingaes, Unit 23, 1968.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour
W. Fork Buckland R.	12/8	13	3	16	7	6	0	13	29	0	6	0	35	0.9	39
Upper Kiwalik R.	12/7	13	2	15	6	1	0	7	22	0	1	0	23	0.4	58
Squirrel R. & Lower Kobuk R.	12/6	12	3	15	8	2	3	13	28	0	8	0	36	0.7	51
Total, Lower Kobuk Drainages		38	8	46	21	9	3	33	79	0	15	0	94	2.0	47
Pick R.	12/5	6	8	14	32	2	0	34	48	0	2	0	50	0.8	63
Pah R.	12/5	5	1	6	5	1	0	6	12	0	1	0	13	0.5	26
Upper Kobuk R.	12/5	0	1	1	8	3	0	11	12	0	3	0	15	1.3	12
Total, Upper Kobuk R. Drainages	12/5	11	10	21	45	6	0	51	72	0	6	0	78	2.6	30
Lower Noatak R.	12/6	2	8	10	5	7	6	18	28	0	19	0	47	1.4	34
Eli R.	12/6	19	2	21	3	1	3	7	28	0	7	0	29	0.7	41
Total, Lower Noatak area	12/6	21	10	31	8	8	9	25	56	0	26	0	76	2.1	36

Moose Sex and Age Ratios. Kobuk and Noatak Drainages, Unit 23, 1968.

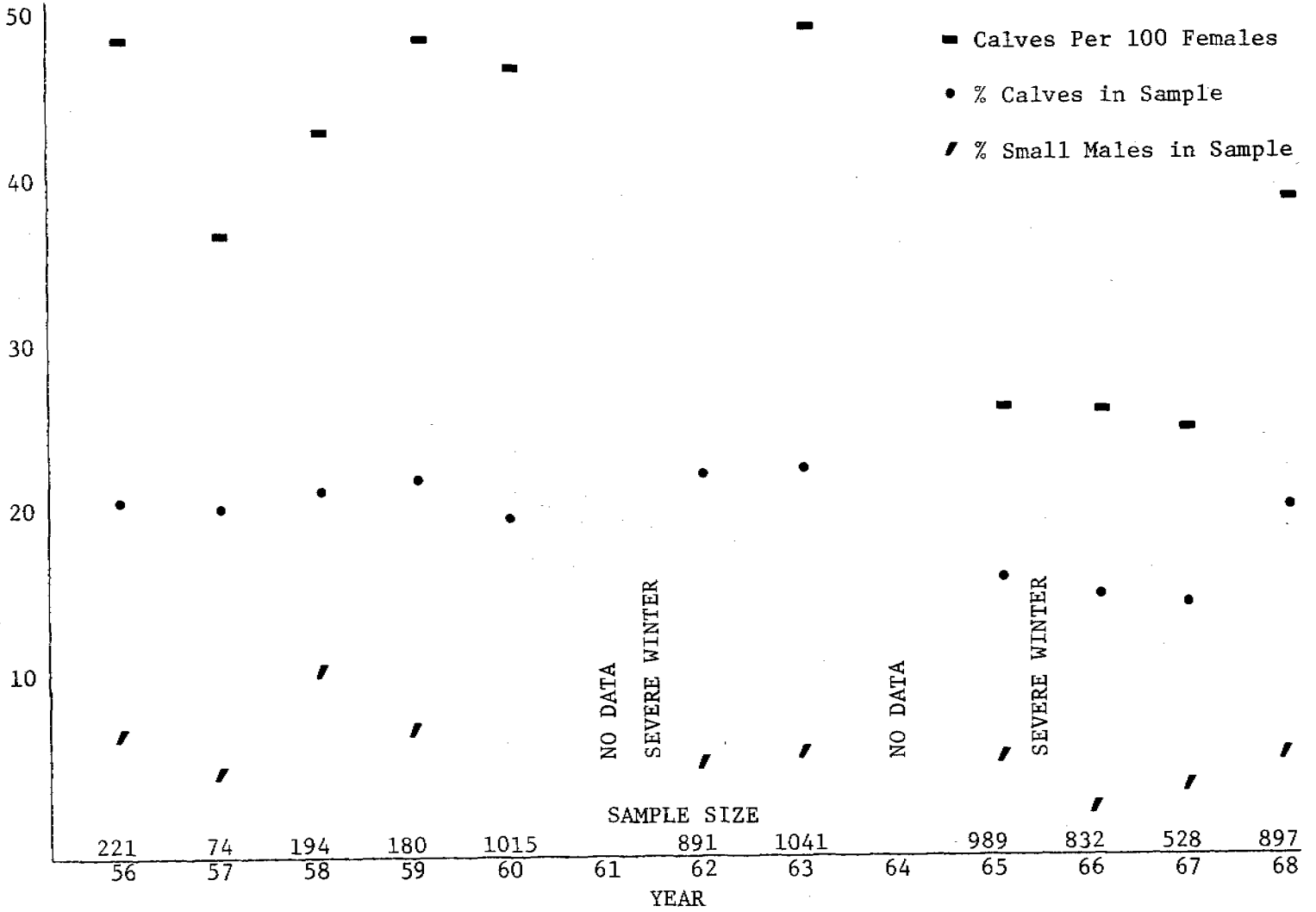
Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM % in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose
W. Fork Buckland R.	12/8	123.1	23.1	23.1	8.6	100.0	46.2	0.0	17.1	39	35
Upper Kiwalik River	12/7	214.3	28.6	15.4	8.7	400.0	14.3	0.0	4.3	58	23
Squirrel R. & Lower Kobuk	12/6	115.4	23.1	25.0	8.3	75.0	61.5	60.0	22.2	51	36
Total, Lower Kobuk Drainages		139.3	24.3	21.1	8.5	106.7	45.4	25.0	15.9	47	94
Pick R.	12/5	41.1	23.5	133.3	16.0	800.0	5.9	0.0	4.0	63	50
Pah R.	12/5	100.0	16.7	20.0	7.7	200.0	16.7	0.0	7.7	26	13
Upper Kobuk R.	12/5	9.1	9.1	-	6.7	66.7	27.3	0.0	20.0	12	15
Total, Upper Kobuk R. Drainages	12/5	41.2	19.8	90.9	12.8	333.3	11.8	0.0	7.7	30	78
Total, Lower Noatak R. Area	12/6	124.0	40.0	47.6	13.2	76.9	104.0	52.9	34.2	36	76

Fig. 1. Indices of Survival of Moose to 1 Year of Age, Tanana Flats. Based on May-June Aerial Composition Counts, 1961-1969.



*Ratios derived from cumulative total of moose obtained on repetitive counts.

Fig. 2. Moose Production and Survival, Tanana Flats, 1956-1968. Based on Aerial Composition Counts Made in October-December. Techniques and Areas Standardized From 1960-1968.



Unit 26: Surveys on the Anaktuvuk and Colville Rivers by Mel Buchholtz indicate very good survival of moose to one year of age, where they comprised 38 and 19 to 33 percent, respectively, of the moose observed. Considering the good sighting conditions reported, it does not appear that the population is large. Apparently antler development and calving are about three weeks later on the Colville than in interior Alaska; no calves were observed on May 23 but they were becoming apparent on June 10 and 11. The proportion of bulls suggests that hunting is a more important factor in their survival than harvest tickets reveal, or many bulls were not in the area counted. The former seems most likely.

The information presented was prepared by Alaska Department of Fish and Game staff biologists including the following:

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WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job No.: 5 Title: Moose Productivity

Period Covered: July 1, 1968 through June 30, 1969

ABSTRACT

Reorganization of the Division of Game precluded completion of the objectives of this study. Information on age distribution of various moose populations is presented. Pregnancy rates and survival of calves through their first year of life are presented for Game Management Unit 5 (Yakutat). Survival estimates are presented for the Tanana Valley.

WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

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Job No.: 5 Title: Moose Productivity

Period Covered: July 1, 1968 through June 30, 1969

OBJECTIVES

To obtain information on fertility, natality, age of sexual maturity, and survival of calves in selected moose populations.

PROCEDURES

Ovaries, uteri and mandibles were collected from moose killed by hunters and from those killed in accidents. Fertility was determined from analyses of uterine contents. Age determinations were made from examinations of cementum layers on incisiform teeth. Natality and survival of calves were measured in conjunction with Jobs 2, 4 and 7.

FINDINGS

The information gathered during this reporting period was affected by a major reorganization of the Division of Game. Some activities were terminated, others were de-emphasized and a few were discontinued due to public and political pressures. Of the latter the loss of the antlerless seasons in portions of southcentral Alaska are notable.

Most of the information collected is of a statistical nature and is not meaningful for management purposes when analyzed annually. Accordingly only a few narrative comments are included.

In Utero Analysis

Scavenging birds and mammals and decomposition have always made it difficult to collect a meaningful sample of moose reproductive tracts from the Yakutat District. This year a rather large sample was collected but about one third was from animals taken prior to the rut or from calf age class. Several tracts taken after October 1 were either damaged or incomplete. Nonetheless, each of 29 tracts collected after October 1,

showed the animal to be pregnant. The animal was considered pregnant if it contained either active corpra lutea or if embryos were found. There were not enough specimens to make a meaningful estimate of incidence of twinning. Pregnancy rate data are given in Table 1.

Age Analysis

Age analyses of the 1968 hunter-killed moose from Yakutat show that, with one or two notable exceptions, the age structure of the herd does not appear to have changed significantly since at least 1964, when analysis began. Age class 2 for 1968 represented only 6.5 percent of the total kill as compared to the previous four year average of 17 percent. Also in 1968, age class 10+ represented 19.6 percent of the total kill compared to the prior four year average of 6.2 percent. It should be noted that the 10+ segment has shown a steady increase and that the C and 1 age classes have shown a steady decrease, except for 1968 where there was an increase in the representation of 1 age class animals. With only five years' data it is difficult to make many valid calculations on trend comparisons. Age analysis of hunter-killed moose from 1964 through 1968 is attached as Table 2.

Age composition data for the entire state for the years 1967-68 and 1968-69 are presented in Tables 3 through 23.

Productivity

The survival of calves through the first year of life is obviously one key element in the welfare of an animal population. Efforts to measure this variable have, over the years, met with only moderate success. During this report period few attempts were made to obtain data and no comments on the data presented in Tables 24 through 28 are warranted.

Table 1. Moose Pregnancy Rates, Yakutat, Unit 5, 1968.

Cementum Age Class	Not Pregnant But Killed Prior to October 1.	Pregnant 1/	1. Fetus or C.L. 2/	2. Fetuses or C.L. 2/	3. Fetuses or C.L. 2/	At Least 1 Fetus or C.L.	% Pregnant After October 1.	Twins/100 Pregnancies	Mean No. C.A.'s
1	1	1	1			1	100	0	0
2	3 3/	3 3/	1	1		3	100		0.6
3	2								
4	2	1	1			1	100	0	1.0
5		1		1		1	100	100	5.0
6	1	3		3 4/		3	100		7.3
7		1			1	1	100		11.0
8									
9		2		2		2	100	100	9.5
10		4	1	3 5/		4	100		16.3
11		5	2	3 5/			100		16.0
12		2		2		2	100	100	18.5
13		1		1		1	100	100	20.0
14		1 6/				1	100		
15	1	4	2	2		4	100	50	14.3

1/ Considered pregnant if fetal structures or C. L. present, calves not included.
2/ Assume C. L. and/or fetal structure numbers to be same, i.e., 2 C. L. = 2 fetuses, except as noted.
3/ One incomplete specimen in sample.
4/ Two specimens had 2 C. L.'s but only 1 fetus.
5/ One specimen incomplete in sample.
6/ Incomplete specimen.

Table 2. Age Analysis in Percentages, of Hunter Killed Moose from GMU-5. Yakutat.

Cementum Age Class	YEAR 1968	1967	1966	1965	1964
C	7.1	7.4	8.0	4.0	5.0
1	16.3	10.1	16.0	21.0	30.0
2	6.5	15.5	12.0	21.0	19.0
3	7.6 1/	13.5 2/	18.0 3/	15.0 4/	10.0 5/
4	8.2 1/	12.2 2/	9.0 3/	6.0 4/	9.0 5/
5	7.6 1/	14.2 2/	7.0 3/	12.0 4/	7.0 5/
6	8.2 1/	6.8 2/	8.0 3/	5.0 4/	7.0 5/
7	9.8 1/	3.4 2/	3.0 3/	4.0 4/	2.0 5/
8	4.9 1/	5.4 2/	5.4 3/	6.0 4/	2.0 5/
9	4.4 1/	3.4 2/	2.0 3/	1.0 4/	2.0 5/
10	19.6	8.1	7.0	6.0	4.0
Sample Size	186	148	113	185	95

1/ Age class 3 thru 9 combined 50.7%
2/ Age class 3 thru 9 combined 58.9%
3/ Age class 3 thru 9 combined 54.0%
4/ Age class 3 thru 9 combined 49.0%
5/ Age class 3 thru 9 combined 42.0%

Percentages for 1964 - 1965 were taken from bar graphs in Moose Segment Reports so are not exact.

Table 3. Age Distribution of Moose Harvested in Unit 5 - Yakutat, 1967-1968.

Age	MALE No.	MALE %	FEMALE No.	FEMALE %	UNKNOWN No.	UNKNOWN %	TOTAL No.	TOTAL %
C	4	5.4	6	8.7	1	5.5	11	6.8
1	11	14.8	3	4.3	1	5.5	15	9.3
2	14	18.9	6	8.7	3	16.6	23	14.2
3	12	16.2	7	10.1	1	5.5	20	12.4
4	10	13.6	4	5.8	3	16.6	17	10.5
5	12	16.2	11	15.9	3	16.6	26	16.1
6	6	8.1	3	4.3			9	5.5
7	2	2.7	2	2.9	1	5.5	5	3.1
8	0		5	7.2	3	16.6	8	4.9
9	2	2.7	2	2.9			4	2.4
10+	1	1.3	20	29.0	2	11.0	23	14.2
Totals	74	100.0	69	100.0	18	100.0	161	100.0

Table 4. Age Distribution of Moose Harvested in Denali Highway - Unit 13. 1967-1968.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL No.	TOTAL %
C	5	3.2	4	8.8	9	4.5
1	41	26.7	8	17.7	49	24.7
2	10	6.5	4	8.8	14	7.0
3	26	16.9	5	11.1	31	15.6
4	21	13.7	4	8.8	25	12.6
5	24	15.6	9	20.0	33	16.6
6	6	3.9	3	6.7	9	4.5
7	5	3.3	2	4.4	7	3.5
8	5	3.3	3	6.7	8	4.0
9	4	2.6			4	2.0
10	6	3.9	3	6.7	9	4.5
Totals	153	100.0	45	100.0	198	100.0

Table 5. Age Distribution of Moose Harvested in 1967-1968. Unit 13 Other Than Denali and Total.

AGE	Unit 13 Other Than Denali No.	%	Unit 13 Total No.	%
C	5	12.1	14	5.8
1	2	4.8	51	21.3
2	4	9.7	18	7.5
3	8	19.5	39	16.3
4	6	14.6	31	12.9
5	1	2.4	34	14.2
6	3	7.3	12	5.0
7	2	4.8	9	3.7
8	2	4.8	10	4.1
9	1	2.4	5	2.0
10+	7	17.0	16	6.6
Totals	41	100.0	239	100.0

Table 6. Age Distribution of Moose Harvested in Matanuska Valley, Unit 14, 1967-1968.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL No.	TOTAL %
C	5	17.9	12	27.9	17	23.9
1	13	46.4	6	13.9	19	26.8
2	2	7.1	3	7.0	5	7.0
3	3	10.7	3	7.0	6	8.5
4	3	10.7	2	4.7	5	7.0
5	2	7.1	3	7.0	5	7.0
6						
7			2	4.7	2	2.8
8			3	7.0	3	4.2
9						
10+			9	20.9	9	12.7
Totals	28	100.0	43	100.0	71	100.0

Table 7. Age Distribution of Moose Harvested in Unit 14 Other Than Matanuska Valley, 1967-1968.

AGE	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
C	9	34.6	6	18.2	15	25.4
1	7	26.9	1	3.0	8	13.6
2	2	7.7	1	3.0	3	5.1
3	2	7.7	2	6.1	4	6.8
4	1	3.8	2	6.1	3	5.1
5	1	3.8	2	6.1	3	5.1
6						
7	3	11.5	5	15.2	8	13.6
8	1	3.8	1	3.0	2	3.4
9			2	6.1	2	3.4
10+			11	33.3	11	18.6
Totals	26	100.0	33	100.0	59	100.0

Table 8. Age Distribution of Moose Harvested in Unit 14, Total, 1967-1968.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL No.	TOTAL %
C	14	25.9	18	23.7	32	24.6
1	20	37.0	7	9.2	27	20.8
2	4	7.4	4	5.3	8	6.2
3	5	9.3	5	6.6	10	7.7
4	4	7.4	4	5.3	8	6.2
5	3	5.6	5	6.6	8	6.2
6						
7	3	5.6	7	9.2	10	7.7
8	1	1.9	4	5.3	5	3.8
9			2	2.6	2	1.5
10+			20	26.3	20	15.3
Totals	54	100.0	76	100.0	130	100.0

Table 9. Age Distribution of Moose Harvested in Unit 14, Total. 1968-1969.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL No.	TOTAL %
C	8	7.4	9	21.4	17	11.3
1	29	26.8	7	16.6	36	24.0
2	15	13.8	3	7.1	18	12.0
3	25	23.1	3	7.1	28	18.7
4	13	12.0	5	11.9	18	12.0
5	12	11.1	2	4.7	14	9.3
6	1	.9	1	2.3	2	1.3
7	1	.9	1	2.3	2	1.3
8	2	1.9	2	4.7	4	2.7
9	2	1.9	4	9.5	6	4.0
10+	0	0.0	5	11.9	5	3.3
Totals	108	100.0	42	100.0	150	100.0

Table 10. Age Distribution of Moose Harvested in Unit 14 Other Than Matanuska Valley, 1968 - 1969.

AGE	MALES No.	%	FEMALES No.	%	TOTAL No.	%
C	6	14.2	6	30.0	12	19.3
1	8	19.0	3	15.0	11	17.7
2	7	16.6	2	10.0	9	14.5
3	8	19.0	1	5.0	9	14.5
4	5	11.0	3	15.0	8	12.9
5	5	11.9	1	5.0	6	9.6
6						
7	1	2.3			1	1.6
8	1	2.3	2	10.0	3	4.8
9	1	2.3	1	5.0	2	3.2
10+			1	5.0	1	1.6
Totals	42	100.0	20	100.0	62	100.0

Table 11. Age Distribution of Moose Harvested in Unit 20 Other Than Taylor Highway, Both Sexes. 1967-1968.

AGE	20A No.	20A %	20B No.	20B %	20C No.	20C %
C	1	6.2	3	11.0	2	3.0
1			3	11.0	7	10.6
2					1	1.5
3					7	10.6
4	1	6.2	2	7.4	6	9.0
5	2	12.5	1	3.7	9	13.6
6			3	11.0	13	19.6
7	3	18.7	1	3.7	9	13.6
8	2	12.5	3	11.0	6	9.0
9			2	7.4	0	0
10+	7	44.0	9	33.3	6	9.0
Totals	16	100.0	27	100.0	66	100.0

Table 12. Age Distribution of Moose Harvested in Unit 20, Both Sexes. 1967-1968.

AGE	Total U. 20 Less Taylor		Taylor Highway		Total U. 20	
	No.	%	No.	%	No.	%
C	6	5.5			6	3.9
1	10	9.2	4	9.3	14	9.2
2	1	.9	1	2.3	2	1.3
3	7	6.4	4	9.3	11	7.2
4	9	8.3	4	9.3	13	8.5
5	11	10.1	5	11.6	17	11.1
6	16	14.7	10	23.2	26	17.1
7	13	11.9	6	12.3	19	12.5
8	11	10.1	5	11.6	16	10.5
9	2	1.8			2	1.3
10+	22	20.2	4	9.3	26	17.0
Totals	109	100.0	43	100.0	152	100.0

Table 13. Age Distribution of Moose Harvested in Unit 13 Other Than Denali Highway, 1968 - 1969.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL* No.	TOTAL* %
C	1	4.2	2	40.0	3	9.7
1	2	8.3			2	6.5
2	4	16.7			4	12.9
3					0	0.0
4	2	8.3			2	6.5
5	3	12.5	2	40.0	6	19.4
6	4	16.7			4	12.9
7	1	4.2			1	3.2
8	2	8.3			3	9.7
9	1	4.2			1	3.2
10+	4	16.7	1	20.0	5	16.1
Totals	24	100.0	5	100.0	31	100.0

* 2 of unknown sex

Table 14. Age Distribution of Moose Harvested in Unit 13, Denali Highway Only, 1968 - 1969.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTAL No.	TOTAL %
C	1	.8	4	20.0	5	3.3
1	36	27.7	3	15.0	39	26.0
2	17	13.1	1	5.0	18	12.0
3	18	13.8	3	15.0	21	14.0
4	16	12.3	1	5.0	17	11.3
5	11	8.5	2	10.0	13	8.6
6	6	4.6	2	10.0	8	5.3
7	5	3.8			5	3.3
8	3	2.3			3	2.0
9	6	4.6	1	5.0	7	4.7
10+	11	8.5	3	15.0	14	9.3
Totals	130	100.0	20	100.0	150	100.0

Table 15. Age Distribution of Moose Harvested in Unit 13 (including Denali), 1968 - 1969.

AGE	MALES No.	%	FEMALES No.	%	TOTAL No.	%
C	2	1.3	6	24.0	8	4.4
1	38	24.7	3	12.0	41	22.7
2	21	13.6	1	4.0	22	12.2
3	18	11.7	3	12.0	21	11.6
4	18	11.7	1	4.0	19	10.5
5	14	9.1	4	16.0	19	10.5
6	10	6.5	2	8.0	12	6.6
7	6	3.9			6	3.3
8	5	3.2			6	3.3
9	7	4.5	1	4.0	8	4.4
10+	15	9.7	4	16.0	19	10.5
Totals	154	100.0	25	100.0	181	100.0

Table 16. Age Distribution of Moose Harvested in Unit 14, Matanuska Valley, 1968 - 1969.

AGE	MALES		FEMALES		TOTAL	
	No.	%	No.	%	No.	%
C	2	3.0	3	13.6	5	5.6
1	21	31.8	4	18.1	25	28.4
2	8	12.1	1	4.5	9	10.2
3	17	25.7	2	9.0	19	21.5
4	8	12.1	2	9.0	10	11.3
5	7	10.6	1	4.5	8	9.1
6	1	1.5	1	4.5	2	2.3
7			1	4.5	1	1.1
8	1	1.5			1	1.1
9	1	1.5	3	13.6	4	4.5
10+			4	18.1	4	4.5
Totals	66	100.0	22	100.0	88	100.0

Table 17. Age Distribution of Moose Harvested in Unit 15 (Homer Area), 1968 - 1969.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTALS* No.	TOTALS* %
C						
1	23	46.0			29	35.8
2	6	12.0	3	17.6	11	13.6
3	3	6.0	1	5.9	6	7.4
4	5	10.0	2	11.8	7	8.6
5	2	4.0	1	5.9	4	4.9
6	3	6.0	1	5.9	4	4.9
7	3	6.0			5	6.2
8	3	6.0	1	5.9	4	4.9
9	1	2.0	3	17.6	4	4.9
10+	1	2.0	5	29.4	7	8.6
Totals	50	100.0	17	100.0	81	100.0

* 14 animals of unknown sex included in total

Table 18. Age Distribution of Moose Harvested in Unit 15, 1968 - 1969.

AGE	MALES No.	MALES %	FEMALES No.	FEMALES %	TOTALS* No.	TOTALS* %
C						
1	24	40.7			30	31.6
2	6	10.2	3	13.6	11	11.6
3	4	6.8	2	9.1	8	8.4
4	6	10.2	2	9.0	8	8.4
5	4	6.8	1	4.5	6	6.3
6	4	6.8	2	9.1	6	6.3
7	3	5.1	1	4.5	6	6.3
8	4	6.8	1	4.5	5	5.3
9	3	5.1	3	13.6	6	6.3
10+	1	1.7	7	31.8	9	9.5
Totals	59	100.0	22	100.0	95	100.0

* Including 14 animals of unknown sex

Table 19. Age Distribution of Moose Harvested on the Taylor Highway, 1968 - 1969.

AGE	UNIT 20C		UNITS 11, 12, 25, 13		TAYLOR - TOTAL	
	No.	%	No.	%	No.	%
C	1	2.2			1	1.9
1	0	0.0			0	0.0
2	4	8.7			4	7.7
3	3	6.5			3	5.8
4	7	15.2			7	13.5
5	7	15.2	2	33.3	9	17.3
6	9	19.6			9	17.3
7	4	8.7	1	16.6	5	9.6
8	1	2.2	1	16.6	2	3.8
9	1	2.2	1	16.6	2	3.8
10+	9	19.6	1	16.6	10	19.2
Totals	46	100.0	6	100.0	52	100.0

Table 20. Age Distribution of Moose Harvested in Unit 20 Other Than Taylor Highway, 1968 - 1969.

AGE	20A		20B		20C		TOTAL	
	No.	%	No.	%	No.	%	No.	%
C	2	16.7	10	27.8	1	5.6	13	19.7
1			2	5.6	1	5.6	3	4.5
2	1	8.3	4	11.1	1	5.6	6	9.1
3	1	8.3	6	16.7			7	10.6
4			2	5.6	2	11.1	4	6.1
5			2	5.6	4	22.2	6	9.1
6	3	25.0	3	8.3	1	5.6	7	10.6
7	2	16.7	2	5.6			4	6.1
8			2	5.6	1	5.6	3	4.5
9	2	16.7			4	22.2	6	9.1
10+	1	8.3	3		3	16.7	7	10.6
Totals	12	100.0	36	100.0	18	100.0	66	100.0

Table 21. Age Distribution of Moose Harvested in Unit 20 Including Taylor Highway, 1968 - 1969.

AGE	20A		20B		20C		TOTAL	
	No.	%	No.	%	No.	%	No.	%
C	2	16.6	10	27.8	2	3.1	14	12.5
1			2	5.6	1	1.6	3	2.7
2	1	8.3	4	11.1	5	7.8	10	8.9
3	1	8.3	6	16.7	3	4.7	10	8.9
4			2	5.6	9	14.1	11	9.8
5			2	5.6	11	17.2	13	11.6
6	3	25.0	3	8.3	10	15.6	16	14.3
7	2	16.6	2	5.6	4	6.3	8	7.1
8			2	5.6	2	3.1	4	3.6
9	2	16.6			5	7.8	7	6.3
10+	1	8.3	3	8.3	12	18.8	16	14.3
Totals	12	100.0	36	100.0	64	100.0	112	100.0

Table 22. Age Distribution of Moose Harvested on the Taylor Highway, including Nebesna and Mentasta (Units 20, 11, 12, 13 and 25) Both Sexes, 1968 - 1969.

AGE	NO.	%
C	2	3.2
1	1	1.6
2	4	6.3
3	5	7.9
4	8	12.7
5	9	14.3
6	10	15.9
7	7	11.1
8	4	6.3
9	2	3.2
10+	11	17.5
Totals	63	100.0

Table 23. Age Distribution of Moose Harvested in Miscellaneous Units (individual sample size too small) 1968 - 1969.

AGE	UNIT 16		UNITS 9, 16, 17, 21, 22, 23, & 25	
	No.	%	No.	%
C			1	2.0
1	4	21.1	15	30.6
2	2	10.5	5	10.2
3	3	15.8	7	14.3
4	2	10.5	2	4.1
5	4	21.1	9	18.4
6	1	5.3	4	8.2
7	2	10.5	3	6.1
8			1	2.0
9	1	5.3	1	2.0
10+			1	2.0
Totals	19	100.0	49	100.0

Table 24. Yearling Moose Survival, GMU-5. Yakutat. May 1969.

Counting Area	Percent Calves December 1968	Sample Size	Percent Yearlings May 1969	Sample Size
Doame R. to Alsek R.	9.40	38	17.4	86
Alsek R. to Tanis R.	15.70	172	5.8	69
Tanis R. to Italio R.	19.31	165	12.1	99
Italio R. to Dangerous R.	14.20	119	9.5	74
Dangerous R. to Situk R.	17.10	152	14.8	88
Situk R. to Yakutat Bay	21.05	38		
Total for Unit 5	15.43		12.3	

Table 25. Summary of Moose Population Composition Counts. Tanana Flats, May, 1969.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour	Yrlgs.
Tanana Flats (pre-tagging) Area I	5/15/69			60	85	38	1	124	184			0	227	2.75	83	43
Tanana Flats (post-tagging) Area I	6/4/69 6/6/69			169	49	29	3	112	281		35		359	3.70	97	43
Tanana Fl (post-tagging) Area II	6/7/69			54	28	9	3	54	108		15		137	1.80	76	14
Tanana Flats (post-tagging) Area III	6/7/69			25	16	14	5	40	65		24		100	2.00	50	11

Table 26. Moose Sex and Age Ratios, Tanana Flats. May, 1969.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose	% Yrlgs. in Herd
Tanana Flats (pre-tagging) Area I	5/15/69	48.4					34.7	Yrlgs. 2.5		83	227	18.9
Tanana Flats (post-calving) Area I	6/4/69 6/6/69	150.8					31.2	9.3	9.7	97	359	11.9
Tanana Flats (post-tagging) Area II	6/7/69	100.0					27.7	33.3	10.9	76	137	10.2
Tanana Flats (post-tagging) Area III	6/7/69	62.5					60.0	26.3	24.0	50	100	11.0

Table 27. Summary of Moose Population Composition Counts. Colville River, June, 1969.

Area	Date	Large MM	Small MM	Total MM	FF W/0	FF W/1	FF W/2	Total FF	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Moose	Count Time (hr.)	Moose per Hour	Yrlgs.
Anaktuvuk River (75 mi. south from jct. w/ Colville R.	5/22/69			16	13	14	2	29	45			3	77	1	77	29
Colville R. (Umiat--30 miles upstream)	5/22/69			6	19	11	1	31	37			0	55	1.50	37	18
Colville R. (5 mi. south of jct. w/Itkillik R. to Umiat)	6/10/69			16	17	4	1	29	45		6		74	1.70	43	23
Colville R. (Ninulluk Bluff to jct. w/Killik River)	6/11/69			16	27	6	1	34	50		8		60	.75	80	2

Table 26. Moose Sex and Age Ratios. Colville River, June, 1969.

Area	Date	Total MM per 100 FF	Small MM per 100 FF	Small MM per 100 Large MM	Small MM% in Herd	Small MM per 100 MM Calves	Calves per 100 FF	Incidence of Twins per 100 FF w/calf	Calf % in Herd	Moose per Hour	Total Moose	% Yrlgs. in Herd
Anaktuvuk R. (75 mi. south from jct. w/ Colville R.)	5/22/69	55.2					Yrlgs. 100.0	Yrlgs. 12.5		77	77	37.7
Colville River (Umiat--30 mi. upstream)	5/22/69	19.4					Yrlgs. 58.1	Yrlgs. 8.3		37	55	32.7
Colville R. (5 mi. south of jct. w/Itkillik R. to Umiat)	6/10/69	55.1					20.7	20.0	8.1	43	74	31.1
Colville R. (Ninuluk Bluff to jct. w/Killik R.)	6/11/69	47.1					23.5	14.3	13.3	80	60	3.3

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WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job No.: 6 Title: Moose Tagging and Movement Studies

Period Covered: July 1, 1968 through June 30, 1969

ABSTRACT

Studies of moose populations in three areas of the State, Matanuska Valley, Tanana Valley, and Kenai Peninsula, are reported.

The study in the Matanuska Valley is now completed and an analysis of the data is needed from this effort which involves adult animals and a previous study that involved calf moose.

Efforts to define moose population identity in the Tanana Valley have met with moderate success. Additional observations to locate tagged animals are needed.

The work on the Kenai Peninsula is being done on the Kenai National Moose Refuge in cooperation with Refuge personnel. This first effort merely further demonstrated the feasibility of using a helicopter as a moose-tagging platform.

WORK PLAN SEGMENT REPORT

Federal Aid in Wildlife Restoration

State: Alaska

Project No.: W-17-1 Title: Big Game Investigations

Work Plan: K Title: Moose

Job. No.: 6 Title: Moose Tagging and Movement Studies

Period Covered: July 1, 1968 through June 30, 1969

OBJECTIVES

To determine patterns of movements, population turnover, and to obtain known-age specimens.

To estimate the peak and magnitude of calving.

PROCEDURES

Matanuska Valley

The procedures together with the information regarding the initial 35 moose collared in the Matanuska Valley were presented in the segment report for Work Plan K-6, Project No. W-15-R1, which ended June 30, 1966.

A continuation of the description of the collar colors, ear tag numbers, tagging dates, sex and age is presented in Table 1. Thirty-five moose were collared from July 1, 1965 to June 30, 1966 and 109 additional moose were collared to March 28, 1968. One moose, pendant number 75, was recollared to pendant number 40 because the initial collar was too difficult to read.

Tanana Flats

Tagging methods used in 1969 were analogous to those used in 1966 and 1968, as described in Volume X, Federal Aid in Wildlife Restoration, Alaska Department of Fish and Game, 1969.

Area streamer color codes changed slightly although the tagging areas remained the same. A summary of the color codes used for calf tagging since its inception on the Tanana Flats is presented in Table 2. A map is attached showing the three areas (Fig. 1).

Kenai Peninsula

A marking project was initiated in the upper Mystery Creek drainage about five miles north of the Sterling Highway at an elevation of approximately 2000 feet above sea level. From October 21 to 29, 1968, a total of twenty-eight adult moose (17 males and 11 females) was captured and marked in a joint effort of the United States Bureau of Sport Fisheries and Wildlife and the Department. The helicopter technique described by Nielson and Shaw (1967) was used. Succinylcholine chloride was the immobilizing agent. Dosages, drug effect, and other pertinent data are shown in Table 3.

Marking consisted of four-inch-wide highly visible collars and "Saflag" ear streamers attached with numbered metal ear tags.

Personnel assisting in this tagging effort included Robert Richie, Robert Seemel and John Kurtz of the United States Bureau of Sport Fish and Wildlife; and Dick Bishop, Jack Didrickson, Loyal Johnson, Al Johnson and Royce Perkins of the Department.

Table 2. Streamer Color Code and Year, Moose Calf Tagging, Tanana Flats, Unit 20A.

	1966		1968		1969	
Area	Basic Color	"Twin" Color	Basic Color	"Twin" Color	Basic Color	"Twin" Color
I	Orange	Red	Red	White	Red	White
II	Green	White	Orange	Dark Blue	Orange	Light Blue
III	Pink	Blue	Yellow	Pink	Pink	Yellow

In 1969, Alaska Department of Fish and Game personnel assisting with the tagging operation were Bill Griffin, Mel Buchholtz, Jean Ernest, Bob Hinman, Jack Didrickson, Royce Perkins, Dimitri Bader, Chuck Irvine, and Dick Bishop. Scott Grundy did much of the preparation. The U. S. Army, Ft. Wainwright provided helicopter pilots, crews, and volunteer taggers. SSG Wayne Booher, Post Conservation Office, provided liaison with the Army. Jerry Kocer of the University of Oklahoma also assisted in tagging.

One commercial helicopter (Hiller 12E) was chartered from Merric Helicopters, Inc. A Piper PA18-150 was chartered from Frontier Flying Service for part of the tagging operation; for the balance of the time a Department PA18-150 was used as a spotter aircraft. The Army provided the use of one HY-1D (Huey) helicopter.

Phenology, Distribution of Moose, and other Biological Factors

Between 21 and 25 May, 1969 Dick Bishop conducted aerial counts of moose in the tagging areas (Table 4). Phenologically the season was about two weeks advanced compared to the "normal" year. As a result, there was considerably more visual interference than usual by the time tagging commenced. Bud Burris indicated that leaf emergence was about 30 percent completed by May 13. By 21 May emergent sedge vegetation in the ponds was 6 to 8 inches above the water, where normally it would be just protruding. Leaf emergence had probably reached 60 to 80 percent by that time. As a result, it was difficult to locate moose in areas with second growth or mature deciduous trees, such as Areas II and III and parts of Area I. This undoubtedly affected the number of moose seen on the counts and during the tagging.

It is difficult to judge the relative abundance of moose compared to the spring of 1968, but I do think that their distribution was different. There seemed to be fewer moose in the vicinity of Clear Creek Butte and the larger open swamps to the east of the Butte, and proportionately more to the south of the Butte along Clear Creek, Dry Creek, and the adjacent wet meadows or swamps. The latter areas were quite wet, while the former seemed to have less standing water than in 1966-1968.

The total number of moose seen during pre-tagging counts in 1969 should not be compared directly with totals observed in previous years because the 1969 counts were primarily an attempt to assess the status of calving activity, secondarily to gain some indication of yearling survival, and the effort expended was considerably less than in past years. Yearling survival, as indicated by the ratio of yearlings to cows, appears to have been good.

Tagging Conditions

Some combination of most of the minor difficulties coincidental with tagging moose calves occurred during the operation in 1969. In Areas II and III the well developed foliage and the abundance of high brush and mature trees made working conditions difficult. As a result, the number of moose calves tagged was low (see Area Summaries, attached). Considering the few returns we have had from these areas, however, it seemed worthwhile to make another attempt to obtain information on the movements of the moose calving in those areas. Further tagging in Area II and III is not recommended unless increased aerial surveillance of adjacent areas is assured.

Some effort was perhaps wasted with respect to the number of calves tagged per unit effort in Area I by searching in areas of low moose densities. However, we hoped to tag more or less proportionately to the densities of moose and therefore wished to have these areas represented if possible. This has been accomplished.

Our tagging effort was concentrated in Area I, particularly in the Clear Creek-Dry Creek area during the last few days of tagging in an effort to obtain as large a sample as possible. In future calf tagging operations we may wish to subdivide Area I into a number of smaller units and attempt to learn more precisely the subsequent movements and distribution of moose using various parts of this most important calving area.

RESULTS

Movements of Matanuska Valley Collared Moose

A total of 143 moose (27 males and 116 females) was collared during the three winters the project was underway. In 1966, 1967, and 1968, respectively, 35, 79, and 29 adult moose were collared. Fifty percent of the moose were collared during the month of March. Of the 143 moose collared during the duration of the project, half (71) were observed again and (72) were not seen again.

Six of the moose collared were calves, one of which, pendant number 8, was found dead 113 days later. Of the remainder of the calves, only one was seen again 292 days after collaring and 6.5 miles (all reference to miles is in air miles) from the collaring site. Seven yearlings were collared, 4 of which were not seen again. One of the yearlings, pendant number 143, was taken by a hunter on Yenlo Mt. 235 days and 57 miles from the collaring site. Of the remaining 2 yearlings, pendant number 51 was seen on two occasions, within 3 and 6 days of collaring, and it had moved less than one mile. Pendant number 50, the remaining yearling, was seen 3.5 miles from the collaring site 698 days after collaring.

Records of all movements are presented in Table 5. Many of the movements were noted during the course of the drugging and collaring operations the following year which resulted in winter observations primarily, when moose are easily seen and readily available. Reasons for the lack of movement records during the summer months include leaf emergence, possible altitudinal migration of moose into areas where surveillance was not possible, other duties taking observers away from the Valley or limiting them to office work, and poor weather. Aerial observation was found to be unreliable, primarily because the collars were designed to be read on the ground and the speed added to the angle of viewing resulted in very difficult analysis of collar colors from aircraft. In addition, aerial observation would be prohibitively expensive except in the course of other duties such as sex and age composition counts.

In attempting to analyze the data collected from the movement study on adult moose, it is clear from the data accumulated that most movements are of a minimal nature within the Matanuska Valley. However, caution must be exercised in the interpretation of such data because most of the observations are made during the same general period from year to year (as winter 1966 and winter 1967) affording individual animals large time

periods to move anywhere they please. The collaring method is obviously deficient in areas of inaccessible, roadless terrain and in periods of leaf emergence. Radio telemetry would disclose this important movement information on a daily, weekly, monthly, or even hourly basis.

It is interesting to note that none of the moose collared in the Lazy Mountain Area of the Matanuska Valley were observed to have crossed the Matanuska River to reside in the area containing most of the Valley floor. It is possible the Matanuska River presents a barrier, but if it does, why did 4 moose appear in Game Management Unit 16 after obviously crossing the Little Susitna and Big Susitna Rivers? Fewer than 15 collared moose were seen more than 12 miles while 56 were seen less than 12 miles from the point of collaring indicating that in all probability, most moose born and surviving until adulthood in the Matanuska Valley tend to remain, resulting in a more or less finite moose population within the area.

The collared moose wearing pendant number 19 was seen over 27 miles (at 35 days) from the collaring site, but eventually this bull was observed within 9 miles of the site after 733 days had passed indicating an area preference. Many other collared moose were observed within a mile or two of the collaring site after a year or more had gone by.

Collared moose observations were difficult or impossible to come by during periods of leaf emergence as stated earlier. Table 6 exhibits this, and also reveals that it occurs in successive years, 1966 to 1969. A shortage of personnel during summer and fall is another factor which contributed greatly to the paucity of moose observations during summer-fall periods.

In two instances animals, where observations were made after 1000 days, were only 1 1/2 and 7 miles away from the tagging site when seen during the same general season i.e., winter or early spring. Much speculation has arisen over the premise that the Matanuska Valley moose herd may be split into two segments, one portion that moves altitudinally depending on weather conditions from the Valley floor to the mountains which partially surround the Valley and one portion that remains on the Valley floor during the entire year. If the supposition is valid, then the regulatory authority which imposes restrictions and creates game regulations should be advised and rulings should be made in accordance with information provided. It would be possible for instance, to allow hunting on only one segment of the herd if seasons closed before an altitudinal migration took place. The data accumulated during the tenure of this study cannot add substantially to the supposition nor can they disprove it. It appears presently that radio telemetry would be the only known means of providing the required data. By and large, the data accumulated on movements of collared moose indicate that most moose are generally back in the same area they were collared if they are seen during the same season a year or more later. There are exceptions to this as noted below.

The months that observations of collared moose are highest are January, February and March as indicated in Table 6, which also illustrates the lack of observations during the summer and fall periods.

Table 7, which describes movements of collared moose prior to death, reveals that 3 moose (2 males and one female) traveled in a westerly direction out of the Matanuska Valley and were taken by hunters 71, 57 and 56 air miles from the point of collaring. In addition, a biologist conducting a sex and age composition count in the area of Mt. Susitna-Beluga on November 13, 1969 saw a collared moose which would again be in excess of 50 miles from the center of collaring activity. One would expect very few returns from these areas because they are remote and contain no established roads, yet 3 of the 8 hunter kills of collared moose were reported from that area, which is a portion of the lower Susitna Valley (see Table 8). Aircraft hunting plays a very important role in the harvest of moose in that Game Management Unit however, and all reports came from aircraft hunters. Only one hunter of eight reported seeing the collar prior to harvesting a collared moose.

Mortality of Collared Moose

As Table 8 reveals, 19 moose, 10 females and 9 males, were killed or died during the 3 year period. Eight were taken by hunters, 4 were illegally taken, 4 causes of death were unknown, 1 was taken in self defense by a dog musher when the moose attacked his team, 1 was killed by a train, and 1 died from an overdose of drugs during the collaring study.

Of the 4 collared moose which were taken illegally, pendant number 5, a female, was taken 379 days after collaring and was 1.5 miles from the point of collaring. Pendant number 9, also a female, was taken 644 days after collaring and was located 16 miles from the point of collaring, and pendant number 63, a female, was taken after 1041 days, 7.5 miles from the collaring site. Female number 83 was killed 522 days and was 1.5 miles from the collaring site.

The female moose (pendant number 43) which was killed in self defense was located 1.5 miles from the site of collaring and had lived 41 days from the date of collaring. The female bearing pendant number 42 was the only moose struck and killed by a train during the study period. Pendant number 42 had moved 3 miles in 24 days.

Among the 4 moose dead from unknown causes, pendant number 8 was a female calf found 113 days after tagging and in a badly decomposed condition. It is believed that pendant number 8 died from malnutrition shortly after collaring, but the carcass was not located for 3 months. Pendant number 65 was a bull yearling that was found at the foot of a steep bank near the Fishook Road in the Matanuska Valley 52 days and .75 miles from the collaring site. Examination of the carcass revealed that it may have been struck by a car and pushed over the bank where it died. Pendant number 72 was found 1092 days after collaring and she was located .25 miles from the collaring site, the death probably caused by old age and malnutrition. Pendant number 73 was an old female struck by a dart near the spinal cord and after 3 days she could not regain her feet. Number 73 was destroyed by Protection Officer Frederick J. Smith due to her inability to rise.

Pregnancy Status of 20 Female Collared Moose

During the course of the adult collared moose study, 20 female moose were checked for pregnancy status by rectal palpation (Table 6). Of the 20 females palpated, 18 were found to be pregnant and one half (9) of those had last year's calves with them at the time they were collared and palpated. Table 9 also reveals that 2 of the 20 female moose palpated were not pregnant, 1 of which was aged by tooth sectioning at 16 years. The other female which did not have a foetus was 7 years old.

One of the pregnant females was a long yearling, aged at 1 year plus, and produced a calf at approximately 21 months of age.

Tanana Flats

Tagging: Two-hundred and twenty-nine moose calves were tagged in 1969. The data are presented by date and tagging area in Table 10. Fewer calves were tagged in 1969 compared to 1968 because less total effort was expended.

Table 10. Summary of Moose Calves Tagged on the Tanana Flats, 1966-1969.

Year	Area I	Area II	Area III	Total
1966	136	34	60	230
1968	234	57	67	358
1969	192	11	26	229
Total	562	102	153	817

Substantially more twins were found in 1969 compared to 1968 and the spatial distribution of moose was different, as mentioned earlier. There were not other apparent differences such as a drastic difference in early survival or numerous carcasses, indicating severe winter mortality.

Not all the records and tag recoveries and sightings have been summarized and for this report only a review of the general patterns of recoveries is presented.

Most sight records of tagged moose have been made during aerial moose counts in October and November, and again in May and June. Most of these counts have been made in Unit 20A; various problems exist in attempting to count moose in 20B, and our efforts there have been rather unproductive in terms of numbers of moose seen. Therefore, most of the sight records have been made on the Tanana Flats, i.e., in the general area where the

calves were tagged. Counts in the Alaska Range have produced the next largest group of sight records and certainly some of the most interesting records. Tagged calves have been observed near the head of the Wood River, up Snow Mountain Gulch, on Newman Creek (tributary to Dry Creek), on the West Fork (Little Delta River), in and around the Japan Hills, Three Mile Creek, and various other points among the foothills of the Alaska Range between Tatlanika Creek and the West Fork, Little Delta River. Movements to these points from the tagging grounds vary from 30 to 50 miles in a straight line. Most of the observations involved five to six month-old calves with their mothers and demonstrate a fall movement of moose to the foothills; however, the Newman Creek observation was made on July 10.

General observations in these areas after November suggested a movement out of the higher country as winter progresses and snow depth increases. We have no sight records of tagged moose in the higher country in winter, but we have made very few flights in the mountains at that time of year.

In Unit 20B we have relatively few sight or recovery records, but the distribution of those we do have is interesting. Several different tagged moose have been seen in the Richardson Highway-Badger Road area. A calf was shot at 35 mile Chena Hot Springs Road the winter after its birth. Another was seen at 16 mile, Chena Hot Springs Road. Tagged twins were observed just east of Too Much Gold Creek, between the Fairbanks Creek and Chatanika River drainages in September, about 3.5 months after their birth.

A tagged calf was seen on Davis Road, just south of Airport Road on the outskirts of Fairbanks. We are sure that if we had covered other adjacent parts of 20B more thoroughly on aerial counts, more sight records would have been made.

In summary, there appears to be regular movement of some cows with tagged calves from the Tanana Flats into the Alaska Range, and of others into western Unit 20B, in addition to a "group" of moose that does not leave the Flats. At this time it is not known to what extent moose from the tagging areas move west beyond the Wood River, or northwest across the Tanana River to the country west of Fairbanks in Unit 20B. Essentially no aerial surveys have been made in those areas. It appears likely that moose move between these areas and the Tanana Flats.

Discussion

The value of a marked individual or group depends on observing or recapturing it at a later date. Therefore, any marking program carries the implication of plans for recovering the marked animals in some way. In this case, we have planned to obtain visual recoveries through aerial moose count flights, reconnaissance flights and from the public. For physical recoveries we have depended upon hunter cooperation and finding dead tagged moose through reports from the public and incidentally to other activities in the field.

While we have obtained numerous reports and some recoveries of streamers from the Tanana Flats and the Alaska Range, the returns from 20B have been few but enough to make us speculate that there may be considerable movement between the Flats in 20A and the adjacent parts of 20B. This raises many questions about the relationships of moose populations in 20A and 20B, and in turn the question of how well our regulations fit the needs of moose management in these areas. From the returns obtained so far, it is clear that some proportion of the moose population using the Tanana Flats in the spring moves into 20B in the fall and winter, but we do not know to what extent the moose in 20A contribute to the breeding population in 20B, or vice versa. We have tacitly assumed that the breeding populations of moose in these two Subunits are separate in most of our management considerations, or at the least that there is no significant contribution by moose in Subunit 20A to the huntable population in Subunit 20B. In view of the observations in 20B of moose tagged in 20A, this contention should be reconsidered.

There are several important management objectives which must be pursued in central Unit 20. Calf tagging on the Tanana Flats with appropriate follow-up work will aid in achieving them. These objectives are:

1. Determine the relationships of moose populations in central Unit 20 (Tanana Flats in Subunit 20A and adjacent parts of Subunits 20B and 20C) by determining the importance of the Tanana Flats as a calving area, investigating seasonal movements and distribution of moose in central Unit 20, and by comparing sex and age composition of data from various possible population groups in central Unit 20.

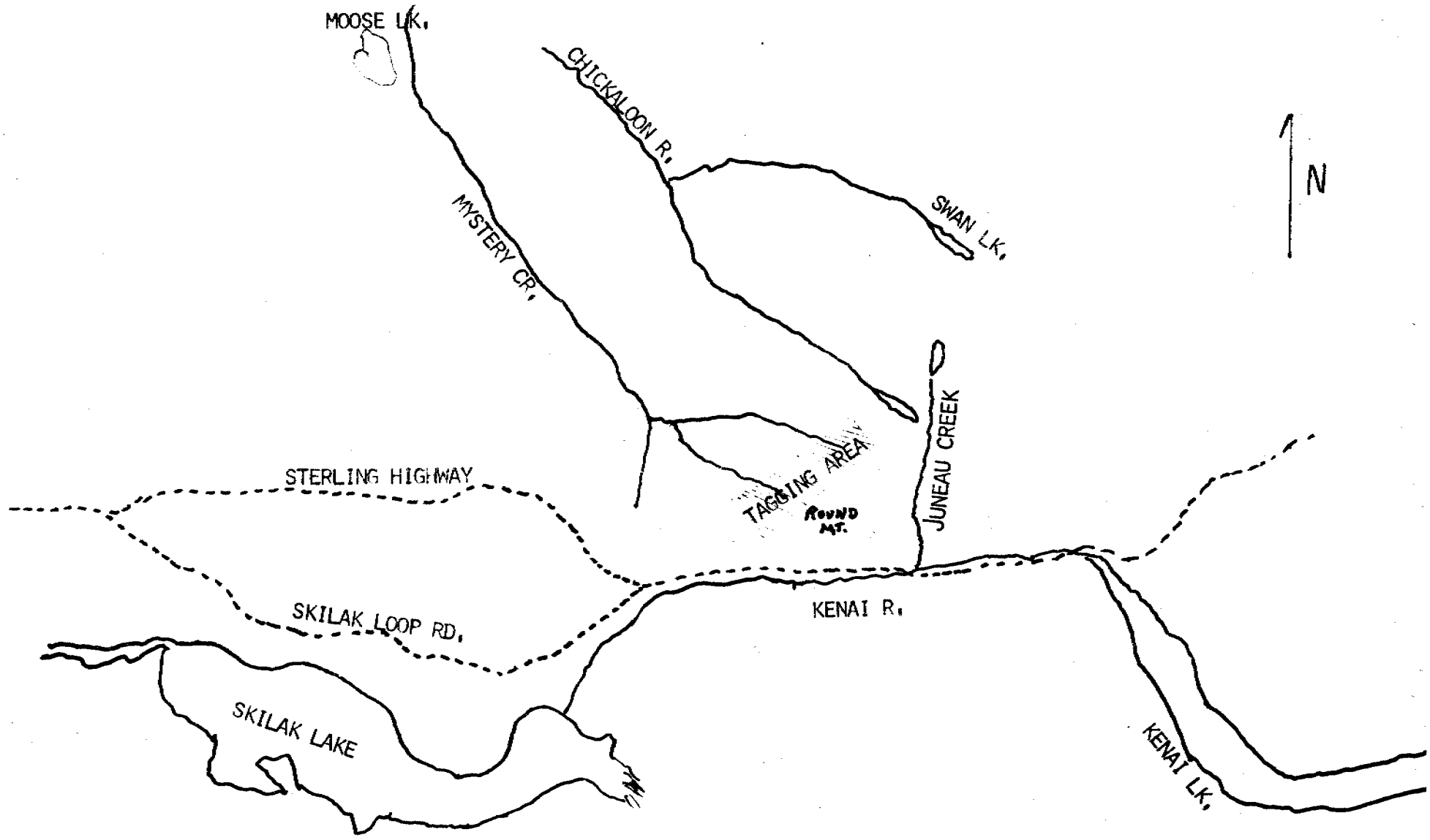
2. Develop a comprehensive, long term management and research plan for central Unit 20, involving delineation of wintering areas, range evaluation, range improvement, improved access in Subunit 20A, and consideration of maximum recreational hunting benefits, including trophy hunting. Such a plan should involve extensive military support and cooperation for as long as they retain some interest in the bombing range. A draft of this sort of program was submitted in 1968 and again in 1969.

The need for more refined moose management practices in central Unit 20 seems sure to increase. A comprehensive research-management program seems imperative to meet this need.

Statistical data from these tagging operations are presented in Tables 11-16.

Table 11. Estimated Costs of Tagging Project, Tanana Flats, 1969.

Commercial Helicopter Cost	$4,852.00
Commercial Spotter Aircraft Cost	728.00
State Spotter Aircraft Cost	540.00
Salaries	1,700.00
Travel	435.00
Per Diem	567.00
Miscellaneous Equipment - tags, pliers, shoes, vests, odds and ends	200.00
Total	$9,022.00



10 MILES

FIG. 2 ADULT MOOSE TAGGING AREA UNITS 15A & 7

Table 1. Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
36	3817	3818	1/16/67	F	A	T17N R1W Sec 2 SW 1/4	1	0	0	R+W	0	P	L	
37	3819	3820	1/18/67	F	A	T17N R1E Sec 5	2	0	0	R+W	0	P	RE	Hole - left side of face 3" in front of eye.
38	3821	3822	1/19/67	F	A	T17N R2E Sec 2 SE 1/4	3	0	0	R+W	0	Wht	L	
39	3826	3827	1/20/67	F	A	T18N R2E Sec 23 SW 1/4	4	0	0	R+W	0	Wht	R	
40	3823	3824	1/21/67	F	A	T18N R2E Sec 35 SW 1/4	5	0	0	R+W	0	B	L	Originally pendant #75, recollared to #40.
41	3830	3831	1/23/67	M	A	T18N R2E Sec 35 NW 1/4	6	0	0	R+W	0	B	R	Required approx. 15 min. aritifical respiration.
42	3832	3833	1/25/67	F	A	T17N R1W Sec 8 NE 1/4	7	0	0	R+W	0	Y	L	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
43	3834	3835	1/25/67	F	C	T18N R1E Sec 31 SW 1/4	8	0	0	R+W	0	Y	R	
44	3836	3837	1/26/67	F	A	T17N R1W Sec 3 NE 1/4	9	0	0	R+W	P	0	L	
45	3838	3839	1/26/67	F	A	T17N R1W Sec 5 SE 1/4	10	0	0	R+W	P	0	R	
46	3840	3841	1/26/67	F	A	T18N R1E Sec 33 NE 1/4	11	0	0	R+W	P	W	L	Had tagged calf with her.
47	3844	3845	1/27/67	F	A	T17N R2E Sec 35 SW 1/4	12	0	0	R+W	P	W	R	
48	3846	3847	1/30/67	M	A	T17N R2E Sec 35 SW 1/4	13	0	0	R+W	P	B	L	Gave artificial respiration.
49	3848	3849	1/31/67	F	A	T18N R1W Sec 36 NW 1/4	14	0	0	R+W	P	B	R	
50	3850	3851	1/31/67	F	A	T18N R2W Sec 22 SW 1/4	15	0	0	R+W	P	Y	L	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
51	3852	3825	1/31/67	F	A	T17N R1W Sec 2 NW 1/4	16	0	0	R+W	P	Y	R	
52	3856	3857	1/30/67	M	A	T17N R3W Sec 13 NW 1/4	17	0	0	R+W	W	0	L	Gave artificial respiration for 10 minutes.
53	3858	3859	2/2/67	F	A	T17N R1E Sec 27 NE 1/4	18	0	0	R+W	W	0	R	
54	3860	3861	2/3/67	M	A	T17N R1W Sec 1 NW 1/4	19	0	0	R+W	W	P	L	
55	3863	3864	2/4/67	F	A	T17N R1E Sec 32 NW 1/4	20	0	0	R+W	W	P	R	
56	3862	3865	2/6/67	F	A	T17N R2W Sec 12 NW 1/4	21	0	0	R+W	W	B	L	
57	3866	3867	2/7/67	F	A	T16N R1E Sec 10 NE 1/4	22	0	0	R+W	W	B	R	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
58	3868	3869	2/8/67	F	A	T17N R1W Sec 2 SW 1/4	23	0	0	R+W	W	Y	L	Gave artificial respiration for 10 minutes.
59	3854	3855	2/2/67	F	A	T17N R1W Sec 11 NE 1/4	24	0	0	R+W	W	Y	R	Bad wound behind left shoulder.
60	3870	3871	2/9/67	F	A	T17N R1W Sec 5 NE 1/4	25	0	0	R+W	B	0	L	
61	3872	3873	2/9/67	F	A	T17N R3E Sec 1 SW 1/4	26	0	0	R+W	B	0	R	
62	3875	3901	2/10/67	F	A	T17N R1E Sec 1 NE 1/4	27	0	0	R+W	B	P	L	
63	3902	3903	2/13/67	F	A	T18N R1E Sec 34 NW 1/4	28	0	0	R+W	B	P	R	
64	3951	3952	2/8/67	F	A	T17N R2E Sec 1 SW 1/4	29	0	0	R+W	B	W	L	Gave artificial respiration for 10 minutes.

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
65	3876	3877	2/8/67	F	A	T17N R2W Sec 12 NE 1/4	30	0	0	R+W	B	W	R	
66	3878	3880	2/8/67	F	A	T17N R2E Sec 12 NE 1/4	31	0	0	R+W	B	Y	L	Tag #3879 damaged and discarded.
67	3881	3882	2/9/67	F	A	T17N R2E Sec 1 SE 1/4	32	0	0	R+W	B	Y	R	
68	3883	3884	2/9/67	F	A	T17N R1E Sec 5	33	0	0	R+W	Y	0	L	
69	3885	3886	2/10/67	F	A	T17N R2E Sec 1 NW 1/4	34	0	0	R+W	Y	0	R	
70	3887	3888	2/10/67	F	A	T17N R2E Sec 1 SW 1/4	35	0	0	R+W	Y	P	L	
71	3904	3905	2/14/67	F	A	T17N R2W Sec 2 SW 1/4	36	0	0	R+W	Y	P	R	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
72	3895	3896	2/19/67	F	A	T18N R1E Sec 29 SW 1/4	37	0	0	R+W	Y	W	L	
73	3897	3898	2/20/67	F	A	T17N R1W Sec 3 SW 1/4	38	0	0	R+W	Y	W	R	
74	3899	3900	2/21/67	F	A	T18N R1E Sec 30 SE 1/4	39	0	0	R+W	Y	B	L	
75	4167	3906	2/21/67	F	A	T17N R1W Sec 13 NE 1/4	40	0	0	R+W	Y	B	R	
76	3889	3890	2/15/67	F	A	T17N R2W Sec 12 NE 1/4	41	0	0	R+W	0	0	L	
77	3891	3892	2/17/67	F	A	T17N R2W Sec 17 NW 1/4	42	0	0	R+W	0	0	R	
78	3893	3894	2/17/67	F	A	T17N R3W Sec 21 SW 1/4	43	0	0	R+W	P	P	L	

Table 1. (cont.) Adult Moost Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
79	3907	3908	2/21/67	F	A	T17N R1W Sec 3 SW 1/4	44	0	0	R+W	P	P	R	
80	3909	3910	2/22/67	F	A	T17N R1E Sec 3 NW 1/4	45	0	0	R+W	W	W	L	
81	3911	3912	2/25/67	F	A	T17N R1E Sec 2	46	0	0	R+W	W	W	R	
82	3913	3914	3/1/67	F	A	T18N R1E Sec 35 SE 1/4	47	0	0	R+W	Y	Y	L	
83	3915	3916	3/1/67	F	A	T18N R1E Sec 27 NW 1/4	48	0	0	R+W	Y	Y	R	
84	3917	3918	3/4/67	F	A	T17N R1E Sec 5 SE 1/4	49	0	0	R+W	B	B	L	
85	3274	3276	3/9/67	F	Y	T18N R1E Sec 31 NE 1/4	50	0	0	R+W	B	B	R	
86	3919	3920	3/10/67	F	Y	T18N R2E Sec 31 SE 1/4	51	0	0	R+W	Y 0	P	L	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
87	3921	3922	3/10/67	F	A	T17N R1W Sec 1 NE 1/4	52	0	0	R+W	Y	O P	R	
88	3923	3924	3/11/67	F	A	T17N R1E Sec 1 NW 1/4	53	0	0	R+W	Y	O W	L	Gave artificial respiration.
89	3925	3926	3/12/69	F	A	T17N R1W Sec 10 NW 1/4	54	0	0	R+W	Y	O W	R	Gave artificial respiration.
90	3927	3928	3/12/67	M	A	T17N R1W Sec 1 NW 1/4	55	0	0	R+W	Y	O B	L	Gave artificial respiration for 15 minutes.
91	3929	3930	3/14/67	F	A	T18N R1E Sec 30 SE 1/4	56	0	0	R+W	Y	O B	R	
92	3931	3932	3/14/67	F	A	T18N R1E Sec 28 SE 1/4	57	0	0	R+W	Y	O Y	L	
93	3933	3934	3/15/67	F	A	T17N R1W Sec 11 SW 1/4	58	0	0	R+W	Y	O Y	R	
94	3935	3936	3/15/67	F	A	T18N R1E Sec 30 SE 1/4	59	0	0	R+W	Y	P O	L	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
95	3937	3938	3/15/67	F	7	T18N R1E Sec 34 NE 1/4	101	0	0	R+W	Y P	0	R	
96	3939	3940	3/15/67	M	4	T18N R1E Sec 31 NE 1/4	102	0	0	R+W	Y P	W	L	
97	3941	3942	3/16/67	F	10	T17N R1E Sec 4 NW 1/4	103	0	0	R+W	Y P	W	R	
98	3943	3944	3/16/67	F	6	T17N R1W Sec 1 NW 1/4	104	0	0	R+W	Y P	B	L	
99	3945	3946	3/17/67	F	10	T17N R3W Sec 15 SE 1/4	105	0	0	R+W	Y P	B	R	Rectal palpation-pregnant.
100	3947	3948	3/20/67	F	3	T17N R1W Sec 10 NW 1/4	106	0	0	R+W	Y P	Y	L	Palpated - is pregnant.
101	3949	3950	3/21/67	F	10	T17N R1E Sec 4 NW 1/4	107	0	0	R+W	Y P	Y	R	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
102	3953	3954	3/21/67	M	3	T17N R1W Sec 1 NE 1/4	108	0	0	R+W	Y W	0	L	Artificial respiration for 10 minutes.
103	3961	3962	3/22/67	F	8	T17N R1W Sec 10 NW 1/4	109	0	0	R+W	Y W	0	R	
104	3957	3958	3/21/67	F	7	T18N R1E Sec 30 SE 1/4	110	0	0	R+W	Y W	P	L	
105	3959	3960	3/22/67	F	5	T18N R1E Sec 34 SE 1/4	111	0	0	R+W	Y W	P	R	
106	3963	3964	3/24/67	F	3	T16N R3W Sec 26 NE 1/4	112	0	0	R+W	Y W	B	L	
107	3965	3966	3/26/67	F	A	T18N R1W Sec 35 NW 1/4	113	0	0	R+W	Y W	B	R	
108	3967	3968	3/27/67	M	C	T18N R2E Sec 32 SE 1/4	114	0	0	R+W	Y W	Y	L	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
109	3969	3970	3/27/67	F	10	T18N R1E Sec 32 NW 1/4	115	0	0	R+W	Y W	Y	R	Pregnant. Very little respiration.
110	3971	3972	3/28/67	F	1	T18N R1E Sec 30 SW 1/4	116	0	0	R+W	Y B	0	L	Gave artificial respiration for 40 minutes.
111	3973	3974	3/28/67	F	5	T18N R1E Sec 34 SE 1/4	117	0	0	R+W	Y B	0	R	Palpated - was pregnant.
112	3975	3976	3/29/67	F	8	T18N R1E Sec 30 SW 1/4	118	0	0	R+W	Y B	P	L	Palpated - pregnant.
113	3977	3978	3/29/67	M	2	T17N R1W Sec 2 NE 1/4	119	0	0	R+W	Y B	P	R	
114	3981	3982	4/1/67	F	11	T18N R1E Sec 29 SW 1/4	120	0	0	R+W	Y B	W	L	
115	3985	3986	4/3/67	F	5	T17N R1W Sec 2 SE 1/4	121	0	0	R+W	Y B	W	R	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
116	8001	8002	2/6/68	F	5	T18N R1E Sec 29	122	0	0	R+W	Y B	Y	L	
117	8003	8004	2/6/68	F	3	T18N R1E Sec 31	123	0	0	R+W	Y B	Y	R	Pregnant by palpation.
118	8007	8005	2/7/68	F	11	T19N R3E Sec 20	124	0	0	R+W	YY	0	L	
119	8008	8009	2/7/68	M	*	T17N R3W Sec 21	125	0	0	R+W	YY	0	R	
120	8010	8011	2/9/68	F	7	T17N R2W Sec 12 NE 1/4	126	0	0	R+W	YY	P	L	Rectal palpation, pregnant.
121	8006	8012	2/15/68	F	12	T19N R2E Sec 28	127	0	0	R+W	Y Y	P	R	
122	8014	8013	2/20/68	F	1	T17N R2E Sec 1 S 1/2	128	0	0	R+W	Y Y	W	L	Pregnant by palpation.
123	8016	8015	2/21/68	F	8	T17N R2E Sec 2 NE 1/4	129	0	0	R+W	Y Y	W	R	

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
124	8021	8022	2/24/68	F	5	M.P.103.5 Glenn Hwy.	130	0	0	R+W	Y	Y B	L	
125	8019	8017	2/26/68	F	16	T18N R2E Sec 33 Hw 1/4	131	0	0	R+W	Y	Y B	R	
126	8018	8022	2/26/68	F	10	T18N R2E Sec 30 NE 1/4	132	0	0	R+W	Y	0 0	L	
127	8023	8024	2/26/68	M	2	T19N R3E Sec 22	133	0	0	R+W	Y	0 0	R	
128	8025	8026	2/28/68	M	1	T17N R2W Sec 12	134	0	0	R+W	Y	P P	L	
129	8027	8028	2/29/68	F	2	T19N R2E Sec 33 NE 1/4	135	0	0	R+W	Y	P P	R	Pregnant by palpation.
130	8029	8030	3/4/68	F	6	T17N R2W Sec 10 NW 1/4	136	0	0	R+W	Y	W W	L	Pregnant by palpation.
131	8032	8033	3/4/68	F	8	M.P.54 Talkeetna Hwy.	137	0	0	R+W	Y	W W	R	Pregnant by palpation.

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
132	8034	8035	3/5/68	M	6	T19N R4W Sec 28 NW 1/4	138A (Shot)	0	0	R+W	Y	Y	L	Shot in self-defense, salvaged. See accession card #24846.
133	8036	8037	3/5/68	F	4	T18N R2E Sec 2 N 1/2	138	0	0	R+W	Y	Y	L	Palpated, pregnant.
134	8038	8039	3/11/68	M	2	T18N R2E Sec 10 N 1/2	139	0	0	R+W	Y	Y	R	
135	8040	8041	3/12/68	F	11	T17N R2W Sec 10 NW 1/4	140	0	0	R+W	Y	B	L	
136	8042	8043	3/13/68	F	7	T17N R2W Sec 9 NW 1/4	141	0	0	R+W	Y	B	R	
137	8044	8045	3/14/68	M	5	M.173.2 ARR & Talk. Hwy.	142	0	0	G+W	W	O	P	R

Table 1. (cont.) Adult Moose Tagged and Collared in Matanuska Valley - Winter 1966-67.

Specimen #	Ear Tag #		Tagging Date	Sex	Age	Location	Pendant #	Year	Area	Collar	Above	Below	Left or Right	Remarks
138	8046	8047	3/15/68	M	1	T18N R3W Sec 18 SE 1/4	143	0	0	G+W	W 0	P	L	
139	8048	8049	3/15/68	F	3	T19N R4W Sec 17 SE 1/4	144	0	0	G+W	W 0	W	L	Palpated - pregnant.
140	8050	8051	3/19/68	M	6	T19N R4W Sec 17 SW 1/4	145	0	0	G+W	W 0	W	R	Wound on left cheek 2-3" back of eye.
141	8052	8053	3/19/68	M	3	T19N R4W Sec 17 SW 1/4	146	0	0	G+W	W 0	B	L	
142	8054	8055	3/19/68	F	*	T19N R4W Sec 7 NE 1/4	147	0	0	G+W	W 0	B	R	Pregnant by palpation.
143	8056	8057	3/25/68	F	A	T16N R2W Sec 18 SW 1/4	148	0	0	G+W	W 0	Y	L	
144	8058	8059	3/26/68	M	2	T19N R4W Sec 6 SE 1/4	149	0	0	G+W	W 0	Y	R	
145	8060	8061	3/28/68	M	7	T18N R3W Sec 27 NW 1/4	150	0	0	G+W	W P	0	L	

*Uncertain determination of age.

Table 3. Adult Moose Tagged and Collared in Upper Mystery Creek, Kenai Peninsula. October 21 - 29, 1968.

Specimen #	Ear # L	Ear # R	Tagging Date	Sex	W/ Calf	* Age	Collar Tag No.	Collar Color	Ear Streamer (Orange)	Hit Location	Drug Dosage (Succinyl Choline Chloride) (mg)	Time to Go Down (Min.)	Remarks
1	MC 68 6647	6863	10/21	F	Yes	A	6550	Orange	No	R Ham, High	23.5	13	Very alert - difficult to handle
2	MC 68 6896	6910	10/21	F	No	7	6914	Orange	No	R Center Back	23.5	19	
3	MC 68 8549	8550	10/21	F	No	A	8523	Orange	No	L Shoulder	24.5	7	
4	MC 68 8566	8568	10/21	F	No	A	8567	Orange	R	L Leg, Low		15	Very alert - on feet quickly
5	MC 68 8557	8598	10/21	F	Yes	A	8599	Orange	R	R Ham	23.5	15	
6	MC 68 8595	8596	10/21	F	Yes	7	8597	Orange	R	Top Sacrum	23.5	11	
7	MC 58 7511	7523	10/22	M	No	A	6624	Yellow	No	R Ham	25.5	13	Very alert - difficult to handle
8	MC 68 6950	6918	10/22	M	No	A	6915	Yellow	No	L Ham, Middle	24.5	22	" " "
9	MC 68 7524	7548	10/22	F	No	10	7549	Orange	No	Paunch	24.5	15	" " "
10	MC 68 None	None	10/22	F	No	A	8593	Orange	No	L Rump, High	25.5	20	" " "
11	MC 68 8580	8579	10/22	F	No	3	8581	Orange	No	L Ribs, High	24.5	8	Highly anesthetized
12	MC 68 6617	6651	10/22	F	No	6	6625	Orange	No	Ham, High	25.0	17	

Table 3. (cont.) Adult Moose Tagged and Collared in Upper Mystery Creek, Kenai Peninsula. October 21 - 29, 1968.

Specimen #	Ear # L	Tag # R	Tagging Date	Sex	W/ Calf	* Age	Collar Tag No.	Collar Color	Ear Streamer (Orange)	Hit Location	Drug Dosage (Succinyl Choline Chloride) (mg)	Time to Go Down (Min.)	Remarks
13	MC 68 8554	8584	10/22	M	No	2	8556	Yellow	No	L Ham	24.5	10	Highly anesthesized. (Killed by hunter 11/15/68 near E entrance of Skilak L. Rd. approx. 4 mi. from tagging site)
14	MC 68 8574	8564	10/23	M	No	2	8558	Yellow	L	Rump by tail	25.0	8	
15	MC 68 8591	8575	10/23	M	No	A	8577	Yellow	L	R Rump, High	27.0	20	
16	MC 68 6968	6965	10/23	M	No	7	6973	Yellow	No	L Ham	26.0	9	
17	MC 68 8691	7570	10/23	M	No	A	8548	Yellow	No	L Ham, High	26.0	Unknown	Very active - Difficult to handle
18	MC 68 8681	8679	10/23	M	No	9	8680	Yellow	No	L Ham	26.0	8	
19	MC 68 7569	7570	10/23	F	No	11	7560	Orange	No	L Ham, Midway Up	26.0	10	" " "
20	MC 68 8573	8588	10/23	F	Yes	7	8594	Orange	R	L Ham, Front	25.0	17	
21	MC 68 8571	8561	10/23	F	No	5	8565	Orange	R	L Ham	25.0	10	
22	MC 68 8590	8582	10/23	F	Yes	8	8600	Orange	R	L Loin, High	25.0	11	
23	MC 68 8678	8677	10/23	F	No	17	8676	Orange	No	L Ham	26.0	13	
24	MC 68 8682	8683	10/23	F	Yes	6	8684	Orange	R	L Ham	26.0	7	
25	MC 68 8589	8583	10/24	F	No	A	8552	Orange	R	L Ham, Front	25.0	11	" " "
26	MC 68 6978	8507	10/25	F	No	10	7936	Orange	R	R Loin, High		12	
27	MC 68 8760	8685	10/28	M	No	Yrl	8754	Yellow	No	L Ham	26.0	35	" " "
28	MC 68 8560	8555	10/29	M	No	Yrl	8752	Yellow	L	L Ham	26.0	5	Highly anesthetized. Artificial respiration necessary for recovery.

* By cementum layering.

Table 4. Summary of Moose Parturition Counts, Tanana Flats, 1969. Counts Made Prior to Tagging Operations.

Area	Date	Newborn Calves				Yearlings				Total Calves	Total Yrlgs	Total FF	Calves: 100 FF	Yrlgs: 100 FF	MM	Tot. Moose/ Moose Hr.	
		FF/0	FF/1	FF/2	FF/?	W/0 FF	FF/1	FF/2	Tagged								
I	5/23/69	62	8	1	3	4	30	1	11	10	36	105	9.5	34.3	141	292	79
								1 adult MM tagged									
II	5/25/69	16	7	0	2	1	3	0	0	7	4	28	25.0	14.5	44	83	55
III	5/24/69	20	6	4	2	0	4	0	0	14	4	34	41.1	11.8	20	72	29
Totals		98	21	5	7	5	37	1	11	31	44	167	--	26.3	205	447	--

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
1	F	A	1/16/67			
2	F	A	1/18/67			
			2/7/67	20	2	2
			3/24/67	65	1/2	2
			2/24/68	402	2 1/2	2 1/2
			5/5/68	473	1	2 1/2
			5/11/68	479	1/2	1 1/2
			5/13/68	484	1/2	1/2
3	F	A	1/19/67			
			3/15/67	62	1 1/2	1 1/2
4	F	A	1/20/67			
			1/24/67	4	0	0
			1/26/67	6	1	1
			2/9/67	20	2 1/2	2
			2/16/67	27	1 1/2	1 1/2

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			2/17/67	28	1 1/2	0
			3/12/67	51	3	2
			3/15/67	54	4 1/2	1 1/2
			12/24/67	338	1 1/2	3
			5/29/68	495	1/4	1 1/2
			1/3/69	714	1 1/2	1 1/2
			1/15/69	726	1 1/2	0
			1/27/69	738	1 1/2	0
5	F	A	1/21/67			
			1/26/67	5	1	1
			2/6/67	16	3/4	1
			2/20/68	379****	1 1/2	2
6	M	A	1/23/67			
			2/12/67	20	2	2
7	F	A	1/25/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			12/19/67	328	3	3
			12/6/68	681	3	1
8	F	C	1/25/67			
			5/18/67	113****		
9	F	A	1/26/67			
			3/16/67	21	2	2
			3/18/67	51	2	0
			2/2/68	372	22	24
			2/15/68	385	16	7
			10/31/68	644	16	2
10	F	A	1/26/67			
11	F	A	1/26/67			
			3/27/67	60	1 1/2	1 1/2
			4/4/67	68	1	3/4
			2/26/68	396	2 1/2	3
			1/24/69	728	1	1

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			2/23/69	759	1/2	1/2
12	F	A	1/27/67			
			2/6/67	10	1/2	1/2
			3/1/67	33	1	1/2
			12/14/67	321	3 1/2	3
			12/27/67	334	3/4	3
			2/6/68	375	1/4	3/4
			3/9/68	407	1/2	3/4
			3/26/68	424	1/2	0
			4/24/68	453	1/4	3/4
			1/14/69	717	3/4	1/4
13	M	A	1/30/67			
			1/15/69	715	1/4	1/4
14	F	A	1/31/67			
			2/9/67	9	2	2

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			3/8/67	27	1	2
			3/9/67	37	1	0
15	F	A	1/31/67			
			1/1/69	700	3	3
16	F	A	1/31/67			
17	M	A	1/30/67			
			9/30/67	243****	7	7
18	F	A	2/2/67			
			2/5/69	697	9	9
19	M	A	2/3/67			
			2/25/67	22	3 1/4	3 1/4
			2/26/67	23	1	4
			3/14/67	39	3	3 1/2
			3/17/67	42	3	1/4
			3/18/67	43	1 1/2	1 1/2

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			3/20/67	45	1 1/2	0
			3/21/67	46	2 1/2	1 1/2
			3/24/67	49	3	1/2
			1/26/68	357	27	28
			1/28/68	359	27	0
			3/15/68	406	10	22
			2/5/69	733	9	1/2
20	F	A	2/4/67			
21	F	A	2/6/67			
			3/26/68	48	3	3
22	F	A	2/7/67			
23	F	A	2/8/67			
			11/5/67	270	11	11
24	F	A	2/2/67			
25	F	A	2/9/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
26	F	A	2/9/67			
27	F	A	2/10/67			
28	F	A	2/13/67			
			2/24/67	11	1	1
			3/13/67	28	1	0
			3/26/67	41	2 1/4	1
29	F	A	2/8/67			
			2/10/67	2	3/4	3/4
			2/18/67	10	1/2	1
30	F	A	2/8/67			
			2/21/67	13	2	2
			1/17/69	708	9 1/2	8
31	F	A	2/8/67			
			2/14/68	371	6	6
32	F	A	2/9/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
33	F	A	2/9/67			
			2/2/69	71	3	3
34	F	A	2/10/67			
			1/5/68	329	17	17
35	F	A	2/10/67			
			2/3/68	324	1	1
			10/1/68	599	5 1/2	5 1/2
36	F	A	2/14/67			
37	F	A	2/19/67			
			2/27/67	8	3	3
			2/14/69	725	1 1/2	1 1/2
38	F	A	2/20/67			
39	F	A	2/21/67			
40	F	A	2/21/67 (See #75)		5	5
			3/15/66			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			2/21/67	343	5	5
			11/21/68	617	4	8 1/2
			3/25/69	740	2 1/2	7 1/2
41	F	A	2/15/67			
42	F	A	2/17/67			
			3/13/67	24****	3	3
43	F	A	2/17/67			
			2/20/67	3	3/4	3/4
			3/8/67	19	1/2	1
			3/30/67	41	1 1/2	3/4
44	F	A	2/21/67			
			3/11/67	18	1	1
			3/13/67	20	2	1
			5/24/67	92	5	3
45	F	A	2/22/67			
46	F	A	2/25/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			3/9/67	12	2 1/2	2 1/2
			3/10/67	13	1 1/2	3/4
			3/12/67	15	2 1/2	1
			3/13/67	16	2 1/2	1/2
			3/14/67	17	1 1/2	1
			12/26/67	304	2	1
			12/28/67	306	2	0
			8/1/68	523	3 1/2	5
			10/28/68	611	1 1/2	4 1/2
			2/12/69	718	2	3
47	F	A	3/1/67			
48	F	A	3/1/67			
			3/27/67	26	5	5
49	F	A	3/4/67			
			3/26/68	388	20	20

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
50	F	Y	3/9/67			
			3/14/67	5	1/2	1/2
			2/5/69	698	3	3
51	F	Y	3/10/67			
			3/13/67	3	1/2	1/2
			3/16/67	6	1/4	1/4
52	F	A	3/10/67			
			3/15/67	5	1 1/2	1 1/2
53	F	A	3/11/67			
54	F	A	3/12/67			
55	M	A	3/12/67			
56	F	A	3/14/67			
			3/6/68	358	18	18
57	F	A	3/14/67			
58	F	A	3/15/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
59	F	A	3/15/67			
60	F	A	2/10/66			
			2/16/66	6	3/4	3/4
61	F	A	2/11/66			
62	F	A	2/15/66			
63	F	A	2/16/66			
			12/23/68	1041****	7 1/2	7 1/2
64	F	A	2/17/66			
65	M	Y	2/18/66			
			4/11/66	52****	3/4	3/4
66	F	A	2/18/66			
			4/18/68	790		
			11/29/68	1015	1 1/2	1 1/2
67	F	A	3/2/66			
68	M	A	3/3/66			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			8/27/66	177****	3	3
69	F	A	3/3/66			
70	M	C	3/4/66			
71	F	A	3/8/66			
72	F	A	3/10/66			
			1/6/67	302	3 1/2	3 1/2
			1/19/67	315	4	3 1/2
			1/22/67	318	1 1/2	4
			3/7/69	1092	1/4	1 1/2
73	F	A	3/11/66	****		
74	M	A	3/11/66			
75	F	A	3/15/66 (Retagged #40)			
76	F	A	3/16/66			
			2/15/67	336	5 1/2	5 1/2
			2/28/67	349	4 1/2	1

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
			3/6/67	356	5	1
			3/22/67	372	4 1/2	1
77	F	A	3/16/66			
78	F	A	3/16/66			
79	F	C	3/16/66			
80	M	A	3/17/66			
			8/20/66	156****	11 1/2	11 1/2
81	F	A	3/18/66			
			1/5/68	658	12 1/2	12 1/2
82	M	A	3/18/66			
83	F	A	3/23/66			
			8/27/67	522****	1 1/2	1 1/2
84	F	A	3/23/66			
85	F	A	3/24/66			
86	F	A	3/25/66			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
87	F	A	3/29/66			
			4/12/67	379	4	4
88	M	C	3/29/66			
89	F	A	4/5/66			
			3/5/68	700	9 1/2	9 1/2
			3/26/68	721		
90	F	A	4/6/66			
91	F	3	4/12/66			
			6/1/66	50	12	12
92	F	A	4/12/66			
93	M	C	4/13/66			
			1/30/67	292	6 1/2	6 1/2
94	F	A	4/16/66			
95 to 100 UNUSED						
101	F	7	3/15/67			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
102	M	4	3/15/67			
103	F	10	3/16/67			
104	F	6	3/16/67			
105	F	10	3/17/67			
			3/21/67	4	1 1/2	1 1/2
			3/30/67	13	1 3/4	1
106	F	3	3/20/67			
107	F	10	3/21/67			
			3/26/67	5	1 1/2	1 1/2
			3/27/67	6	1 1/2	0
			3/29/67	8	0	1 1/2
			3/31/67	10	1 1/2	1 1/2
			4/2/67	12	1 1/2	0
108	M	3	3/21/67			
			11/17/67	241****	71	71

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
109	F	8	3/22/67			
			1/24/68	308	1 1/2	1 1/2
			3/27/68	371	1 1/2	1
			2/25/69	706	3	1 1/2
110	F	7	3/21/67			
111	F	5	3/22/67			
112	F	3	3/24/67			
113	F	A	3/26/67			
114	M	C	3/27/67			
115	F	10	3/27/67			
116	F	1	3/28/67			
117	F	5	3/28/67			
118	F	8	3/29/67			
119	M	2	3/29/67			
			11/1/68	583****	6 1/2	6 1/2

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
120	F	11	4/1/67			
			4/4/67	3	1	1
121	F	5	4/3/67			
122	F	5	2/6/68			
123	F	3	2/6/68			
			11/12/68	311	13	13
124	F	11	2/7/68			
			2/28/68	21	1	1
125	M	A*****	2/7/68			
			11/11/68	278****	1	1
126	F	7	2/9/68			
127	F	12	2/15/68			
128	F	1	2/20/68			
129	F	8	2/21/68			
130	F	5	2/24/68			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
131	F	16	2/26/68			
			3/4/68	7	2	2
			1/3/69	312	1/2	2
			2/4/69	344	1/2	1/2
132	F	10	2/26/68			
133	M	2	2/26/68			
134	M	1	2/28/68			
135	F	2	2/29/68			
136	F	6	3/4/68			
137	F	8	3/4/68			
138	F	4	3/5/68			
139	M	2	3/11/68			
140	F	11	3/12/68			
			11/19/68	252****	56	56
141	F	7	3/13/68			

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
142	M	5	3/14/68			
			3/27/68	14	1/4	1/4
			3/28/68	15	1/4	0
143	M	1	3/15/68			
			3/28/68	13	1/2	1/2
			11/5/68	235****	57	57
144	F	3	3/15/68			
145	M	6	3/19/68			
146	M	3	3/19/68			
147	F	*****	3/19/68			
			3/21/68	2	0	0
148	M	2	3/25/68			
149	M	2	3/26/68			
			3/27/68	1	0	0

Table 5. MATANUSKA VALLEY COLLARED MOOSE MOVEMENTS 1966-1969*

Pendant	Sex	Age	Date***	Elapsed Days	Miles** From Tagging Site	Miles** From Prior Sighting
150	M	7	3/28/68			
?	?		11/13/69		Approximately 50 air miles. (Seen by Julius Reynolds on serial moose survey.)	

* To 3/18/69.
** Air Miles.
*** First date listed is tagging date.
**** Dead.
***** Uncertain determination of age.

Table 6. COLLARED MOOSE OBSERVATION REPORTS BY MONTH, MATANUSKA VALLEY

YEAR	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.		
Winter of:														
1965 - 66		1		1		1								
1966 - 67	7	19	41	4	2			2						
1967 - 68	2	9	14	2	4			1	1		2	6		
1968 - 69	12	9	3					1		3	7	2		
TOTAL	21	38	58	7	6	1	0	4	1	3	9	8	=	156

Table 7. MOVEMENTS OF COLLARED MATANUSKA VALLEY MOOSE PRIOR TO DEATH IN DISTANCE AND TIME

Sex	Age (Yrs)	Pendant #	Date Tagged	Area Observed	Date Observed	Elapsed Days	Distance*
F	A	5	1/21/67	T18N R2E S35 NE 1/4	1/26/67	6	3/4
				T17N R2E S11 SE 1/2	2/6/67	34	2 1/2
				T17N R2E S1 SE 1/4	2/20/68**	394	1 1/2
F	C	8	1/25/67	T18N R1E S31 SW 1/4	5/18/67**	113	0
F	1	9	1/26/67	T17N R1W S1 SE 1/4	3/16/67	49	2
				T17N R1W S1 SE 1/4	3/18/67	51	1 1/2
				T19N R4W S16	2/2/68	372	18
				T18N R4W S25	10/31/68**	644	18
M	3	17	1/30/67	T18N R3W S17 SW 1/4	9/30/67**	211	7
F	8	42	2/17/67	T17N R1W S7	3/13/67**	23	3
F	14	43	2/17/67	T17N R3W S21 SE 1/2	2/20/67	2	3/4
				T17N R3W S29 NE 1/4	3/8/67	19	1/2
				T17N R3W S21 SW 1/4	2/17/67**	40	1
F	A	63	2/16/66	T18N R3W S27 NW 1/4	12/23/68**	1041	7
M	1	65	2/18/66	T18N R1E S14 SE 1/4	4/11/66**	51	3/4

Table 7. MOVEMENTS OF COLLARED MATANUSKA VALLEY MOOSE PRIOR TO DEATH IN DISTANCE AND TIME

Sex	Age (Yrs)	Pendant #	Date Tagged	Area Observed	Date Observed	Elapsed Days	Distance*
M	A	68	3/3/66	T18N R3E S7	8/27/66**	177	3
F	A	72	3/10/66	T17N R3W S14 NE 1/4	1/6/67	312	3
				T17N R3W S36 SE 1/4	1/19/67	325	3 1/2
				T17N R3W S21 NE 1/4	1/22/67	328	1
				T17N R3W S20 SW 1/4	3/7/69**	1091	1 1/2
F	A	73	3/11/66	T18N R3E S32 SW 1/4	3/13/66**	2	0
M	***	80	3/17/66	T17N R4W S14	8/20/66**	156	11 1/2
F	A	83	3/23/66	T18N R2E S32 NE 1/4	8/27/67**	522	1 1/2
M	3	108	3/21/67	T14N R12W S9	11/17/67**	240	71
M	2	119	3/29/67	T17N R2W S11	11/1/68**	582	6 1/2
M	A	125	2/7/68	T17N R3W S16	11/11/68**	276	1 1/2
F	11	140	3/12/68	N. Side Beluga Mt.	11/19/68**	260	56
M	1	143	3/15/68	T18N R3W S18 SW 1/4	3/28/68	13	1/2
				SE Side Yenlo Mt.	11/5/68**	234	57

* Air miles from collaring site.
** Date killed.
*** Uncertain determination of age.

Table 8. COLLARED MOOSE MORTALITIES

Pendant #	Sex	Hunter	Illegal	Unknown	Self-defense	Railroad	Tagging	
5	F		X					
8	F			X				
9	F		X					
17	M	X						
42	F					X		
43	F				X			
63	F		X					
65	M			X				
68	M	X						
72	F			X				
73	F			X				
80	M	X						
83	F		X					
108	M	X						
119	M	X						
125	M	X						
138A	M						X	
140	F	X						
143	M	X						
		—	—	—	—	—	—	
TOTAL	10F+9M	8	4	4	1	1	1	= 19

TABLE 9. PALPATED FEMALE MOOSE, MATANUSKA VALLEY 1967-68

Pendant #	Age	Pregnant	With Last Years Calf	Date Palpated
107	Adult	Yes	Yes	3/21/67
109	Adult	Yes	Yes	3/22/67
110	Adult	Yes	Yes	3/21/67
111	Adult	Yes	No	3/22/67
112	Adult	Yes	Yes	3/24/67
115	Adult	Yes	No	3/27/67
117	Adult	Yes	No	3/28/67
118	Adult	Yes	No	3/29/67
123	3 yrs.	Yes	Yes	2/6/68
126	7 yrs.	Yes	No	2/9/68
128	Yearling+	Yes	No	2/20/68
129	8 yrs.	Yes	No	2/21/68
131	16 yrs.	No	No	2/26/68
135	2 yrs.	Yes	No	2/29/68
136	6 yrs.	Yes	Yes	3/4/68
137	8 yrs.	Yes	Yes	3/4/68
138	4 yrs.	Yes	Yes	3/5/68
141	7 yrs.	No	No	3/13/68
144	3 yrs.	Yes	No	3/15/68
147	4 (?)*	Yes	Yes	3/19/68

* Uncertain determination of age.

Table 12. Record of Ear Tags Used, Tanana Flats Calf Tagging 1969

Area	Tag Series
I	8813-8850, 8852-8870, 8872-8900, 8906, 9051-9053, 9055-9067, 9069-9075, 9101-9106, 9108-9115, 9117-9120, 9122-9161, 9163, 9165-9170, 9172-9174, 9176-9200, 9201-9208, 9211-9213, 9216-9217, 9219-9223, 9225-9241, 9243-9244, 9246-9263, 9301-9315, 9317-9320, 9322-9377, 9374-9400, 9401-9419, 9422-9432
II	9007-9022, 9027-9028
III	9023-9026, 9029-9050, 9072-9073, 9077-9083, 9085-9096, 9098-9100

TABLE 13.

Helicopter tagging time: Military - 6 hr. Commercial - 6.3 hr. Total - 12.3 hr.
Helicopter total time : Military - 7.5 hr. Commercial - 6.3 hr. Total - 13.8 hr.

Aircraft counting time :
Aircraft total time :

Moose Tagging Results

Streamer left ear - Male
right ear - Female

Daily Summary Sheet

DATE 5/26/69	Area I	Area II	Area III	Total			
Total Moose Tagged	42	8	14	64			
No. Males Tagged	19	3	4	26			
No. Females Tagged	23	5	11	39			
Sets of Twins Tagged	6	0	2	8			
One Twin Tagged	1	3	3	7			
Color in Ear	Red/White	Orange/Blue	Pink/Yellow	--			
Choppers Used	Military HU-ID	Hiller 12E	Hiller 12#				
Tag Series	8801-8900	9001-9100	9001-9100				

TABLE 13.

Helicopter tagging time: Military - 6 hr. Commercial - 5.2 hr. Total - 11.2 hr.
Helicopter total time : Military - 7.5 hr. Commercial - 5.2 hr. Total - 12.7 hr.

Aircraft counting time :
Aircraft total time :

Moose Tagging Results

Streamer left ear - Male
right ear - Female

Daily Summary Sheet

DATE 5/28/69	Area I	Area II	Area III	Total			
Total Moose Tagged	18	3	12	33			
No. Males Tagged	6	2	4	12			
No. Females Tagged	12	1	8	21			
Sets of Twins Tagged	1	0	2	3			
One Twin Tagged	1	0	1	2			
Color in Ear	Red/White	Orange/Blue	Pink/Yellow	--			
Choppers Used	Military HU-ID	Hiller 12E	Hiller 12E				
Tag Series	9101-9200	9001-9100	9001-9100				

TABLE 13.

Helicopter tagging time: Military - 7 hr. Commercial - 5.6 hr. Total - 12.6 hr.
Helicopter total time : Military - 8.5 hr. Commercial - 5.6 hr. Total - 14.1 hr.

Aircraft counting time :
Aircraft total time :

Moose Tagging Results

Streamer left ear - Male
right ear - Female

Daily Summary Sheet

DATE 5/29/69	Area I Commercial	Area II Military		Total			
Total Moose Tagged	21	58		79			
No. Males Tagged	12	28		40			
No. Females Tagged	9	30		39			
Sets of Twins Tagged	5	8		13			
One Twin Tagged	1	2		3			
Color in Ear	Red/White	Red/White		Red/White			
Choppers Used	Hiller 12E	Military HU-ID					
Tag Series	9001-9100	9101-9300					

TABLE 13.

Helicopter tagging time: Commercial - 8.9 hr.
Helicopter total time : Commercial - 8.9 hr.

Aircraft counting time :
Aircraft total time :

Moose Tagging Results

Streamer left ear - Male
right ear - Female

Daily Summary Sheet

DATE 5/30/69	Area I						
Total Moose Tagged	30						
No. Males Tagged	16						
No. Females Tagged	14						
Sets of Twins Tagged	3						
One Twin Tagged	1						
Color in Ear	Red/White						
Choppers Used	Hiller 12E						
Tag Series	9301-9400						

TABLE 13.

Helicopter tagging time: 6.8 hr.
Helicopter total time : 6.8 hr.

Aircraft counting time :
Aircraft total time :

Moose Tagging Results

Streamer left ear - Male
right ear - Female

Daily Summary Sheet

DATE 5/31/69	Area I						
Total Moose Tagged	23						
No. Males Tagged	11						
No. Females Tagged	12						
Sets of Twins Tagged	4						
One Twin Tagged	0						
Color in Ear	Red/White						
Choppers Used	Hiller 12E						
Tag Series	9301-9400						

TABLE 14.

AREA MOOSE TAGGING RESULTS, Tanana Flats, 1969

AREA I

	5/26/69	5/28/69	5/29/69	5/30/69	5/31/69		Total									
Total Moose	42	18	79	30	23		192									
No. Males	19	6	40	16	11		92									
No. Females	23	12	39	14	12		100									
Sets of Twins	6	1	13	3	4		27									
One of Set	1	1	3	1	0		6									
Color Marker	Red/White	Red/White	Red/White	Red/White	Red/White											
Tag Series	8801-8900	9101-9200	9001-9300	9301-9400	9301-9400											
Chopper Use	HU-ID	HU-ID	HU-ID Hill 12E	Hill 12E	Hill 12E											

TABLE 15.

AREA MOOSE TAGGING RESULTS, Tanana Flats, 1969

AREA II

	5/26/69	5/28/69	Total
Total Moose	8	3	11
No. Males	3	2	5
No. Females	5	1	6
Sets of Twins	0	0	0
One of Set	3	0	3
Color Marker	Orange/Blue	Orange/Blue	
Tag Series	9001-9100	9001-9100	
Chopper Use	Hill. 12E	Hill. 12E	

TABLE 16.

AREA MOOSE TAGGING RESULTS, Tanana Flats, 1969

AREA III

	5/26/69	5/28/69		Total													
Total Moose	14	12		26													
No. Males	4	4		8													
No. Females	10	8		18													
Sets of Twins	2	2		4													
One of Set	3	1		4													
Color Marker	Pink/Yellow	Pink/Yellow															
Tag Series	9001-9100	9001-9100															
Chopper Use	Hill. 12E	Hill. 12E															

Kenai Peninsula Moose Movements

Determination of movements depended upon sightings made along the road system reported by the public, and during aerial surveillance by Bureau of Sport Fisheries and Wildlife and the Department. Between December 8, 1968 and June 6, 1969, there were fifteen reported sightings along the Sterling Highway, all within ten miles of the tagging site (see map, Fig. 2). There is no way of knowing how many different animals are represented by these reports. Only one of these was a bull. On November 11, 1968, a bull was killed by a hunter along Sterling Highway near the east entrance of Skilak Lake Loop Road. On November 20, 1968, a cow was seen near the Moose Research Station approximately 20 miles northwest of where she was tagged. This represents the greatest known range of any of the tagged moose. Three tagged animals were spotted from the air on December 23, 1968. Two of these, a large bull (likely #15 MC) and a cow were still high up in the tagging area. The third, a cow, was about 800 feet above the highway on Round Mountain. On February 8, 1969, a cow was sighted on Juneau Creek flats and on May 20, 1969, a bull was seen near Moose Lake.

LITERATURE CITED

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