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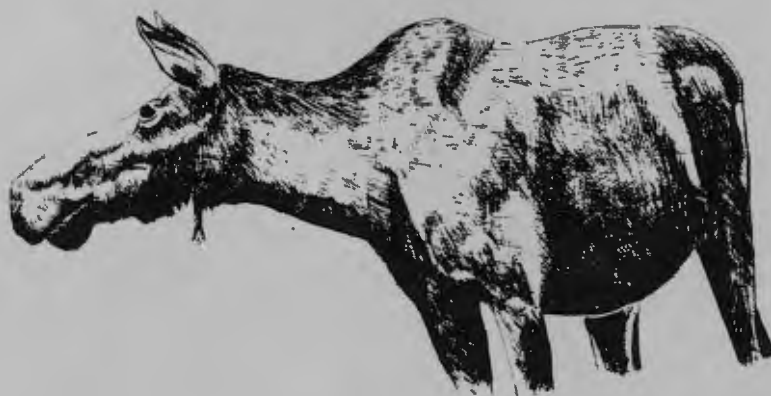


US FISH & WILDLIFE SERVICE--ALASKA

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1989-1990
Survey-Inventory
Report

Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Annual Performance Report of
Survey-Inventory Activities
1 July 1989-30 June 1990

MOOSE



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Walter J. Hickel, Governor
DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner
DIVISION OF WILDLIFE CONSERVATION
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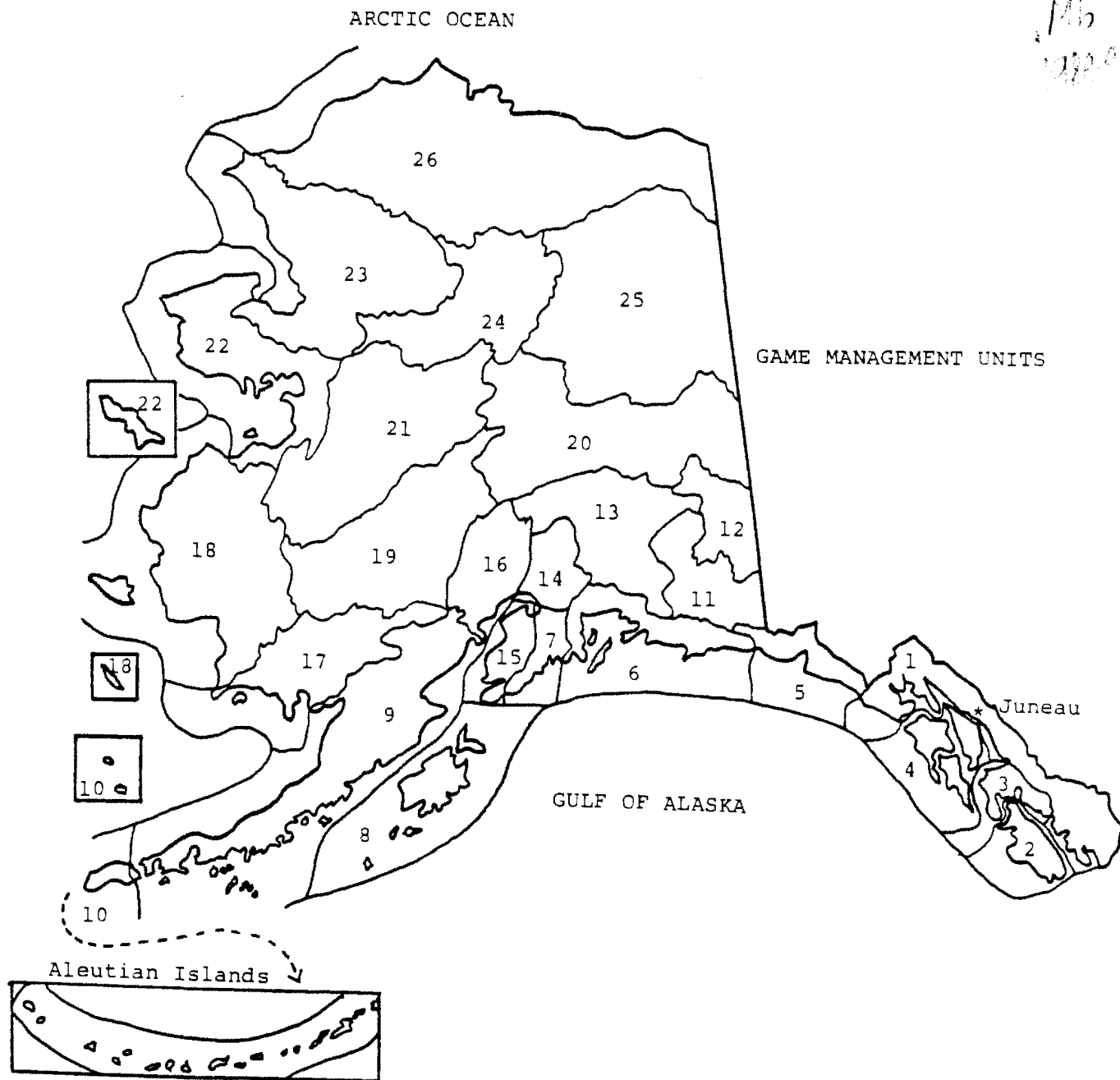
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PROJECT TITLE: Southeast Moose Population Management

OVERVIEW: Moose are found on the mainland coast and some islands in 11 discrete populations that are managed separately: Unuk-Chickamin River valleys, Stikine River, Thomas Bay, Unit 3 islands, Taku River, Berners Bay, Chilkat Range, Chilkat Valley, Yakutat Forelands, Nunatak Bench, and Malaspina Forelands.

Moose populations in most areas appear to be stable, except those of the Stikine River and Nunatak Bench. Calf recruitment and yearling survivals are down on the Stikine River. The population has been reduced at Nunatak Bench since 1986, when the Hubbard Glacier advanced and the rising water depleted habitat. Moose are expanding in Unit 3, and there will be a limited hunting season on Wrangell Island in FY91. There are occasional sightings of moose on Prince of Wales Island in Unit 2.

PROJECT LOCATION: Units 1A and 1B (8,300 mi²)
Ketchikan area, including mainland areas draining into Behm and Portland Canals, and Southeast mainland from Cape Fanshaw to Lemesurier Point and adjacent islands

PROJECT OBJECTIVES:

To maintain a posthunting population of 35, annual harvests of 3, number of hunters at 20, 90 days of effort, and a success rate of 15%.

To maintain a posthunting population of 450, annual harvests of 40, 300 hunters, 2,100 days of effort, and a success rate of 13% in the Stikine River of Unit 1B.

To maintain a posthunting population of 200, annual harvests of 20, 160 hunters, 675 days of effort, and a success rate of 12% in Thomas Bay in Unit 1B.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

In Unit 1A the harvest was monitored with the harvest ticket report. No surveys were conducted. The Stikine River area of Unit 1B was monitored closely in the field during the hunting season. An attempt was made to interview every hunter and to examine every carcass. Jaw and antler measurements were taken from each moose examined, and ages were estimated. The data collected were reconciled with the moose harvest ticket reports. One late-summer and 2 late-winter aerial surveys were conducted to check calf production and survival.

In the Thomas Bay area hunters and carcasses were monitored closely in the field. Registration permits were checked and all hunters were required to turn in their reports. All moose carcasses were checked for antler requirements, and the age of each moose was estimated. One winter aerial survey was conducted to check calf survival.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

The herd in Unit 1A is very small, and few hunters were attracted. The annual harvest varies from zero to six. In 1989 1 moose was killed. Twenty-eight hunters reported hunting 141 days (5-day average). Hunter success was 3.6%.

In the Stikine River area more than 283 hunters hunted over 1,300 days and killed 38 bulls. Hunter success was 13%, and the average hunt lasted 5 days. Yearlings composed 34% of the harvest, down from those of previous years. The late-winter composition survey resulted in less than 8% calves in the herd, down from the >30% reported in a comparable survey in 1980.

The Thomas Bay hunt was restricted to spike/fork bulls only. Permits were issued to 209 people, and 149 hunted. Twenty bulls were killed during 767 hunter days of effort. Hunter success was 13% and hunters averaged 5.5 days afield. Most hunters reported seeing many larger bulls and calves. Based on the apparent success of the antler restriction in improving the bull:cow ratio and calf production, hunters proposed to liberalize the antler restrictions to also include 50-inch (includes 3 brow tines) bulls. The Board of Game approved the new regulation, and it will be in effect for the 1990 season.

PROJECT LOCATION: Unit 1C (7,600 mi²)
The southeast Alaska mainland and the islands of Lynn Canal and Stephens Passage lying between Cape Fanshaw and the latitude of Eldred Rock, including Sullivan Island and the drainages of Berners Bay

PROJECT OBJECTIVES:

To maintain a posthunting population of 150, an annual harvest of 20, 100 hunters, 450 days of effort, and a success rate of 20% in the Taku River.

To maintain a posthunting population of 90, an annual harvest of eight, a posthunting bull:cow ratio of 25:100, 10 hunters, and 10 days of effort in Berners Bay.

To maintain a posthunting population of 150, and annual harvest of 10, 65 hunters, 195 days of effort, and a success rate of 15% in the Chilkat Range.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

We issued 305 registration and 5 drawing permits for the hunts in Unit 1C. A total of 201 hunters participated in both hunts. Permit results are shown in the following table:

<u>Management Area</u>	<u>Success</u>	<u>Days Hunted</u>
Chilkat Range	11%	297
Taku River	26%	339
Berners Bay	100%	9

No aerial surveys were conducted during the reporting period because of unfavorable weather. However, a reconnaissance of the lower Berners River was conducted in September 1989.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Population objectives for the Berners Bay herd were partially met. The estimated posthunting population of 90 was met, and because all 5 permittees harvested moose, the objective of 80% success was exceeded. However, the desired number of hunters, hunter-days, and harvest were not reached. Existing survey data do not suggest that the quota may be liberalized. Additional surveys are needed.

All aspects of Chilkat Range objectives were achieved except one. The hunter success rate was 11%, rather than the desired 15%. But posthunting moose numbers and harvest were right on the objective, and the number of hunters and hunter days exceeded the objective.

Population objectives for the Taku River population were also largely met. Only days of effort fell below the preferred level. The harvest, number of hunters, and success rate surpassed the desired level.

Moose habitat should be cooperatively examined in all 3 ranges with the U.S. Forest Service. The condition of browse should be evaluated and plans laid for its manipulation, if necessary.

PROJECT LOCATION: Unit 1D (2,700 mi²)
That portion of the southeast Alaska mainland
lying north of the latitude of Eldred Rock,
excluding Sullivan Island and the drainages of
Berners Bay

PROJECT OBJECTIVES:

To maintain a posthunting population and bull:cow ratio of 450 and 25:00, respectively; annual harvests of 30; 250 hunters; 500 days of effort; and a success rate of 12%.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

The harvest was monitored and closed when the quota was reached. Harvest data were collected through mandatory reporting of registration permits. Ages of harvested moose were determined by counts of cementum annuli. Aerial surveys were flown in midwinter to estimate sex and age composition of the Chilkat Valley herd. Hunters were polled by questionnaire regarding potential changes to season dates and antler restrictions aimed at allowing a full 2-week hunt. Preliminary work was begun in the spring of 1990 to ascertain browse conditions and establish locations for browse rehabilitation treatments.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Moose populations have increased and are near management objectives for both total posthunting numbers and bull:cow ratios. Recruitment has remained low for several years, precluding attainment of harvest goals. The 1989 season lasted part of 1 day, and of 226 hunters participating; 19 were successful. Hunters expended 226 days of effort, and the success rate was 12%.

PROJECT LOCATION: Unit 5 (5,800 mi²)
Cape Fairweather to Icy Bay, eastern gulf
coast

PROJECT OBJECTIVES:

To maintain a posthunting population of 850, a bull:cow ratio of 20:100, annual harvests of 70, 250 hunters, 1,025 days of effort, and a success rate of 28% in the Yakutat Forelands.

To maintain a posthunting population of 50, an annual harvest of five; 10 days of effort, and a success rate of 50% in Nunatak Bench.

To maintain a posthunting population of 250, bull:cow ratio of 20:100, respectively; annual harvests of 25; 10 hunters; 60 days of effort; and a success rate of 50%.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Harvest and hunter data were analyzed from registration permit reports. Hunts were monitored by Department staff and Fish and Wildlife Protection officers. No aerial surveys were conducted during the reporting period. Weather or visibility conditions precluded aerial surveys. Winter browse was evaluated in Unit 5A for needed treatment. Preliminary agreements were made with the U.S. Forest Service on areas to be treated.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

The absence of aerial sex and age composition counts precluded accurate evaluation of progress in attaining population objectives. In the Yakutat Forelands herd, the posthunting population level was achieved. Harvests, number of hunters, days of effort, and success rate were all below the objective levels; however, the success rate was close to the desired 28%. In the Nunatak Bench area in Unit 5A no hunt was conducted.

In Unit 5B (the Malaspina Forelands) the population was at the desired 250 moose, and the number of hunters (49) was close to the objective of 50. However, hunter success and effort were low.

SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	29.7	21.3	51.0
Actual	35.0	12.1	47.1
Difference	-5.3	9.2	3.9

Actual personnel costs were estimated. Weather conditions prohibited some surveys, so operational costs were less than anticipated. Personnel costs were higher than planned partially because the illness of a Wildlife Biologist III required us to temporarily upgrade a WB I and extend his normal working season.

SUBMITTED BY:

David M. Johnson
Regional Management Coordinator

PROJECT TITLE: Southcentral Alaska Moose Population Management

PROJECT LOCATION: Unit 6 (10,150 mi²)
Prince William Sound and north Gulf Coast

Units 7 and 15 (8,400 mi²)
Kenai Peninsual

Units 9 and 10 (36,250 mi²)
Alaska Peninsula and Unimak Island

Unit 11 (12,800 mi²)
Wrangell Mountains

Unit 13 (23,400 mi²)
Nelchina Basin

Unit 14 (6,600 mi²)
Upper Cook Inlet

Unit 16 (12,300 mi²)
West side of Cook Inlet

Unit 17 (18,800 mi²)
Northern Bristol Bay

PROJECT OBJECTIVES:

Unit 6

To maintain observed moose densities of between 1.8 and 2.0 moose/mi² and bull:cow ratios of 30:100.

Unit 7 and 15

To maintain the existing moose population with a posthunting sex ratio of no less than 15 bulls:100 cows in Unit 7.

To maintain the existing moose population with a posthunting sex ratio of no less than 30 bulls:100 cows in Unit 15.

To maintain the existing moose population with a posthunting sex ratio of no less than 40 bulls:100 cows in Unit 15.

Unit 9

To maintain existing moose densities in areas with moderate (0.5-1.5 moose/mi²) or high (1.5-2.5 moose/mi²) densities.

To increase low-density populations (where habitat conditions are not limiting) to 0.5 moose/mi² by 1995.

To maintain sex ratios of at least 25 bulls:100 cows in low-density areas.

Units 11 and 13

To maintain the existing moose population with a posthunting sex ratio of no less than 15 adults bulls:100 cows.

Unit 14A

To maintain the existing moose population with a posthunting sex ratio of no less than 20 bulls:100 cows.

Unit 14B

To maintain the existing moose population with a posthunting sex ratio of no less than 30 bulls:100 cows.

Unit 14C

To maintain the existing moose population with a posthunting sex ratio of no less than 25 bulls:100 cows.

Unit 16

To maintain a moose population of 10,000 with a posthunting sex ratio of no less than 20 bulls:100 cows.

Unit 17A

To establish a minimum population of 100 moose.

Unit 17B

To achieve and maintain a density of 1 moose/mi² on habitat considered to be good moose range.

Unit 17C

To maintain a minimum density of 0.5 moose/mi² in areas considered to be moose habitat.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Unit 6

Sex and age composition surveys were conducted on 2 January in Unit 6C and 9 January in Unit 6B. In Unit 6C, 258 moose were counted (1.8 moose/mi²): 22 bulls:100 cows, 17 calves:100 cows, 12% calves. The Unit 6B survey resulted in a count of 283 moose (1.5 moose/mi²): 17 bulls:100 cows, 18 calves:100 cows, 13% calves.

The antlered moose registration permit hunt in Unit 6B was monitored by check station and field checks. An Emergency Order closed the hunt on 15 September. A harvest of 30 antlered moose was allowable, and 31 had been reported killed prior to the closure.

The total reported harvest in Unit 6 was 118 (86 males, 32 females). Sixty-nine hunters in Unit 6A averaged 4.2 days afield (37 males, 6 females). In Unit 6B, 178 hunters averaged 4.1 days afield, experienced 23% success, and harvested 41 (31 males, 10 females). In Unit 6C, 34 people averaged 5.6 days afield and experienced 94% success. In Unit 6D, 21 hunters averaged 4.3 days afield and 11% success, harvesting 2 males. Boats were used by 47% of successful hunters for access; 26% used airplanes. Thirty-eight percent of the harvest occurred prior to 8 September.

Teeth from 70 moose were collected and used to determine ages. The average age of 41 males (44% yearlings) was 2.6 years. The average age of 29 females (31% yearlings) was 3.5 years. No winter habitat transect surveys were conducted this period. The Copper River Fire Management Plan was reviewed, and proposed changes were discussed with participating agencies and land owners.

Unit 7

Seven of 32 count areas were surveyed during the 1989 fall sex and age surveys, resulting in the classification of 299 moose: 28 calves:100 cows, 39 bulls:100 cows, 17% calves. Since a census has not been conducted, a population estimate cannot be accurately determined for Unit 7; however, total moose observed during recent fall surveys suggested a moose population between 1,000 and 1,500. The population was stable or declining slightly because of habitat conditions.

A total of 329 hunters harvested 59 bulls. Fifty (85%) successful hunters were residents, compared with 8 (14%) nonresidents and 1 (1%) unspecified. Eighteen (36%) of the 50 residents were also residents of Unit 7. Successful hunters ($N = 58$) reported highway vehicles (39%) as the most often used transportation means; horses and boats were the 2nd and 3rd most popular means of transportation, respectively. Hunters using horses reported the highest rate of success (39%) followed by those few using aircraft (35%).

Hunters in Unit 7 were restricted by regulation to bulls with spike/fork or 50-inch antlers. Twenty-two (39%) hunters reported taking spike/fork bulls, compared with 35 (61%) hunters who harvested large bulls with 50-inch antler spreads or 3 brow tines on at least 1 antler. Of the 57 hunters reporting antler spreads, 22 (39%) harvested bulls with ≥ 50 -inch spreads. The largest single antler class (17 moose) was 50-55 inches (30%).

Unit 9

Fall moose composition surveys were conducted in November and December 1989; 907 moose were counted on 6 trend areas in Unit 9B: 40.4 bulls:100 cows, and 15.5 calves:100 cows. A total of 792 moose was counted on 3 trend areas in Unit 9C: 34.8 bulls:100 cows, 13.5 calves:100 cows. Because of poor weather, only 156 moose were counted in 2 trend areas in Unit 9E: 41.7 bulls:100 cows, 9.7 calves:100 cows.

Hunters reported a total harvest of 232 moose, including 7 females taken during the December registration permit hunt in Naknek River drainage. Bull harvests were 6, 78, 40, and 103 for Units 9A, 9B, 9C, and 9E, respectively. For nonpermit hunts, residents had a success rate of 15.6% versus 24.3% for nonresidents. No census west of Lake Clark or in the Aniakchak/Meshik Area was conducted during this report period.

Unit 11

Fall sex and age counts were not conducted in Unit 11 in 1989 because project personnel were involved in an intensive moose census in Unit 13C. Hunters killed 52 moose in Unit 11 during the 1989-90 season; of these, two (4%) were taken by nonresidents. The success rate was 30%, the average hunt lasted 6.6 days, and 46% of the harvest occurred during the last week of the season. The mean antler size of bulls was 43.5 inches.

Wolves were abundant during the winter of 1989-90, and numerous wolf kills were observed. Wolf predation appeared higher on moose because of the high wolf population and scarcity of an alternate prey species. The Mentasta Caribou Herd moved out of Unit 11 to winter in Unit 12. Snow depths were 175% greater than the 25-year average, causing an increase in winter mortalities of moose.

Unit 13

Fall sex and age counts were conducted in 6 count areas located throughout Unit 13. Counts averaged 65 moose per hour. The overall bull:cow ratio was 25:100, with 15 adult bulls:100 cows. Calves composed 14.5% of the sample. A census was completed over 1,962 mi², including all of Unit 13C and a small portion of Unit 13B east of the Richardson Highway, resulting in a population estimate of 3,096: 1.6 moose/mi², 22 bulls:100 cows. Calves composed 14.6% of the observed moose.

Hunters killed 1,172 moose; nonresidents took 111 (9%). Hunter success was 27%, and the average hunt lasted 5.9 days.

Winter mortality flights were conducted in Unit 13 during March and April to determine overwinter loss. A total of 1,132 moose were counted, with calves composing 7.5% (3.5-10.7%) of the sample, or about half of the percentage of calves that had been

observed the previous fall. Snow depths were recorded throughout the Nelchina Basin, and a winter severity index for moose was calculated. Heavy winter browsing, including some bark stripping on trees, was observed in two areas of riparian habitat where moose had been congregated in large numbers because of deep accumulations of snow.

Fire suppression activities by the Alaska Department of Natural Resources were objected to during fire planning meetings. A wildfire that started in an area designated as limited suppression was initially attacked and put out. The location of the fire was in an area that would have benefitted moose by the resulting browse production. Moose numbers will decline unless fire suppression policies and on-the-ground suppression activities are changed.

Unit 14A

Posthunting sex and age composition was determined from aerial surveys conducted on 30 October and 7 November 1989 ($N = 1,409$ moose). Results indicated a bull:cow ratio of 27:100. Calves composed 24% of the observed moose.

The reported harvest (1-20 September) was 624 moose, including 448 bulls (72%), 173 cows (28%), and 3 unspecifieds (<1%). The transportation methods used by most successful hunters were highway or off-road vehicles (54%), followed by three-wheelers (17%), aircraft (6%), and horses (2%). The average hunt lasted 5.1 days.

Of the 400 drawing permits issued for antlerless moose, 356 persons hunted and 171 (48%) were successful. The composition of the harvest was 163 females (95%) and 8 males (5%). Only 1 hunter was a nonresident. Of the 171 moose harvested, 40% were taken during the 1st week of the season, and 27% and 32% were taken during the 2nd and 3rd weeks, respectively.

Of the 2,546 persons who hunted bulls during the general season, 453 (18%) were successful. Residents accounted for 440 moose (97%); nonresidents, 12 (3%). Fifty-eight percent of the moose were harvested during the 1st week, and 21% and 17% were taken during the 2nd and 3rd weeks, respectively.

From 1 July 1989 to 30 April 1990, 100 moose (41 cows, 26 bulls, 22 calves, 11 unknowns) were killed by trains on the Alaska Railroad. An additional 16 moose were reported struck and not recovered by salvage crews; some of these moose may have died from their injuries. From 1 October 1989 to 30 April 1990, 252 moose (sex-age composition unknown) were killed by highway vehicles.

Unit 14B

Posthunting sex and age composition was determined from a stratified moose trend count conducted 13-15 November 1989 ($N = 563$ moose). Results indicated a bull:cow ratio of 24:100. Calves composed 15.8% of the moose observed.

The reported harvest for the general season (1-30 September) was 173 bull moose. Alaskan residents killed 158 (91%); nonresidents, 10 (6%). The residencies of five (3%) were not specified. Of the 869 hunters who reported, 20% were successful. Twenty-eight percent of the moose were harvested during the 1st week, with 14%, 21%, and 36% taken during the 2nd, 3rd, and 4th weeks, respectively. Forty-three percent of the successful hunters used highway or off-road vehicles, followed by three-wheelers (25%), aircraft (16%), boats (10%), and horses (2%). The average hunt lasted 5.3 days.

From 1 July 1989 to 30 April 1990, 351 moose (150 cows, 99 bulls, 67 calves, and 35 unknowns) were killed by trains on the Alaska Railroad. An additional 36 moose were reported struck but were not found by salvage crews. Some of these collisions probably resulted in fatal injuries. From October 1989 to April 1990, 47 moose (sex-age composition unknown) were killed by automobiles.

Unit 14C

Population size and composition were determined by aerial surveys flown during November, December, and January; 1,329 moose were observed during the surveys, comparable to numbers observed during the past 3 years. Two major drainages, Eagle River and Bird Creek, were not surveyed. Spring survival surveys indicated that approximately one-third of all calf moose in the northern portion of the subunit died of starvation during the winter months. This mortality rate will not affect season lengths or bag limits in 1990.

Hunters killed 120 bulls and 71 cows during the 1989-90 hunting season; of these, 61 bulls were taken during the general season and 59 bulls and 71 cows during special permit seasons. The average hunt lasted 5.7 days, and overall hunter success was 59%. Nearly 40% of all moose were taken on Fort Richardson, and nearly one-third of all moose were taken by bowhunters. Seasons were conducted during September, October, December, and January. An additional 120 moose were killed by vehicles between 1 June 1989 and 31 May 1990.

Unit 15A

In Unit 15A six of the 13 count areas were aerially surveyed during the fall sex and age composition surveys, resulting in the following totals and ratios: 1680 moose classified; 38 calves:100 cows; 22 bulls:100 cows; and 24% calves. The bull:cow ratio increased by 4:100; however, the calf to cow ratio and calf

percentage of total animals classified decreased by 7:100 and 4% respectively, compared with 1988 data.

A winter census was conducted in Unit 15A to determine moose densities. Moose densities in 4 strata were as follows: low-density habitat, 0.11 moose/mi²; medium-density habitat, 3.08 moose/mi²; high-density habitat, 5.02 moose/mi²; and super-high-density habitat, 10.17 moose/mi². The average moose density for all habitats combined was 2.22 moose/mi² in Unit 15A; the estimated population size was 3,432. Using 80% confidence limits suggested this estimate could vary as much as 9.27% or range from 3,114 to 3,750 moose.

An estimated total of 400 archery hunters participated during the 25-29 August preseason archery hunt; 15 spike/fork bulls were harvested. No bulls in the 50-inch or greater size class were taken. Successful hunters averaged 2.3 days afield (range = 1 to 5 days).

A total of 1,098 people reported hunting during the 1-20 September season, resulting in a harvest of 178 bulls and 3 unspecifieds. Successful hunters averaged 4.5 days afield compared with 6.1 days for all hunters. The harvest was composed of 75% (125) spike/fork antlered bulls and 25% (41) bulls with an antler spread of 50 inches or greater or possessing at least 3 brow tines on 1 antler. Residents harvested 99%.

Unit 15B

In Unit 15B West, 2 of 5 count areas were aerially surveyed and 230 moose were classified: 17 bulls:100 cows; 30 calves:100 cows; and 20% calves. Count areas in Unit 15B East were not surveyed during this period because they were last censused in March 1990. The point estimate was 1,039 moose (range = 841-1,237, 80% confidence limits).

Two hundred eighty-five hunters reported hunting during the 1-20 September season, harvesting 41 bulls. Successful hunters averaged 5.4 days afield, compared with 6.4 days for all hunters. Twenty-eight (76%) of the 37 successful hunters reporting their means of transportation used highway vehicles. The next most common method was horses (16%). Hunter success rate was 14%. The harvest was composed of 30 (77%) bulls in the spike/fork category and nine (23%) in the 50-inch or larger class (N = 39).

Moose hunting in Unit 15B East was by drawing permit only. The bag limit was 1 bull with a 50-inch or larger antler spread. One hundred permits were issued, resulting in the harvest of 25 bulls, ranging from of 4 to 11 years (average age = 7.0 yrs).

Unit 15C

One of 8 count areas was surveyed during 1989, resulting in the classification of 546 moose: 36 calves:100 cows, 26 bulls:100

cows, and 21% calves. Although a census has not been conducted, data collected during fall sex and age surveys suggested a population of 2,500 to 3,000 moose.

Seven hundred thirty-seven people hunted during the 1-20 September season; 156 bulls were harvested. Successful hunters spent an average of 3.3 days afield, compared with 6.4 days for all hunters. Successful hunters used the following transportation means for access to hunting areas: ORVs, 63 (44%); highway vehicles, 49 (35%); horses, 15 (11%); aircraft, 8 (6%); and boats, 7 (5%). ORV users accounted for 32% of the reported transportation means and 44% of the reported harvest, making them the most successful group (30% success). Hunters using highway vehicles for transportation were the least successful at 16%. The overall hunter success rate was 21%.

Unit 16

Herd population size and composition for Unit 16B were determined by aerial surveys conducted during October and November. No fall composition surveys were flown in Unit 16A. The number of moose observed during surveys in Unit 16B was 1,536 (38 bulls:100 cows, 26 calves:100cows), comparable to numbers observed during the past 3 years. Extensive late-winter and spring survival studies throughout Unit 16 indicated that most calves (90%), an estimated 50% of the bulls, and 20-30% of the cows had died over winter. This mortality rate will have significant effects on seasons and bag limits for several years.

Hunters harvested 635 moose, including 597 bulls, 28 cows, and 6 unknowns. The harvest size has been similar for the past 4 years. Hunters took 286 moose from Unit 16A and 344 from Unit 16B. The 28 cows were all taken during the December subsistence hunts by residents of Skwentna, Alexander Creek, and Tyonek. The average hunt lasted 5.7 days, and overall hunter success was 27%.

During the September season aircraft were the most popular and efficient methods of transportation; i.e., used by 32% of all hunters and 35% of successful hunters. Hunters using boats (25%) and those using highway vehicles (22%) were the next most popular methods of transportation. People using 3 or 4 wheelers and ATVs composed 18% of all hunters. In Unit 16A, 6% of all hunters used aircraft and 19% highway vehicles. In Unit 16B, 54% used aircraft and only 6% used highway vehicles.

Unit 17

No fall sex and age composition surveys were accomplished during this fiscal year because of a vacancy in the area biologist position during periods having suitable survey conditions. The fall harvest was monitored by personal interviews on the Nushagak River and by analysis of harvest ticket returns, which indicated that 438 hunters killed 175 males during the 1989-90 season. No moose were harvested in Unit 17A, 122 in Unit 17B, and 48 in Unit

17C. The average hunt lasted 6.5 days; hunter success was 40% for residents and 38% for nonresidents. Aircraft were the most common modes of transportation (58%). Sixty-six percent of the harvest occurred during the first 2 weeks of September. Reported harvest during the early season subsistence hunt accounted for 13% ($N = 21$) of the total. Reported harvest during the December subsistence season was 20 moose (12% of the total). The take by local residents was much greater than that reported.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Unit 6

The overall density was 2.1 moose/mi² for Unit 6; the combined density in Units 6B and 6C was lower (1.6 moose/mi²). Because of snow, sex and age composition surveys are seldom conducted prior to the advance of antler drop, thus preventing an accurate measure of sex ratios. The estimated sex ratio of adults approaches 30 males:100 females. Management objectives were met.

Unit 7

Winter conditions were moderate, resulting in normal overwinter moose survival. The selective harvest program initiated in 1987 appears to be increasing the bull:cow ratio (24:100) exceeding the management objective of 15:100. However, hunting opportunities should not be increased until the ratio in Unit 15 allows both units to have similar seasons, thus avoiding major shifts of hunting pressure.

Unit 9

Bull:cow ratios met management objectives; however, calf:cow ratios continued to hamper population growth in low-density areas. Efforts to monitor moose densities within trend count areas were confounded in 1989 because of deeper-than-normal snow depths that affected moose distribution. The Lake Clark portion of Unit 9B no longer has significantly higher calf:cow ratios, compared with the rest of the unit. This decline in calf recruitment, coupled with some overwinter mortalities, caused us to recommend elimination of the antlerless season in that portion of Unit 9B. The Board concurred. If the moose population is to be maintained at medium densities, no females should be harvested until calf recruitment improves to approximately 25-30 calves:100 cows. The situation in Unit 9C, where antlerless moose are still legally hunted, will be monitored closely; at this point, densities appear stable.

Unit 11

The moose population was stable at a density of about 0.7 moose/mi². The overall ratio of 56 bulls:100 cows (50 adult

bulls:100 cows) greatly exceeded the minimum bull:cow objective. Composition counts are again scheduled for the fall of 1990.

There has been little progress in improving moose habitat in this unit, because most of it is in Wrangell Saint Elias National Park/Preserve. Habitat improvement work, including controlled burning to benefit a single species, is prohibited under National Park regulations. However, the unit is included in the Copper River Fire Management Plan, and if a wildfire occurs, only limited suppression response is planned except in areas of human habitation.

Unit 13

Moose numbers declined over much of the unit during this period. There was a 10% decline in the moose per hour figures, and fall calf recruitment was the lowest observed since 1975. The unit-wide adult bull:cow ratio during fall the 1989 surveys just met the objective (15:100). Counts in Units 13E and 13B suggested that the adult bull:cow ratio was as low as 10:100 in some heavily hunted areas.

Calf mortality was very high during the winter. Deep-snow conditions and heavy wolf predation over much of Units 13B, 13C, and 13E nearly resulted in a complete loss of calves. In addition, adult mortality attributable to deep-snow conditions and predation was also high. Moose numbers are expected to decline if wolf predation remains at current levels and severe winters continue.

Current bull harvests are too high because of low calf recruitment and increased adult mortality. To reduce bull harvests, maintain the bull:cow objective in the face of 2 severe winters, and avoid shifts in hunting patterns, the Board reduced the 1990 moose hunting season to 5 days in September and required Tier II permits for a December 1990 hunt.

Wildfires are the best means to improve long-term productivity of moose habitat to help maintain high densities of moose. More effort is needed to ensure that future suppression of wildfires follows guidelines established in the current fire management plan.

Unit 14A

The population was estimated at 4,600 moose. Aerial surveys in the fall of 1989 indicated the posthunting population objective of 20 bulls:100 cows was achieved. However, record snowfall during this past winter resulted in high adult mortality from malnutrition, and deep snow contributed to record mortality from trains and vehicles. Adult winter mortality was estimated at 10% for cows and 25% for bulls. The disproportionate winter loss of bulls probably reduced the bull:cow ratio, and mortality of all sex and age classes resulted in a significant decline in moose

numbers. Recruitment this coming year may not make up the difference. To maintain a posthunting sex ratio of 20 bulls:100 cows and to ensure that the moose population does not decline further, the general hunting season was shortened in the fall of 1990 to a total of 10 days, (1-10 September), and the permit hunt for cows was eliminated.

Unit 14B

A stratified population census was conducted in Unit 14B in December 1987, resulting in an estimate of 2,900 moose (± 450) and a bull:cow ratio of 37:100. A stratified moose trend count conducted in November 1989 indicated the bull:cow ratio was 24:100, which is below the population objective of 30:100. No cows have been harvested since the fall hunting season in 1987, and the harvest of 173 bulls in 1989 was less than the 6-year mean. Therefore, the most likely cause for the decline in the bull:cow ratio can be attributed to a proportionate increase in the number of cows. During 1983-1987 an average of 163 cows were harvested each year.

Record snowfall this past winter contributed the greatest recorded mortality from trains and vehicle collisions (i.e., at least 398 moose). Severe winter conditions also resulted in high calf and adult mortality because of starvation.

An estimated 41-44% of the moose population died during the winter from assorted causes, leaving 1,600 to 1,700 moose from a prewinter population of about 2,900. The severe winter may also have resulted in lower calf production in the spring of 1990 because some cows would still be in poor physical condition at parturition. Because the moose population has significantly declined and adult cow mortalities were high, the hunting season during the fall of 1990 was closed.

Unit 14C

Aerial surveys conducted during late 1989 and early 1990 resulted in a ratio of 34 bulls:100 cows, significantly above the project objective of 25 bulls:100 cows. The bull:cow ratio would have been higher if the Portage area had been counted earlier. Lack of snow delayed the survey there until early January, when 20-30% of all bulls had already shed their antlers.

Unit 15A

Results from 1989 surveys indicated the bull:cow ratio to be 22:100, an increase of 10:100 since 1987. We would like to maintain the population at its current size. Loss of habitat through human development or deterioration from natural plant community succession is the primary factor controlling moose densities in Unit 15A. Attempts to enhance areas through prescribed burning by the U.S. Fish and Wildlife Service and the

Department have been largely unsuccessful because of restrictions necessary to safely burn on the Kenai Peninsula.

During the winter unusually deep accumulations of snow resulted in depths of 3 to 4 feet over most of the western one-third of Unit 15A. Since the majority of the moose used this area as winter range, greater-than-normal mortalities occurred, especially among calves. The census conducted in late winter suggested calves declined from 24% in November to 11% by late February. Although adult mortalities could not be assessed during the 2 surveys, they were insignificant.

No change in season lengths was recommended for 1990. The selective harvest program has gained further public support during the 1989 season, and it should be continued for 1990. These regulations automatically compensated for the greater-than-average winter mortality.

Unit 15B

The moose population in Unit 15B West has slightly exceeded the objective of 15 bulls:100 cows; results from 1989 surveys indicated the bull:cow ratio at 17:100. Although Unit 15B East was not surveyed in 1989, it was well over the objective of 40 bulls:100 cows, based on staff observations and comments from people hunting in the area. Moose habitat in Unit 15B has been deteriorating primarily through natural plant community succession and human encroachment. Since recent censuses have not been conducted, an accurate assessment of population trend is not available; however, the severe winter may have caused the population to decline slightly. No changes in season or bag limits were recommended for the 1990 season.

Unit 15C

The selective harvest program was designed in part to increase bull:cow ratios. Although only 1 count area was surveyed during this reporting period and an accurate assessment of the program's success cannot be made, hunter reports and general field observations suggested that bulls were abundant.

Unit 16

Aerial composition surveys conducted during late 1989 resulted in an average ratio of 38 bulls:100 cows, nearly twice the project minimum of 20:100. Extensive composition flights and a population census should be conducted during 1990-91.

Unit 17

In 1988-89 the posthunting season moose populations were 50-100 in Unit 17A, 2,500-3,000 in Unit 17B, and 1,400-1,700 in Unit 17C. Snowfall during the winter was greater than normal; however, incidental observations and reports from local residents

suggested that winter mortalities were less than feared. All of the radio-collared moose ($N = 25$) in Unit 17C survived the winter. On 20 June 1990, the calf:cow ratio for radio-collared moose in Unit 17C was 91:100. No comparable data were available for other portions of the unit.

SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	271.2	127.6	398.8
Actual	271.2	134.1	405.3
Difference	0.0	+6.5	+6.5

The winter mortality aerial surveys that were conducted in response to deep-snow conditions and reports of starving moose increased operating costs (+6.5). Much more money would have been spent had the Legislature not appropriated additional money.

SUBMITTED BY:

Kenneth W. Pitcher and John N. Trent
Regional Management Coordinators

PROJECT TITLE: Interior Moose Population And Habitat Management

PROJECT LOCATION: Unit 12 (10,000 mi²)
Upper Tanana and White River drainages,
including the northern Alaska Range east of
the Robertson River, and the Mentasta,
Nutsotin, and northern Wrangell Mountains

Unit 19 (36,500 mi²)
Drainages of the Middle Fork and upper
Kuskokwim River upstream from the village of
Kalskag

Unit 20 (50,400 mi²)
Tanana Valley, Central Alaska Range, White
Mountains, Tanana Hills

Unit 21 (44,000 mi²)
Koyukuk River drainages upstream from the
Dulbi River

Unit 25 (53,100 mi²)
Eastern north slope of the Brooks Range

Units 26B and 26C (25,800 mi²)
Upper Yukon River drainage

PROJECT OBJECTIVES:

To maintain a stable or increasing moose population in the
region.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Unit 12

Fall aerial composition surveys were conducted during November
1989. A total of 1,317 moose were classified during 30 hours (44
moose/hr). This figure has increased steadily since 1984,
indicating slow population growth. The posthunting sex ratio was
50 bulls:100 cows, and there were 13 yearling bulls:100 cows,
indicating an acceptable sex ratio and recruitment in excess of
natural mortality. The calf:cow ratio of 35:100 cows ≥ 2 years in
1989 is the second-highest recorded in Unit 12 since 1978, second
only to the 40:100 cows ≥ 2 years in the fall of 1988. A late
March 1990 survey suggested that calf survival during the deep-
snow winter of 1989-90 was excellent, at least in the area
immediately surrounding Tok.

Harvest reports were analyzed; a total of 354 hunters reported
harvesting 76 bull moose (success rate = 21%) during the fall,
representing an 8% decline in the harvest and a 6% decline in

hunter success from the 5-year means. Harvests have declined by over 50% from the average harvest for the period 1963 to 1974, when the moose population was much larger. Unusually dry weather affected moose movements and hunter success. Resident hunters harvested 55 bulls (72%); nonresidents, 20 (26%). One successful hunter did not indicate residency. One hundred seventy-eight unit residents harvested 31 bulls (41% of the harvest), representing 50% of the hunting efforts.

Mean antler width was 45.6 inches; yearlings with <30-inch antlers ($N = 7$) composed 10% of the harvest, bulls with 30.0 to 49.9-inch antlers ($N = 33$) composed 45%, and mature bulls with >50-inch antlers composed 45% of the harvest. Mean antler width was slightly larger than the 1988 mean of 42.5 inches.

A total of 999 plants at 17 sites were measured in the Tok area and along the upper Tanana River to determine relative usage by moose. Higher-than-normal usage was apparent because of above-normal snow depths during the winter. Trampling of plants was more evident than in previous years. Areas of willow/birch that had been treated by crushing were utilized far more heavily than uncrushed areas. Crushed areas were located away from the highways, and only 2 moose were reported killed by automobiles in the Tok area, representing a substantial reduction over automobile-related mortalities of previous years. A survey of adult cow moose radio-collared during the OTH-B Radar Tok Moose Study indicated initial calf production of at least 123 calves:100 cows ≥ 3 years in the Tok area.

Units 19, 21A, and 21E

During 1989 a moose census of a portion of Unit 21A was attempted with personnel from the USFWS-Innoko National Wildlife Refuge. Because of weather and logistical problems, no data were gathered.

Moose population status and trend surveys were conducted in 10 traditional count areas. Although moose populations remained at moderate levels, they were increasing slowly. Population status and trend indications were based on observations of a total sample of 2,746 moose. Moose observed per hour of survey time was 65.9. Overall, calf:cows ratios averaged 36:100, and bull:cow ratios averaged 42:100. While moose numbers were significantly higher than in previous years, bull:cow and calf:cow ratios declined.

In many of the Kuskokwim-area villages, the number of returned harvest reports increased substantially. I believe compliance with reporting requirements has increased significantly in recent years because of increased village visits.

Reported moose harvests in each of the units exceeded the target numbers. Reported success rates exceeded the objectives for each unit. Reported average antler spreads for harvested bull moose

were 48.6 inches and 47.9 inches, respectively, for Units 19B and 19C.

Continuing contact with other major landowners in the units was maintained. During fire season, daily contact was maintained with Department of Natural Resources and Bureau of Land Management personnel, and close adherence to fire plans was maintained.

Units 20A and 20B

A population estimation survey was conducted in November 1989 over 970 mi² of the Minto management area in Unit 20B. The population at the 90% confidence level was estimated to be 1,598 \pm 13.9% moose. The mean density was 1.6 moose/mi². In conjunction with the population estimation survey, we investigated the applicability of a new "minicensus" survey method that would yield population estimates at lower cost. The analysis of the minicensus data involved a number of computer simulations that will be finalized during the next reporting period.

In early May 1990 aerial surveys were flown in Units 20A and 20B to assess overwinter survivals. Calf:cow ratios were 16:100 and 52:100 in Units 20A and 20B, respectively. Bull:cow ratios were 37:100 and 40:100 in Units 20A and 20B, respectively.

During the peak of calving on 24-25 May we conducted aerial surveys in Units 20A and 20B to assess the rate of twinning. Twenty-two percent of the sampled cows on the Tanana Flats in Unit 20A had twins and 44% of the sampled cows on Minto Flats in Unit 20B had twins.

Moose hunters were interviewed in Unit 20A during September. Interviews will be compared with harvest reports received during the fall and winter of 1989-90 to estimate reporting rates among successful hunters.

The harvest in Unit 20A by 1,133 reporting hunters was 371 bulls. The harvest in Unit 20B by 2,221 reporting hunters was 429 bulls. The Unit 20B harvest included 12 bulls taken by subsistence hunters in the Minto area and 50 bulls taken by archers in the Fairbanks area.

Unit 20D

Population trend count surveys were conducted in the Donnelly, Knob Ridge, Delta Agricultural Project, and Central Creek trend count areas (TCA). Moose population size was stable in southwest Unit 20D, although from 1988 to 1989 calf survivals declined from 47 to 27 calves:100 cows in the Donnelly TCA. Moose in southeast Unit 20D were stable in the Knob Ridge area but may have been declining in the Robertson River drainage. There has been a steady decline in the moose sample size and moose/hour in the

Robertson River since 1986, and only 14 calves:100 cows were observed during 1989. Moose were probably declining in northern Unit 20D because of poor recruitment. Although calf:cow ratios improved in 1989, survivals to 18 months of age were poor (3-4 yearling bulls:100 cows).

Composition surveys were flown in the Robertson River and Billy Creek drainages, and composition data were also collected during trend count surveys listed above. The bull:cow ratio varied from 27-31 bulls:100 cows in southwest Unit 20D, and it was declining in the Donnelly TCA. The bull:cow ratio was steady or declining in southeast Unit 20D. It was steady in the Knob Ridge TCA (41 bulls:100 cows), but it declined in the Robertson River from 60 bulls:100 cows in 1986 to 37 bulls:100 cows in 1989. In northern Unit 20D, bull:cow ratios remained steady in the Billy Creek (94 bulls:100 cows) and continued to decline in the Central Creek TCA (36 bulls:100 cows).

A total of 620 people reported hunting, accounting for 127 moose. Moose permits were issued to 15 hunters for the Dot Lake subsistence moose hunt (1 January to 15 February). Subsistence hunters reported killing one moose.

Data on antler size and configuration were collected during the Donnelly trend count survey. Large bulls (>50-inch spread) increased from 9% in 1987 to 15% in 1989. The proportion of yearling bulls remained high (44%).

Unit 20E

Fall aerial composition surveys were conducted during the period 25 October to 28 November 1989. A total of 203 moose were classified during 9.1 hours (22 moose/hr). Less survey effort was expended in the fall of 1989 because of bad weather conditions.

The posthunting sex ratio was 56 bulls:100 cows, and there were 11 yearling bulls:100 cows. I believe that the observed sex ratio would have been better had all areas been surveyed. The observed bull:cow ratio was acceptable, however, and recruitment of 1988 calves was adequate for continued, slow population growth. The ratio of calves:cows ≥ 2 years was 48:100, indicating good survival of 1989 calves to 5 months of age, compared with those of recent years. Winter conditions during the winter 1988-90 were relatively severe in Unit 20E, but with moose density far below carrying capacity, moose probably fared well.

Harvest reports were analyzed. A total of 287 hunters reported harvesting 37 bull moose (success rate = 13%) during the fall of 1989. Exceptionally dry weather affected moose distribution and reduced success, compared with recent years. Local resident hunters ($N = 57$) reported taking 15 bulls (41% of the harvest) for a 26% rate of hunter success. Other Alaska residents ($N = 224$) took 22 bulls (10% success). Twelve moose were taken

in the Yukon River area; the remainder, from southern Unit 20E. The Mosquito Fork yielded the most moose of any drainage ($N = 13$). Mean antler width was 47.3 inches, compared with 46.2 inches in 1988.

Unit 21B

In November 1989 sex and age composition surveys were conducted. Calf:cow ratios were average at 33:100; bull:cow ratios were low at 27:100, and the percentage of yearling bulls in the herd was down to 6%. Seventy-four moose were harvested in the area.

Forty-six neonatal moose calves were radio-collared from the 1989 cohort, and by the end of the reporting period 7 moose with functional radio collars were still alive. Of the 35 known mortalities, black bears killed 69%, wolves 14%, 14% died of unknown causes, and grizzly bear accounted for 3%.

Units 21C and 24

In October 1989 a population estimation survey was conducted in the Kanuti area ($1,500 \text{ mi}^2$) in Unit 24. The population was estimated at the 90% confidence level to be $1,171 \pm 25\%$ moose. Productivity continued to be low in the area. The bull:cow ratio was 78:100, the calf:cow ratio 18:100, and the percentage of yearling bulls in the herd was 7%.

In November 1989 a population estimation survey was conducted in the southeastern area of Unit 24 east of Huslia ($2,757 \text{ mi}^2$). The population was estimated at the 90% confidence level to be $2,865 \pm 22\%$ moose. Productivity in the area was lower than normal because of extensive flooding during the spring of 1989. Bull:cow ratios were 67:100, calf:cow ratios were 23:100, and the percentage of yearlings in the herd was 3.5%. The reported harvest within the area was 146 moose.

Unit 21D

In November 1989 sex and age composition surveys were conducted. Productivity was below normal with the bull:cow ratio 39:100, the calf:cow ratio was 25:100, and the yearling bull percentage of the herd was 7%.

The reported harvest was 182 bulls and 22 cows during 2 season openings. A moose hunter check station was operated during the September season on the Koyukuk River, and 302 hunters were checked.

Sixty-five neonatal moose calves were radio-collared in the Three-day Slough area in May 1990. By the end of the period 66% of the calves were dead. Black bear accounted for 66%, grizzly bear 11%, wolves 5%, drowning 3%, unidentified predators 5%, and unknown causes 11%.

Units 25A, 25B, 25D, 26B, and 26C

Composition ratios of 536 moose in Unit 25A during fall trend surveys were 86 bulls:100 cows, 41 yearlings:100 cows, and 33 calves:100 cows. The population contained 16% yearlings and 13% calves.

The habitat in Unit 25D East was stratified and trend counts were conducted to determine general population size and distribution and establish new baseline trend figures. Moose densities were estimated for high, medium, and low density areas (i.e., 2.04, 0.66, 0.15 moose/mi²). A rough population estimate for the area was 2,001 moose. Composition ratios, based on a count of 328 moose were 67 bulls:100 cows, 10 yearling bulls:100 cows, and 44 calves:100 cows. There were 10% yearlings and 21% calves in the population.

Spring surveys of 204 moose in western Unit 26B resulted in bull:cow and calf:cow ratios of 33:100 and 15:100, respectively. There were 10% calves in the population. Of 600 moose counted during fall trend surveys in eastern Unit 26B and western Unit 26C, there were 54 bulls:100 cows, 28 yearlings:100 cows, and 10 calves:100 cows. Yearlings and calves composed 14% and 6%, respectively, of the population.

There were 195 nonpermit hunters in Unit 25, and 93 (47.7%) succeeded in harvesting moose. The reported harvest was 14 less than that for the preceding year. Unit 25D East had the highest harvest (38 bulls). Eighty-six percent of hunters in Unit 25 were residents. Forty-five people reported hunting in the registration permit hunt in Unit 25D West. They harvested 16 bulls (36% success). In Unit 26, 57 hunters took 26 bulls (45.6% success). All but one of the moose harvested came from Unit 26B.

Of 298 hunters in the entire study area, 52% used boats, 35% used aircraft, and 13% used other types of transportation. Subsistence harvest information was not gathered during the reporting period, but it is expected to have been light. The reported harvest was 26 moose by 120 hunters.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Unit 12

While moose numbers in Unit 12 were still far below the population objective, all indications are that they have been increasing recently, albeit at a very low rate. Increased harvests of grizzly bears and black bears near Tok may be responsible for increased survival of calves. Hunter success will remain below the objective of 35% until the moose population increases substantially. The posthunting sex ratio of at least 40 bulls:100 cows was achieved.

Unit 20E

Moose are probably still increasing in Unit 20E, based on observed yearling recruitment and assumed low adult mortality rates. Grizzly bear and wolf predation limited growth of this moose population, and the population objective of 8,000-10,000 may not be achieved by the year 2000. A posthunting bull:cow ratio of at least 40 bulls:100 cows was achieved.

Units 19, 21A, and 21E

In Units 19, 21A, and 21E, virtually all of the above objectives were met. Further work is needed to obtain population estimates for selected areas. Because reported average antler spreads for harvested moose in Unit 19C were below the targeted measurement of 48.0 inches, some revisions in the objective or season adjustments may have to be considered in the future.

Units 20A, 20B, 20C, 20F, and 25C

Initial application and testing of the minicensus technique to estimate population densities and composition was completed during the reporting period in Unit 20B. Application of this technique, where little previous information has been available, will allow development of density estimates and refined population objectives within the next 2 years.

Unit 20D

Moose continued to do well in southwestern Unit 20D. Calf survivals were fair to good, although they declined significantly in the Donnelly TCA. The decline in calf survival was due to an expanding wolf population in this area. The bull:cow ratio was at the lower limit of the management objective. Antler restrictions should be maintained; some thought should also be given to changing the definition of a bull with 50-inch antlers to a bull having 4 brow tines.

Moose in southeastern Unit 20D were doing fairly well; however, the season should be shortened from 1-20 September to 1-15 September to compensate for the declining bull:cow ratios and poor calf survivals. The poor calf survivals were probably due to an increasing wolf population in this area. Moose were declining in northern Unit 20D. The decline is probably due to predation by wolves and grizzly bears, and it will not be reversed until predator:prey ratios have been altered.

Unit 21B

Determinations have been made into the causes and extent of calf mortalities. Regulatory recommendations will be made to meet objectives.

Unit 21C and 24

Population estimates have been completed for 15% of the area in Unit 24. Population objectives will be developed during the next reporting period.

Unit 21D

The moose population was at or above the objective level.

Unit 25, 26B, and 26C

The moose population in Unit 25D West has been receiving light harvest; it is approaching the objective of 1,300. The area was not surveyed during the reporting period; however, trend surveys will help assess whether the population is indeed growing. Population objectives will be based on stratification and trend surveys.

SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	148.3	74.0	222.3
Actual	148.3	74.0	222.3
Difference	0.0	0.0	0.0

SUBMITTED BY:

Kenton P. Taylor
Regional Management Coordinator

PROJECT TITLE: Arctic Moose Population Management

PROJECT LOCATION: Unit 18 (42,000 mi²)
Yukon-Kuskokwim Delta

PROJECT OBJECTIVES:

To increase populations by 10% a year.

To maintain the bull:cow ratios for both populations at a minimum of 30 bulls:100 cows.

To improve harvest reporting and compliance with hunting regulations.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Aerial surveys of moose populations on the Yukon and Kuskokwim Rivers were completed; trend count areas were surveyed by use of fixed-wing aircraft during December and March along the Kuskokwim and Yukon Rivers, respectively.

In cooperation with the U.S. Fish and Wildlife Service, 21 moose were immobilized and affixed with radio collars. Fifteen moose were from the Kuskokwim River drainage, and six were from the Yukon River drainage. Five additional moose from the Yukon River were collared during the winter of 1989, yielding a total of 26 moose that had been tracked on a monthly basis. Additional funding and support for the project was provided by the Association of Village Council Presidents, Lower Yukon School District, Kuspuks School District, Yupiit School District, and the U.S. Bureau of Land Management.

A hunter check station on the Yukon River during September 1989 was used to collect harvest and age information. A total of 160 hunters went through the check station, and 40 licenses and 36 harvest tickets were issued. Of the 71 moose reported harvested, 50 were sampled for antler measurements and 44 were sampled for aging by extracting an incisor.

Harvest statistics were gathered from harvest tickets turned in by hunters; 120 hunters turned in harvest tickets, and 33 moose were reported harvested. Successful hunters needed an average of 4.5 days afield to harvest a moose. Thirty-one successful hunters used boats as transportation, and two used snowmachines. Nineteen moose (58%) were harvested in the Yukon River drainage, two (6%) were harvested in the Johnson River drainage, and 12 (36%) were harvested east of the Kuskokwim River.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

During the past 5 years (1985-86 to 1989-90), recruitment rates obtained from aerial survey data have ranged from 12% to 21% for both the Yukon and Kuskokwim River populations. Steady increases in moose numbers have been observed in the Yukon River winter trend count areas since 1985; however, fall sex and age composition surveys of the Yukon River population still need to be completed. During December 1989 fall surveys of the Kwethluk, Kisaralik, and 11 other drainages of the Kuskokwim River were completed. The Kuskokwim River population was estimated to be greater than 300 with a bull:cow ratio of 54:100. Improving harvest reporting and compliance with regulations is being achieved through hunter contacts at the check station, radio and newspaper announcements, law enforcement activities, and village meetings.

SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	11.1	8.0	19.1
Actual	11.1	4.9	16.0
Difference	0.0	-3.1	-3.1

Because USFWS/OAS aircraft were used instead of charter aircraft for many surveys, costs were not as high as anticipated.

PROJECT LOCATION: Unit 22 (23,000 mi²)
Seward Peninsula and that portion of the
Nulato Hills draining west into Norton Sound

PROJECT OBJECTIVES:

To assess harvest and collect moose jaws from successful hunters.

To estimate abundance, sex and age composition, and recruitment to yearling age and determine trends in population size and composition.

To identify and reduce the magnitude of unreported harvest.

To develop a moose management plan, with special emphasis on areas adjacent to the road systems.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

A total of 290 moose (208 males and 82 females) were reportedly harvested. A breakdown of the harvest by unit was as follows: 22A, 24; 22B, 80; 22C, 18; 22D, 138; and 22E, 30. Ninety-three percent of the hunters participating in this year's hunt (713)

were residents; the success rate was 41%, and 121 moose jaws were collected from successful hunters.

Ten hours were spent conducting surveys during November in Units 22B and 22D. Data derived from these surveys showed the ratio of males:females to be 31:100 in Unit 22B and 19.5:100 in Unit 22D. The percentages of calves for populations in Units 22B and 22D were 9% and 14%, respectively. During March 9 hours were spent surveying moose in several drainages of Unit 22D; the short yearling recruitment was 16%. The moose census conducted in Unit 22C during the month of March yielded a population estimate of 407 moose (0.3 moose/mi²). Short yearling recruitment for the area was 21%.

A school program developed several years ago explaining the importance of wildlife management concepts, rules, and regulations was used extensively in Unit 22 schools. Several trips were made to villages to explain the need for regulations and harvest reporting as well as to assist licence vendors.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

A combination of inclement weather and improper snow conditions during both spring and fall prevented completion of adequate moose surveys in all units. The moose census conducted in Unit 22C proved to be successful, and acceptable confidence intervals surrounding the population estimate were obtained.

The unreported harvest of moose in Unit 22 is substantial; much of it is attributable to hunters who do not purchase licenses or pick up harvest tickets, rather than by those who hunt outside the seasons. Efforts to inform the public of the importance of wildlife conservation and the need for regulations are starting to bear fruit in some communities, as the number of individuals purchasing licenses and/or picking up harvest tickets has increased. However, additional contact with local residents, particularly with village residents, needs to take place if complete compliance with moose regulations is to be forthcoming. Although several discussions in the form of meetings and a radio talk show took place during the year, the actual ground work for development of a moose management plan was not initiated.

SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	18.8	6.5	25.3
Actual	18.8	8.7	27.5
Difference	0.0	+2.2	+2.2

Costs of the Unit 22A census was higher than anticipated.

PROJECT LOCATION: Unit 23 (43,000 mi²)
Kotzebue Sound/Western Brooks Range

PROJECT OBJECTIVES:

To maintain the population size at existing levels.

To maintain a bull:cow ratio of 40:100 or higher in heavily hunted areas.

To develop updated population objectives in consultation with the public and other agencies.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Fall composition counts were completed during November and December 1989 in trend count areas located in the Tagagawik, Bear Creek, Inmachuk, middle Noatak, Nimiuktuk, and Wulik River drainages. Spring surveys were completed in established trend count areas located in the lower and upper Kobuk and lower Noatak River drainages.

A total of 360 hunters reported harvesting 210 moose (199 bulls, 9 cows, and 2 unspecifieds) during the reporting period. Thirty-seven moose were taken by residents of Unit 23, 54 by nonlocal residents, 99 by nonresidents, and 2 were not specified. One hundred one moose were taken from the Noatak drainage, 57 were from the Kobuk drainage, 30 were from the Selawik drainage, eight were from the northern Seward Peninsula, 10 were from the Kivalina-Wulik area, and the locations of four were unspecified. Two hundred twenty-eight hunters used aircraft as transportation, one used a horse, 87 used boats, seven used ATV's, 14 used snowmachines, and two used highway vehicles.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Data from fall surveys indicated that bull:cow and calf:cow ratios remained the same as previous years in all count areas except in the middle Noatak, where it dropped from 57 bulls:100 cows in 1987 to a low of 35 bulls:100 cows in the fall of 1989. This decline was most pronounced among large bulls. We suspect that intensive trophy hunting by nonlocal hunters may have caused this trend to develop. The calf:cow ratio in the middle Noatak also dropped from an average of 39 calves:100 cows in 1986-88 to a record low of 11 calves:100 cows. The severe winter of 1988-89 and extensive flooding that occurred in the Noatak River drainage during spring break-up probably caused the decline.

Data from spring surveys indicated that calf percentages declined in the Noatak and Kobuk trend count areas during 1990. Both

drainages had flooded extensively during the preceding spring, and calf mortality was undoubtedly higher than normal.

Although moose populations were doing well in Unit 23, the trend towards declining numbers of bulls in the Noatak should be closely monitored. Beginning with the fall 1990 hunting season, nonresidents hunting in the Noatak River drainage may only take bulls with either spike/fork antlers or 50-inch or larger antlers. If this regulatory change fails to alter this trend, more restrictive regulations may need to be enacted.

SEGMENT PERIOD PROJECT COST:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	14.1	9.5	23.6
Actual	14.1	9.5	23.6
Difference	0.0	0.0	0.0

PROJECT LOCATION: Unit 26A (53,000 mi²)
Western North Slope

PROJECT OBJECTIVES:

To establish a management plan and an upper harvest limit for moose in Unit 26A.

To maintain a hunter success rate of not less than 50%.

To maintain spatial and temporal separation of recreational and subsistence hunters.

WORK ACCOMPLISHED DURING THE PROJECT SEGMENT PERIOD:

Late-winter aerial surveys were conducted during 15-19 April 1990 in the Colville River drainage to determine population status and short yearling recruitment. During these surveys, 666 adult moose and 89 short yearlings were observed, yielding a short yearling recruitment rate of 12%.

Harvest data were compiled from harvest reports submitted by hunters. Our data indicated that hunters harvested 41 bulls and 3 cows during the fall 1989 hunting season. The average hunt lasted 6.4 days. The hunter success rate was 68%. Most of the harvest took place during the last week of August (30%) and the first week of September (35%). The harvest was distributed throughout the Colville River drainage; the largest number of animals were taken from the Chandler (35%) and the Anaktuvuk River areas (20%). The distribution of bulls among antler size categories follows: <25 in, none; 25-29.99 in, 2.3%; 30-34.99 in, none; 35-39.99 in, 11.6%; 40-44.99 in, 4.7%; 45-49.99 in,

7.0%; 50-54.99 in, 18.6%; 55-59.99 in, 30.2%; 60-64.99 in, 11.6%; >65 in, 4.7%.

PROGRESS TOWARDS MEETING PROJECT OBJECTIVES:

Because the Unit 26A area biologist position was vacant for half of the reporting period, no fall sex and age composition surveys were completed; however, the annual winter trend survey of the Colville River drainage was completed. A census of the population is planned for the winter of 1991. The hunter success rate was 68%, well above the management goal of 50%. The goal of temporal and spatial separation of recreational and subsistence hunters was realized in most areas. The August hunt, which is restricted to residents of the unit, allowed local hunters to complete much of their hunting before recreational hunters arrived. In addition, local hunters tended to concentrate their efforts in the lower part of the Colville River using boats, and recreational hunters generally flew into the upper regions of the drainage.

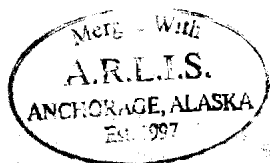
SEGMENT PERIOD PROJECT COSTS:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	6.0	5.0	11.0
Actual	6.0	9.4	15.4
Difference	0.0	+4.4	+4.4

Because chartered aircraft were used instead of state aircraft for the Colville River surveys, costs were higher than anticipated.

SUBMITTED BY:

Steve Machida
Regional Management Coordinator



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Alaska Resources
Library & Information Services
Anchorage, AK



**Federal Aid Project
funded by your purchase of
hunting equipment**

U.S. Fish and Wildlife Service

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