Federal Aid in Wildlife Restoration
Annual Performance Report of
Survey-Inventory Activities
1 July 1992 - 30 June 1993

MOOSE

Susan M. Abbott, Editor

Volume XXIV, Part VIII
Project W-24-1, Study 1.0
December 1993

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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.

Project Location: Subunit 1A and Unit 2 (8,900 mi^2)

Subunit 1A - Ketchikan area including mainland areas draining into Behm and Portland Canals

Unit 2 - Prince of Wales and adjacent islands south of Sumner Strait and west of Kashevarof Passage and Clarence Strait

Project Objectives and Activities:

1) Maintain a posthunting population of 35, annual harvests of 3 bulls by 20 hunters (15% success rate), and 90 days of hunting effort.

2) Monitor the moose harvest, conduct aerial surveys as opportunities arise, and collect anecdotal information from hunters.

Work Accomplished During the Project Segment Period: We monitored the Subunit 1A moose harvest using harvest ticket reports. Staff flew one cursory helicopter survey on 17 April 1993 and seven moose, including three calves. We interviewed known moose hunters opportunistically to ascertain attitudes toward changing this hunt to a registration permit hunt and found no opposition to this concept. The Board of Game instituted a registration permit requirement for 1993.

Progress Towards Meeting Project Objectives: The moose population in Subunit 1A is very small, and few people hunt there. The annual harvest has varied from 0 to 8. During 1992, at least 35 hunters killed 5 moose in the Unuk River drainage, for a success rate of 14%.

Project Location: Subunit 1B and Unit 3 (5,900 mi^2)

Southeast Mainland from Cape Fanshaw to Lemesurier Point and islands of the Petersburg, Kake and Wrangell area

Project Objectives:

1) Maintain a posthunting population of 450 moose, annual harvests of 40 moose, 300 hunters, 2,100 hunter-days of effort, and a success rate of 13% in Subunit 1B south of LeConte Bay (Stikine River area).

2) Maintain a posthunting population of 200 moose, annual harvests of 20 moose, 160 hunters, 675 hunter-days of effort, and a success rate of 12% in Subunit 1B north of LeConte Bay (Thomas Bay area).

3) Establish project objectives for Unit 3.

Work Accomplished During the Project Segment Period: The Stikine River area of Subunit 1B was monitored in the field during the hunting season. We tried to interview every hunter and to examine every carcass. Staff examined jaws, estimated ages, and recorded antler measurements for each moose observed. The data collected were reconciled with the moose harvest ticket reports. We completed two helicopter surveys; herd calf percentage dropped from 16% in December to 9% in March. The Board of Game instituted a registration permit requirement for 1993 but did not adopt a proposed antler restriction.

In the Thomas Bay area of Subunit 1B hunters and carcasses were monitored in the field. Registration permits were checked and all hunters were required to turn in their reports. Staff checked all moose carcasses for antler requirements, and we estimated the age of each harvested moose.

We monitored the hunt on Wrangell and Mitkof islands in Unit 3 using harvest ticket reports. This was complimented by ADF&G personnel using local sources of information.

Progress Towards Meeting Project Objectives: In the Stikine River area about 230 hunters killed 19 bulls. Hunters reported 1,355 days of effort. One cow was found dead during the season but no determination of cause of death was possible. This is the fourth consecutive year of declining harvest and no project objectives were met.

The Thomas Bay hunt was restricted to bulls with antlers that had a spike/fork antler with at least a 50", or three or more brow tines on one side. There were 111 hunters that reported 594 days of effort. All permittees were required to pass a simple test identifying legal antlers. Of 29 bulls killed, 25 were legal, 3 did not meet antler restrictions, and 1 was killed by an ineligible hunter.

In Unit 3 Wrangell Island was open for the third year with a spike/fork-50 inch season. An estimated 27 hunters participated and 2 legal bulls were killed. We estimated hunter effort at 124 days and hunter success at 7%.

Mitkof Island was open for the second year with the same season and bag limit as Wrangell Island. Because the 1991 season closed early due to an excessive kill of bulls

reported from Mitkof Island this year. At least 195 hunters were in the field for 703 days and killed 12 bulls for a success rate of 6%.

At public meetings in Wrangell and Petersburg the consensus was to manage all of Unit 3 by way of an antler restriction permit registration hunt. This change in the regulations was adopted by the Board of Game for the 1993 season.

Project Location: Subunit 1C (7,600 mi^2)
Southeast Alaska mainland, and 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 and Activities:

1) Measurable management objectives for Taku River moose include the following:

Post-hunt moose numbers	150
Annual hunter kill	20
Number of hunters	100
Hunter-days of effort	450
Hunter success	20%

2) Measurable management objectives for Berners Bay moose include the following:

Post-hunt moose numbers	90
Annual hunter kill	8
Post-hunt bull:cow ratio	25:100
Number of hunters	10
Hunter-days of effort	30

3) Measurable management objectives for Chilkat Range moose include the following:

Post-hunt moose numbers	150
Annual hunter kill	10
Number of hunters	65
Hunter-days of effort	195
Hunter success	15%

4) Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: We issued 316 registration and 10 drawing permits for the two hunts covering three management areas in Subunit 1C. A total of 226 hunters participated in these hunts. Permit results for hunters reporting the location of their hunt are as follows:

Management Area	Hunters	Success	Days Hunted
Chilkat Range	121	20%	484
Taku River	93	37%	402
Berners Bay	9	100%	23

We conducted an aerial survey in the Berners Bay area in January 1993. We counted 83 moose in two hours. We estimated bull:cow and calf:cow ratios at 23 and 13:100, respectively.

Progress Towards Meeting Project Objectives: Management objectives for the Berners Bay herd were mostly met. With 83 moose observed during the winter survey, the post-hunt population exceeded the objective of 90. All 9 of the 10 permittees who hunted took moose; thus the objective of 80% success was surpassed. However, only about two-thirds of the desired effort in hunter days was expended.

Most Chilkat Range management objectives were achieved. The kill of 20 moose exceeded the goal of 10, and 121 hunters doubled the objective of 65. Four hundred eighty-four hunter days were expended compared to the objective of 195, and the success rate of 20% surpassed the 15% objective. Because no aerial survey was conducted, the post-hunt population objective was not measured. It should be noted that a high take in the Gustavus area (11 moose) contributed to the success rate for the Chilkat Range as a whole. This kill rate may not be sustainable in the Gustavus area.

Some management objectives for the Taku River moose population were not met, although the number of hunters and hunter days expended were closer to the objectives than in recent years. Hunter success exceeded the management objective (37% compared to the goal of 20%), as did the kill (34 moose compared to 20). The number of hunters (93) and hunter days expended (402) were slightly lower than the objectives. No aerial surveys were conducted, so the post-hunt size of the population is unknown.

Project Location: Subunit 1D (2700 mi^2)
The Southeast Alaska mainland north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay

Project Objectives and Activities:

1) Measurable management objectives for Subunit 1D moose include the following:
Post-hunt moose numbers 450

Post-hunt bull:cow ratio	25:100
Annual hunter kill	30
Number of hunters	250
Hunter-days of effort	500
Hunter success	12%

2) Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: The 1992 Tier II moose season in the Chilkat valley was closed by emergency order before the season opening because of severe conditions the previous winter and apparent poor condition of the moose herd. We flew aerial surveys of the known winter range in the Chilkat drainage in mid-December 1992 and in mid-March 1993.

Progress Towards Meeting Project Objectives: In the wake of the severe 1990-91 winter and because of poor aerial survey results, an emergency order closing the 1992 moose season was issued before the opening. A December 1992 survey indicated adequate moose numbers to resume the hunt, which will be managed as an antler restriction hunt while remaining within the Tier II system. This should allow more people to hunt for a longer period without risking unacceptable impacts to breeding bulls. Up to 200 Tier II subsistence permits will be issued for this hunt.

Project Location: Unit 5 (6,200 mi^2)
Cape Fairweather to Icy Bay, eastern Gulf of Alaska coast

Project Objectives and Activities:

1) Measurable management objectives for Yakutat Forelands moose include the following:

Post-hunt moose numbers	850
Annual hunter kill	70
Post-hunt bull:cow ratio	20:100
Number of hunters	250
Hunter-days of effort	1,025
Hunter success	28%

2) Measurable management objectives for Nunatak Bench moose include the following:

Post-hunt moose numbers	50
Annual hunter kill	5
Number of hunters	10

Hunter-days of effort	60
Hunter success	50%

3) Measurable management objectives for Malaspina Forelands moose include the following:

Post-hunt moose numbers	250
Annual hunter kill	25
Post-hunt bull:cow ratio	20:100
Number of hunters	50
Hunter-days of effort	200
Hunter success	50%

4) Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: We analyzed harvest and hunter data from registration permit reports. Department of Wildlife Conservation staff and Fish and Wildlife Protection officers monitored hunts. Staff flew aerial surveys in portions of Subunit 5A in December 1992. Because of weather conditions and conflicting staff commitments, we were unable to complete these surveys. No surveys were flown in Subunit 5B.

Progress Towards Meeting Project Objectives: In the Yakutat Forelands herd, we estimate the post-hunt moose population objective has been achieved. However, hunter kill (50), number of hunters (199), and hunter-days of effort (901) were below objectives. The hunter success of 25% was near the objective of 28%. In the Nunatak Bench area in Subunit 5A, no hunt was held, so we could not determine management objectives. Previous surveys there indicated a hunt may be possible in the near future.

In Subunit 5B we estimate the existing population is at the desired 250 animals. None of the objectives were met for this population, with the number of hunters (25), hunter days (83), kill (7), and hunter success (28%) below management objectives. The lack of surveys precludes determining if the desired bull:cow ratio was reached in either subunit.

Segment Period Project Costs:

	Personnel	Operating	Total
Planned	$32.2	$21.3	$53.5
Actual	$30.2	$15.3	$45.5
Difference	$2.0	$6.0	$8.0

Explanation: Surveys were not flown.

Submitted by:

Bruce Dinneford
Management Coordinator

Project Title: Southcentral Alaska Moose Population Management

Project Location: Unit 6 (10,150 mi^2)
Prince William Sound and north Gulf of Alaska Coast

Project Objectives:

Subunit 6A (East): Maintain a minimum posthunting population of 350 moose and a minimum bull:cow ratio of 30:100.

Subunit 6A (West): Maintain a minimum posthunting population of 300 moose and a minimum bull:cow ratio of 15:100.

Subunit 6B: Maintain a minimum posthunting population of 300 moose and a minimum bull:cow ratio of 15:100.

Subunit 6C: Increase the posthunting population to a minimum of 400 moose by 1997, and maintain a minimum posthunting bull:cow ratio of 15:100.

Work Accomplished During the Project Segment Period: We completed surveys in Subunits 6A East, 6B, and 6C; and a census in Subunit 6A West. We tallied the number of observable moose during surveys and estimated the total population during a census. Confidence intervals around estimates were calculated at the 90% level. Estimated observable moose in Subunit 6A East was 423 (CI 353-493), with 8% calves (CI 5-10%). Observable moose in Subunit 6B totaled 325 (CI 263-386), including 15% calves (CI 6-24%) and 19 bulls:100 cows (CI 14-24). In Subunit 6C, observable moose totaled 299 (CI 260-339), with 26% calves (CI 22-29%) and 27 bulls:100 cows (CI 20-32). Total estimated population in Subunit 6A West was 295 moose (CI 254-335), including 12% calves (CI 10-15%) and 23 bulls:100 cows (CI 16-29).

The total reported harvest in Unit 6 was 209 moose (135 males, 73 females, and 1 unspecified). In Subunit 6A, 85 males, 45 females and 1 moose of unknown sex were taken by 168 hunters who had a success rate of 78%. In Subunit 6B, 29 males and 15 females were harvested under drawing and registration permit hunts by 143 hunters, with a success rate of 31%. In Subunit 6C, 19 males and 13 females were taken under drawing permit hunts by 35 hunters who had a success rate of 91%. Two males were taken in Subunit 6D.

We monitored the registration hunt for antlered moose in Subunit 6B by field checks of hunters. An emergency order closed the hunt on 3 September. A harvest of 20 antlered moose was allowable, and 29 were reported killed. The 9 animals taken in excess of the

allowable harvest were killed during the 48-hour period between issuance of the closure and its effective date.

Progress Towards Meeting Project Objectives: Management objectives were achieved in all subunits. Populations exceeded minimum levels in Subunits 6A and 6B, and numbers were increasing slowly in Subunit 6C. The bull:cow ratios also exceeded minimums in all subunits where ratios were estimated.

Project Location: Unit 7 (3,520 mi^2)
Kenai Peninsula

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

Work Accomplished During the Project Segment Period: Six of the 30 count areas in Unit 7, excluding the Portage and Placer River drainages were surveyed during the 1992 fall sex and age composition surveys. We classified 248 moose with ratios of 18 calves: 100 cows and 34 bulls:100 cows. Calves accounted for 12% of all moose observed. Total moose observed during recent fall surveys suggest the moose population in Unit 7 is between 1,000 and 1,500 animals.

Based on preliminary harvest reports, 436 hunters reported hunting in Unit 7 during 1992 and 55 bull moose were harvested. Twenty-one (38%) hunters reported taking spike/fork bulls (less than 35 inches) compared to 31 (56%) hunters who harvested large bulls (greater than 39 inches) defined as a 50-inch antler spread or having 3 brow tines on at least 1 antler. Three reports indicated either unknown size or illegal classification. Two moose were reported with antler spreads greater than 60 inches.

Progress Towards Meeting Project Objectives: The selective harvest program initiated in 1987 appears to have increased the bull:cow ratio. The bull:cow ratio (34:100) obtained from 6 count areas met the management objective (minimum of 15:100).

Project Location: Units 9 and 10 (36,000 mi^2)
Alaska Peninsula and Unimak Island

Project Objectives:

• Maintain existing moose densities in areas with moderate (0.5-1.5 moose/mi^2) or high (1.5-2.0 moose/mi^2) densities.

• Increase low-density populations (where habitat conditions are not limited) to 0.5 moose/mi^2 by 1995.

• Maintain sex ratios of at least 25 bulls:100 cows in medium to high density populations and at least 40 bulls:100 cows in low density areas.

Work Accomplished During the Project Segment Period: We surveyed all 3 trend areas in Subunit 9C and 1 area in Subunit 9E (Dog Salmon River) in 1992. Poor snow conditions prevented further survey work. In Subunit 9C, we counted 653 moose and the overall sex ratio was 38 bulls:100 cows. We recorded a ratio of 26 calves:100 cows. In the Dog Salmon count area, we counted 92 moose and ratios were 32 bulls:100 cows and 30 calves:100 cows.

Preliminary 1992 harvests by subunits were 5, 54, 34, and 86 for Subunits 9A, 9B, 9C and 9E, respectively.

Progress Towards Meeting Project Objectives: Poor snow conditions hampered efforts to monitor moose density and composition. Calf production appeared to improve in the 4 trend areas that we surveyed. Only the northern portion of Subunit 9C has a cow moose hunt. Bull:cow ratios in Subunit 9C were at or above the desired ratio. More surveys were needed in Subunit 9E to assess ratios for that area.

Project Location: Unit 11 (12,800 mi^2)
Wrangell Mountains

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

Work Accomplished During the Project Segment Period: We conducted a fall sex and age moose count in 1 count area in 1992. We counted 42 moose at a rate of 13 moose per hour. The bull:cow ratio was 64 bulls:100 cows. Calves comprised 2% of the moose counted.

Preliminary harvest figures indicated hunters killed 23 moose in Unit 11 during the 1992-93 season. Of these, nonresidents took 3 (13%) moose. Hunter success was 19%. The average hunt lasted 7.4 days. Harvest chronology figures show 74% ($\underline{n}$ = 17) of the take occurred during the 1-15 September state sport season, while 26% ($\underline{n}$ = 9) occurred during the remaining portion of the 25 August to 20 September federal subsistence season for local residents. The mean antler size in the harvest was 43.5 inches.

We commented on proposals on land use patterns, access, and development with appropriate and administering agencies when applicable. Discussion about annual review and proposed changes in the Copper River Fire Management Plan occurred with participating agencies and land owners.

Progress Towards Meeting Project Objectives: Composition data in Unit 11 indicated moose numbers were very low with an observed density of 0.1 moose/mi^2. The number of moose counted per hour of survey time during fall composition counts decreased from 51 in 1990 to 29 in 1991 and 13 in 1992. The bull:cow ratio declined by 30% this year but still exceeded the minimum management objective for the unit. Calf production and/or survival in 1992 was almost nonexistent; only 1 calf was observed.

The Park Service did a fall sex and age composition survey in the unit that indicated moose numbers had declined. They recorded seeing 20 moose/hour and a density estimate of 0.5 moose/mi^2, which were slightly higher than our survey results. Early snowfall and record low temperatures may have influenced survey results.

The moose harvest decreased by 45% during 1992. Severe winter weather hampered hunters afield. The harvest appeared to have minimal affect on moose numbers in the unit because only bulls were harvested and the total harvest was very low.

Wolves were abundant in Unit 11 during the winter 1992-93. Wolf predation on moose continued to be high because of high wolf numbers and a scarcity of alternate prey. Using the winter severity index this winter was classified as "average", following 4 "severe" winters.

Project Location: Unit 13 (23,400 mi^2)
Nelchina Basin

Project Objectives: Increase the moose population to an estimated 25,000 by 1995 with a posthunting sex ratio of no less than 15 adult bulls:100 cows.

Work Accomplished During the Project Segment Period: We conducted fall sex and age moose counts in 9 count areas located throughout the unit. We counted 6,438 moose at a rate of 61 moose/hour. The overall bull:cow ratio was 25 bulls:100 cows with 17 adult bulls:100 cows. Calves comprised 16% of the herd.

We attempted a moose census in Subunit 13A during late November but weather and moose movement foiled the survey.

Snow depths were recorded throughout the Basin and a winter severity index for moose calculated. This was the fifth winter in succession classified as "severe" because of deep snow pack.

Hunters killed 617 moose in Unit 13 during the 1992-93 season. A breakdown of the moose harvest shows that 565 bulls were taken during the state-regulated fall season. In addition, 52 bulls were taken under a federally regulated fall subsistence hunt held on federal land in Unit 13 for local residents.

I evaluated land-use proposals which could affect moose habitat and the Copper River Fire Management Plan was reviewed.

We conducted an aerial survey in April to determine overwinter calf survival. In Subunit 13A, calves comprised 15% of the spring sample and 17% of the fall. In Subunit 13B, the composition was 5% calves compared to 10% during the autumn.

Progress Towards Meeting Project Objectives: Moose numbers were estimated to have declined between 25 and 30% over much of Unit 13 between 1987 and 1991. This decline follows a 9-year period (1978-87) when moose numbers increased at approximately 5% per year. Fall 1992 composition count results for the unit were similar to previous years except for an increase in calf production and survival. Comparisons of subunit trends suggested moose numbers and calf recruitment increased in Subunits 13E and 13A, while moose numbers, calf recruitment and bull:cow ratios declined in Subunits 13B and 13C.

The winter was severe, however, snow depths were problematic only in the western portions of the unit, especially Subunit 13E. Wolf predation was a problem in Subunit 13B and calf mortality was observed from November until April.

The bull harvests decreased by 10% from previous year's take. Moose season was lengthened, however, the use of motorized vehicles was prohibited for the first 7 days of the season. We attributed the decline in the harvest to severe weather with record snowfall and cold temperature in early September and vehicle restrictions.

Project Location: Unit 14 (6,600 mi^2)
Subunit 14A
Upper Cook Inlet

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

Work Accomplished During the Project Segment Period: During 13-14 November, we counted moose from aircraft in 19 of 28 survey units previously censused in November 1991. We observed 952 moose and estimated a 3% increase in total numbers from 1991, or a population of 5,300-6,700 moose. We also estimated ratios of 12 bulls:100 cows and 39 calves:100 cows. Calves were 25% of the estimated population. On 24 March, we counted 693 moose in the Knik and Matanuska River valleys and observed 18.9% calves. Overwinter calf survival indicated a mild-moderate winter.

A total of 3,343 hunters reported hunting bulls in the 1-20 September season and 539 (16%) were successful. Of the 400 individuals holding antlerless permits, 351 (88%) hunted and 157 (45%), of those who hunted, were successful.

During 1 July 1992 to 30 April 1993, 7 moose were killed by trains and during 1 September 1992 to 30 June 1993, 114 moose were killed by automobiles. The number of moose thought to have been killed illegally was 20-30, while 3 were reported killed in defense of life and property.

Progress Towards Meeting Project Objectives: The sample of survey units suggested the Subunit 14A posthunting moose population exceeded 6,000 moose and the bull:cow ratio was well below the objective. To strive for a posthunting sex ratio of more than 20 bulls:100 cows and to ensure the moose population does not exceed winter range capacity, regulations for the 1993 hunting season were modified. A legal moose for the general hunting season was limited to bulls possessing antlers with either a spike-fork, or 3 brow tines on at least 1 side or antlers that measure 50 inches or greater in width. The season was lengthened to 32 days (20 August to 20 September) and up to 600 antlerless moose permits were authorized for issuance. Antlerless permits will be divided between 20 August to 20 September (400 permits) and 1-15 November (70 permits). The antlerless moose harvest objective is 220 moose.

Project Location: Subunit 14B
Western Talkeetna Mountains

Project Objectives:

• Increase the moose population to an estimated 2,500 by 1995 with a posthunting sex ratio of no less than 20 bulls:100 cows.

• Achieve and maintain an average annual harvest of 200-300 moose by 1997.

Work Accomplished During the Project Segment Period: Aerial surveys conducted during 10-12 November yielded a bull:cow ratio of 27 bulls:100 cows ($\underline{n}$ = 659 moose). Calves comprised 14% of the moose observed. We estimated the population at 1,900-2,400 moose.

Examination of harvest reports indicated 314 hunters harvested 34 bulls (11% success) during the 1-10 September season. The portion of Unit 14B west of the Anchorage-Fairbanks powerline intertie remained closed to hunting. In addition, 24 moose were killed by trains and 10 were killed by automobiles. We believed not more than 5 moose were killed illegally, and no moose were killed in defense of life and property.

Progress Towards Meeting Project Objectives: Surveys indicated the moose population in Subunit 14B increased slightly since 1990, and remained below the desired level. The number of moose declined approximately 35% during the severe winter of 1989-90; annual surveys should be conducted to determine if this population will increase. Late winter surveys should be initiated to determine recruitment into the population.

The bull:cow ratio is higher than our objective and simple population modeling indicates 115 bulls could be harvested during fall 1993 to reduce the bull:cow ratio to 20 bulls:100 cows. However, to standardize moose seasons regionwide and increase hunter opportunity, regulations for 1993 season were modified. The legal animal for this area will be a bull with either a spike, fork or 3 brow tines on 1 side, or antlers that measure 50 inches or greater in width. The season was lengthened to 20 August to 20 September, and the transportation corridor was again opened for hunting.

This regulation reduces the projected harvest to approximately 45 bulls. With the bull:cow ratio above the desired level, it is possible to increase harvest by issuing drawing permits for any bull. However, the harvest objective will be difficult to meet without an increase in moose numbers.

Project Location: Subunit 14C
Anchorage area and the Placer and Portage river drainages

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

Work Accomplished During the Project Segment Period: We determined herd size and composition for Subunit 14C by aerial surveys flown during November and December. We observed 587 moose. Several drainages were not counted because of poor snow conditions. The ratios of bulls and calves per 100 cows were 35 and 38, respectively. We estimate the current subunit population at 1,900 moose.

Hunters were required to report their success on either a harvest or a permit report depending on whether they participated in the general season or a special permit hunt. The reports require information on harvest location, days hunted, sex of the animal taken, method of transportation, hired services, date of harvest, and antler spread when appropriate.

Over the past decade Subunit 14C has supported a large harvest of cow moose. During the past report period cows comprised 37% of the total harvest, or 79 animals. Despite this harvest the population remained high because of excellent calf survival over many years, possibly related to reduced number of predators throughout much of the wintering range. All cows harvested were killed during special permit hunts. Hunters also took 132 bulls, of which 59 came from the general season and 73 during special permit hunts. Hunters averaged 5.1 days afield and were 23% successful. Nearly 30% of all moose were taken on either Fort Richardson or Elmendorf Air Force Base with an additional 34% taken from the Portage area hunts. Bowhunters took nearly 32% of the total harvest. Seasons ran continuously in 1 portion or another of the subunit from 20 August through 15 January, excluding only from 16 November to 14 December. An additional 90 moose were killed by vehicles in the subunit between 1 June 1992 and 31 May 1993.

Two severe winters since 1989-90, coupled with deteriorating browse has resulted in a 25% population decline in the Fort Richardson-Elmendorf population. Overall, permit numbers will be reduced by 30% for the 1993 season, cow permits by more than 50%. Overharvesting of Portage area moose in 1992 will result in a 1993 reduction of 20 bull permits and 35 cow permits. The population on the military bases was experiencing a gradual, long-term decline, while excellent habitat should allow the Portage population to recover rapidly.

Progress Towards Meeting Project Objectives: Aerial surveys conducted during 1992 found an overall ratio of 38 bulls:100 cows, above the project objective of 25 bulls:100 cows.

Project Location: Unit 15 (4,900 mi^2)
Subunit 15A
Northern Kenai Peninsula

Project Objectives: Maintain the existing moose population with a posthunting sex ratio of no less than 15 bulls:100 cows.

Work Accomplished During the Project Segment Period: We flew 8 of 13 count areas in Subunit 15A during fall sex and age composition surveys. The following totals and ratios resulted: 1,331 moose were classified; 36 calves:100 cows; 16 bulls:100 cows and calves comprised 23% of all moose observed.

An estimated 200 archery hunters participated during the 25-29 August preseason archery only hunt in Subunit 15A resulting in a reported harvest of 12 bulls. Archers were required to follow the same antler restrictions imposed on hunters during the general season, allowing only those bulls with either spike/fork or 50-inch antlers to be hunted. Archers harvested 1 bull in the 50-inch or larger category.

A preliminary total of 1,215 hunters reported hunting Subunit 15A during the 25-29 August (archery) and 1-20 September (general), 1992 season resulting in a harvest of 146 bulls. The harvest was comprised of 96 (66%) spike/fork antlered bulls and 43 (30%) bulls with an antler spread of 50 inches or greater or having at least 3 brow tines on 1 antler and 7 (5%) of unspecified size or illegal. State residents harvested 98% of the moose reported during 1992 for Subunit 15A.

A total of 1,448 applications were received for 20 permits issued to hunt antlerless moose in Skilak Loop Management Area (SLMA). The season was 21-30 September. All permittees hunted and 6 were successful in harvesting an antlerless moose.

Progress Towards Meeting Project Objectives: The Selective Harvest Program enacted in 1987 has allowed the moose population in Subunit 15A to exceed the Department's

objective of 15 bulls:100 cows. Results from annual surveys since 1987 indicated the bull:cow ratio has averaged 19:100, an increase of 6:100 since the program started. Additionally, the department 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 density in Subunit 15A. Attempts to enhance areas through prescribed burning by the USFWS and the Department have been largely unsuccessful because of restrictions necessary to safely burn on the Kenai Peninsula.

The winter of 1991-92 was an unusually deep snow accumulation period with depths of 3-4 feet over most of the western one-third of Subunit 15A. Because most moose in Subunit 15A use this area as winter range, the winter conditions caused higher than normal moose mortality, especially among calves.

The winter of 1992-93 was mild with snow accumulation of less than 2 feet over most of the subunit. Although a winter census was not conducted, the calf survival appeared to be normal. Heavy calf losses during the previous winter probably accounted for the reduction in harvest when compared to 1991.

An increase in season length was recommended for 1993. The selective harvest program has again gained support during the 1992 season and should be continued.

Project Location: Subunit 15B
Central Kenai Peninsula

Project Objectives: Maintain the existing moose population with a posthunting sex ratio of no less than 15 bulls:100 cows in Subunit 15B West and 40 bulls:100 cows in Subunit 15B East.

Work Accomplished During the Project Segment Period: We conducted sex and age composition surveys in 2 of 5 count areas in Subunit 15B East during 1992. We observed 143 moose and this included 84 cows, 42 bulls and 17 calves. The calf:cow ratio was 20:100; the bull:cow ratio was 50:100, and calves comprised 12% of the moose observed.

Preliminary harvest reports indicated 325 hunters reported hunting in 15B West during the 1-20 September season and they harvested 50 bulls. Hunter success rate was 15%.

The bag limit for 15B West was 1 bull with a spike, fork or 50-inch antlers. The 1992 harvest was comprised of 30 (60%) spike or fork antlered bulls, 13 (26%) bulls with an antler spread of at least 50 inches or at least 3 brow tines and 7 (14%) with an unreported antler spread or an illegal bull.

Moose hunting in Subunit 15B East is allowed by permit only with a bag limit of 1 bull with 50-inch or larger antler spread. One hundred permits were issued resulting in the harvest of 31 bulls. Mean age of moose harvested was 5 years (range 3-5 years). The average antler spread was 52 inches (range 38-63 inches).

Progress Towards Meeting Project Objectives: The Selective Harvest Program initiated in 1987 was designed to increase the bull:cow ratio. Areas were not surveyed during 1992 and an assessment of the population's status and trend could not be determined. The bull:cow ratio was suspected to be in excess of 15:100 considering previous survey data. Survey results from Subunit 15B East suggested the sex ratio exceeded the management objective however, the areas surveyed only represented approximately 30% of the area. Staff observations and comments from permittees hunting the area suggested moose were becoming more difficult to find and trophy-sized bulls were less common compared to 5 years ago.

Moose habitat in the subunit was deteriorating primarily through plant succession and to a lesser extent by human encroachment. Because recent censuses have not been conducted, an accurate assessment of population trend was not available. However, the 1989-90 and 1991-92 winters were severe resulting in higher than normal winter mortality especially in the calf and older bull age classes. The winter of 1992-93 was milder, allowing for normal calf and older bull survival.

An increase in season length was recommended for 15B West for the 1993 season because of the mild winter of 1992-93 and success of the Selective Harvest Program. The Selective Harvest Program, designed to protect the male segment of the population from over harvest following a severe winter, should be continued.

Project Location: Subunit 15C
Southern Kenai Peninsula

Project Objectives: Maintain the existing moose population with a posthunting sex ratio of no less than 15 bulls:100 cows.

Work Accomplished During the Project Segment Period: We surveyed 2 of 8 count areas during the 1992 fall sex and age composition surveys. We classified 834 moose with ratios of 33 calves:100 cows and 28 bulls:100 cows. Calves represented 21% of the moose counted.

Preliminary results indicated 1,174 people hunted in Subunit 15C during the 1-20 September season and they harvested 185 moose. The hunter success rate was 16%. Ninety moose (49%) were in the spike/fork class, 84 moose (45%) were classified in the 50-inch category, 9 moose (5%) had antler spreads greater than 60 inches and 1 antler spread exceeded 70 inches. Eleven moose had sublegal or unknown antler sizes.

Five cases of winter mortality were documented even though winter conditions were considered mild.

Progress Towards Meeting Project Objectives: In Subunit 15C the selective harvest program was designed in part to increase bull:cow ratios. Because only 2 count areas were surveyed during this period, an accurate assessment of the program success cannot be made. However, hunter reports and general field observations suggested bulls were more abundant in Subunit 15C and the regulations were generally well supported by a variety of wildlife users. We recommended maintaining the current spike-fork or 50-inch bag limit.

Project Location: Unit 16 (12,300 mi^2)
Subunit 16A
West side Susitna River valley, Yentna-Kahiltna rivers to Chulitna-Tokositna rivers

Project Objectives: By 1995, to achieve a fall population of 3,500-4,000 moose, with a posthunt sex ratio of not less than 20 bulls:100 cows. The human use objective is to achieve an average annual harvest of at least 300 moose by 1997.

Work Accomplished During the Project Segment Period: We conducted aerial surveys during 18-20 November. We estimated the population in Subunit 16A was 2,300-3,400 moose, with 36 bulls:100 cows. Calves comprised 32% of the population.

A total of 847 persons hunted during 1-15 September season and 138 (16%) were successful. Six moose were killed by automobiles, 1 moose was killed in defense of life or property, and an estimated 10 moose were killed illegally.

Progress Towards Meeting Project Objectives: Our surveys indicated the moose population was below the desired level, and has not increased from fall 1990, when the estimate was 2,800-3,400 moose. It was unknown whether this population was limited by habitat, weather or predators, or some combination of these factors. Harvest was not suspected as a limiting factor. Late winter surveys should be conducted to help determine recruitment into the population.

The posthunting sex ratio was well above the desired objective, and harvests should be encouraged. To standardize moose seasons regionwide and provide more hunter opportunity, new regulations were adopted affecting the fall 1993 season. Under the new regulations, a legal animal was a male with a spike, fork or 3 brow tines on 1 side, or with antlers at least 50-inches wide. The season was from 20 August to 20 September. This regime reduced the number of legal bulls in the population, and was expected to substantially reduce the harvest during the general season. Therefore, 100 permits for any

bull, during a 1-15 November season (when success was expected to be higher) were issued.

Project Location: Subunit 16B
West-side of Cook Inlet

Project Objectives: Maintain a population of 6,500-7,500 moose with a posthunt sex ratio of not less than 25 bulls:100 cows.

Work Accomplished During the Project Segment Period: We flew aerial surveys during November and December in portions of the subunit between the Beluga and McArthur rivers.

We observed 276 moose. Poor snow conditions precluded counting in the southern portions of the McArthur River count area. The ratios of bulls and calves per 100 cows were 38 and 18, respectively. The subunit population estimate was 6,500-7,500 moose.

Hunters were required to report their success on either a harvest or a permit report depending on whether they participated in the general season or a special permit hunt. The reports required information on harvest location, days hunted, sex of the animal taken, method of transportation, hired services, date of harvest and antler spread when appropriate.

During the past report period, harvest was limited to bulls only during a 1-20 September season and a mid-winter Tier II hunt. A total of 771 hunters took 192 bulls for a 25% success rate during the general season. A total of 105 (68%) Tier II permittees went afield and they killed 43 bulls. In total, 235 bulls were taken from the subunit. Successful hunters averaged 5.4 days afield and used aircraft (51%), boats (14%) and snowmachines (15%) as their primary means of transportation to their hunting areas.

During 1993, the harvest will be limited to spike-fork or 50-inch bulls only and 30 antlerless moose during the winter Tier II hunt.

The severe winter of 1989-90 resulted in a population decline of 15-20%. Without recent aerial surveys, the precise status of the population was unknown, although extensive mortality was not reported during the past 3 winters. Substantial funding for aerial surveys will be available during fall 1993.

Progress Toward Meeting Project Objectives: Limited aerial surveys during 1992 indicated an overall ratio of 38 bulls:100 cows. This was above the project objective of 25:100 cows.

Project Location: Unit 17 (18,800 mi^2)
Northern Bristol Bay

Project Objectives:

•Establish a minimum population of 100 moose in Subunit 17A.
• Achieve and maintain a density of 1 moose/mi^2 on habitat considered to be good moose range in Subunit 17B.
• Maintain a minimum density of 0.5 moose/mi^2 in areas considered to be moose habitat in Subunit 17C.

Work Accomplished During the Project Segment Period: Fall sex and age moose counts were conducted in 2 trend count areas within Subunit 17C because of poor survey conditions. Counts averaged 66 moose/hour with a total of 304 moose observed. The overall ratios were 53 bulls:100 cows and 71 calves:100 cows (32% calves). We conducted mid-winter aerial surveys along the upper-Nushagak and Mulchatna rivers and their major tributaries. We tallied 319 moose along the Nushagak in 1.6 hours (203 moose/hour), and 304 moose along the Mulchatna in 1.6 hours of flying (188 moose/hour).

We monitored fall harvest by personal interviews on the Nushagak and Mulchatna Rivers and by analysis of harvest ticket returns.

Preliminary data from harvest tickets returned by July 1993 indicated that 522 hunters killed 212 bulls during the 1992-93 season. One moose was harvested in Subunit 17A, 152 in Subunit 17B, and 56 in Subunit 17C. Three moose were harvested in unspecified areas. Hunter success was 48% for local residents, 41% for other Alaska residents, and 34% for nonresidents. Aircraft was the most common mode of transportation (64%). Most of the harvest was distributed throughout the September season (85%). Eighteen bulls were harvested during the December season.

Harvest data from Registration Hunt 983 indicated that 183 hunters harvested 47 bulls and 3 moose of unspecified sex during the 1992-93 season. Moose were not harvested in Subunit 17A, 8 in Subunit 17B, and 34 in Subunit 17C. Eight moose were harvested in unspecified areas. Hunter success was 26% for local residents (43/165) and 39% for other Alaska residents (7/18). Nonresidents were not eligible to participate in this hunt. Boats were the most common means of access (83%).

Progress Towards Meeting Project Objectives: Moose throughout Unit 17 experienced another mild winter in 1992-93 and survival appeared to be high. In Subunits 17B and 17C, trend data suggested the populations were stable or increasing in most areas. Hunter success remained high in spite of ever increasing harvest levels. In recent years moose were common near Nushagak River villages throughout the winter. I believe this was

evidence of an increasing moose population and an indication that local villagers were respecting seasons and bag limits.

Census data for Unit 17 have not been collected since 1987, so there were no recent measures of how the population compares to objective levels. We should budget for a moose census in some portion of Subunits 17B or 17C as soon as possible.

Moose numbers in Subunit 17A continued to be severely depressed. Habitat conditions in that subunit appeared excellent and healthy moose populations were available in adjacent areas. Illegal harvests were the suspected cause for the chronic low population levels in Subunit 17A. Evidence suggested that more than 10 moose were harvested from the subunit during this report period.

Segment Period Project Costs:

	Personnel	Operating	Total	
Planned	179.1	128.4	307.5	
Actual	179.1	73.8		252.9
Difference	0	+54.6	+54.6	

Explanation: Unusual weather created inadequate conditions for complete surveys.

Submitted by:

Jeff Hughes
Wildlife Biologist

Project Title: Region III Moose Population and Habitat Management

Project Location: Units 12, 19, 20, 21, 24, 25, 26(B) and 26(C)

Unit 12

Project Objectives and Activities:

1. Increase the moose population from an estimated 2,500-3,500 to 4,000-4,500 by the year 2010.

   1a. Conduct fall sex and age composition counts in selected trend count areas.

2. Maintain a minimum posthunting sex ratio of 40 bulls:100 cows.

   2a. Monitor hunting pressure and review harvest report data.

Northwestern Unit 12 (Robertson River and upper Tanana Valley):

3. Increase the (1) moose population from an estimated 400 to 800 moose by the year 2000, (2) maintain a minimum of 20 bulls:100 cows along the north slope of the Alaska Range.

   3a. Conduct browse surveys to evaluate winter range condition.

Work Accomplished During the Project Segment Period:

1. During October and November 1992 we flew fall moose composition and trend count surveys in 10 traditional count areas in Unit 12. We classified 1,007 moose in 31.9 survey hours. The moose per hour of survey was 34 which is below the 3-year mean of 40. The calf:100 cows > 2 years old ratio was 30:100 which is slightly below the 5-year average of 32:100. The yearling bull:100 cows ratio was 10:100 which was below the 5-year average of 13:100 and the lowest observed since 1986. The overall bull:cow ratio was 44:100, exceeding the population objective of 40:100.

2. During 1992, preliminary harvest reports indicate that 318 hunters, 285 of which were residents, 14 were nonresidents and 19 hunters of unknown residency, harvested 63 bull moose in Unit 12. The overall success rate was 19.8%. During the past 6 years, the Unit 12 success rate for moose has ranged between 19.8 and 36% and has averaged 25.1%. Harvest and success rate was substantially lower in FY93 than the past three years. Inclement weather during the hunting season is thought to be the primary factor causing the lower harvest. Unit residents

(Northway, Tetlin, and Tok) harvested 21 bulls or 33.3% of the harvest and represented 44.3% of the hunting pressure with 141 hunters. The mean antler width was 44.6 inches which is comparable to the three year mean of 45.1 inches.

3. Browse usage by moose was evaluated within the Tok and upper Tanana River valleys of Unit 12. During FY93, transects were placed through 11 sites and we evaluated 550 shrubs for degree of use by moose (none to high). Results indicate that browse usage by moose in Unit 12 continues to be low and that browse is not an important limiting factor to moose population growth.

Progress Toward Meeting Project Objectives: The bull:100 cows objective is being met. Based on the current trend of the Unit 12 moose population in order to meet the other two objectives, active management would be necessary. The Alaska Board of Game took no action on a management plan designed to benefit the moose population in northwestern Unit 12 during their June 1993 meeting. The management objectives for this unit will be further refined in FY94.

Unit 19, 21A, and 21E

Project Objectives and Activities:

Unit 19:

1. Develop statistically sound population estimates for select portions of the unit by spring 1993.

2. Annually assess population status and trend in portions of the unit where harvest levels make significant impacts on moose populations.

3. Maintain a unitwide reported harvest of at least 500 moose.

4. Maintain a unitwide reported hunter success rate of at least 45%.

5. Maintain a reasonable harvest of cow moose in Subunits 19A and 19D.

6. Maintain an annual average antler spread measurement of at least 48 inches in Subunits 19B and 19C.

7. Assess accuracy of harvest reporting in select portions of the unit.

Subunits 21A and 21E:

1. Delineate moose survey areas in both subunits suitable for use in obtaining annual information on population status and trend.

2. Maintain a moose population in Subunit 21A capable of sustaining a reported harvest of at least 150 bull moose with an average antler spread measurement in excess of 48 inches.

3. Maintain a moose population in Subunit 21E capable of sustaining a reported harvest of at least 125 moose that includes some reasonable opportunity to take cow moose.

4. Maintain a reported hunter success rate of at least 50% in both subunits.

5. Encourage the U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, and Alaska Department of Natural Resources to reduce suppression efforts on wildfires that do not threaten human life, property, or valuable resources, in accordance with provisions of the Alaska Interagency Fire Plans, so that fire can fulfill its natural role of maintaining young, highly productive, and diverse habitats.

6. Increase compliance with the requirement to use harvest tickets and reports.

Work Accomplished During the Project Segment Period:

1. We conducted moose population and status surveys in several traditional count areas during autumn 1992, but a census scheduled for the Holitna Controlled Use Area was not completed because of leaf retention on deciduous vegetation which made survey conditions unsuitable in that area. Several trend counts were completed in Subunits 21A and 21E.

2. Preliminary reported moose harvest in Subunit 19A was 175 with a 69.2% success rate. However, reporting rates are very low (45% in 1988). In units 19B and 19C, reporting rates are better, with 129 (44.8% success) and 103 (44.2% success) moose harvested, respectively, being reported for 1992-1993. Reporting compliance in Subunit 19D has also been poor, with 103 moose being reported for 1992-93. In Unit 19, reported moose harvests continue a steady decline which started during the 1989-90 season. This is probably because of 1) heavy mortality from wolf predation and winter starvation, 2) shortened season lengths, 3) unseasonably warm weather during the 1991 fall season, and 4) an early snow during the fall 1992 season.

   In Subunit 21A, the reported moose harvest includes 101 moose (55.2% success). In Subunit 21E, the reported harvest includes 121 moose and a 71.6% success rate, although it is likely that this level of success is an artifact of poor reporting.

3. Browse surveys were not conducted during summer 1993 because of lack of transportation.

4. No telemetry studies were instigated in the area during this report period.

Progress Toward Meeting Project Objectives: Most harvest objectives were met as outlined above. Cow moose harvests for Subunit 19A will not be allowed for the 1993-94 season because of action by local advisory committees.

Subunit 20A

Project Objectives and Activities:

1. Manage for a November adult population (i.e. excluding calves) of 10,000 to 12,000 adult moose by 1995.

2. Manage for at least 30 bulls:100 cows overall, and at least 20 bulls:100 cows in the Tanana Flats, western foothills, and eastern foothills census areas.

3. Maintain an annual harvest of ≤300 bulls ≥2 years old, and a total harvest of <400 bulls until the population objective is reached.

   3a. Monitor harvest from the general season with harvest report cards and hunter check stations. Assume that adult bulls have antlers ≥30 inches.

4. Allow the harvest of cow moose when the population is above the population objective of 10,000 adult moose.

   4a. Estimate population trend.

Work Accomplished During the Project Segment Period:

1 & 2. Record snowfall in September 1992 resulted in the unprecedented retention of leaves on the deciduous trees throughout much of Interior Alaska. These leaves and bent-over trees caused sightability of moose to be too low to attempt most surveys that we had planned.

We did complete composition surveys in 3 trend areas in the foothills where sightability was not as restrictive. On 16-17 November we completed composition surveys in the Walker Dome, Windy, and most of the Japan Hills trend areas. We were unable to complete 2 sample units in the Japan Hills because of fog and icing conditions in the mountains. The overall bull:cow ratios (32:100) easily exceeded the management objective for at least 20:100 in each trend area (28:100,

31:100, and 36:100, in Windy, Walker Dome, and Japan Hills, respectively). Calf:cow ratios have not varied much (35-37:100) in the Japan Hills since 1987. Calf:cow ratios varied widely in the two other trend areas, ranging from 25:100 (1992) to 49-50 (1988, 1990) in the Walker Dome area, and 35:100 (1987) to 50-51:100 (1990, 1992) in the Windy area.

After the deep snow winter of 1992-93, we conducted pre-calving moose surveys in the northern Tanana Flats to determine over-winter survival of calves. We completed a 10.3 hour survey of 319 mi^2 on 5 May 1993. We observed more 11-month-old calves, or short-yearlings, than we expected, with 29 short-yearlings:100 cows and 19% short-yearlings in the sample. These values exceed those collected during the 2 most recent surveys in 1987 (26:100, 16%) and 1990 (16:100, 12%), but were not as high as from 1981-84 (31-33:100, 19-20%).

We also completed 2 calving surveys in the northern Tanana Flats from 21-28 May 1993 to determine twinning rates. We conducted the first survey during the normal peak of calving (21-24 May) and counted 438 moose; 22 cows with calves, 194 cows without calves, 92 yearlings (both sexes) and 108 bulls. Because so few cows had calves (10%), we thought that calving may have been late. We conducted a second survey in a portion of the same area one week later (28 May) and nearly 3 times as many cows had calves (29%). During the second survey, we counted 186 moose; 28 cows with calves, 31 cows with yearlings but no calves, 37 cows without calves or yearlings, 1 lone calf, and 27 bulls. We did not observe any twins in either survey.

3. The record snowfall in September 1992 shortened many moose hunts and access was very poor throughout the last half of the season. We monitored the last half of the hunting season by operating a hunter check station on the Tanana River at the Chena Pump Campground (one of the primary boat launching areas) from 13 - 20 September 1992. We contacted 63 hunters in 27 groups. Only 3 (4%) of the hunters had harvested moose. Fifty-five percent of the groups used riverboats, 33% used airboats, and 11% used canoes with kicker motors.

   According to the interim report from the 1992-93 moose harvest report cards, 981 hunters harvested 245 moose from Subunit 20A (25% success rate). Of these, 194 (79%) had antler spreads of 30 inches or larger, 44 (18%) had spreads less than 30 inches, and 7 (3%) had unknown antler spreads.

Progress Toward Meeting Project Objectives: To reach the objective for a November moose population of 10,000 to 12,000 adult moose by 1995, the adult population would need to increase approximately 4% per year from the 8,788 adult moose estimated in November 1991. Considering the relatively severe winters recently and the high density of wolves, the population has probably not increased that much. However, if a substantial number of wolves are removed from Subunit 20A as planned beginning in winter

1993-94, this population objective could easily be met by 1995. We anticipate censusing portions of Subunit 20A in November 1993 to update the density and composition data.

We met the objective to maintain at least 20 bulls:100 cows in the western foothills (32:100). We did not survey the Tanana Flats because foliage still remained on many trees, which obstructed visibility.

We met the objectives of harvesting ≤300 adult bulls (194) and <400 total bulls (245). This substantial decrease in the annual harvest was due, in large part, to the unseasonable winter weather that occurred halfway through the moose season.

Subunit 20B

Project Objectives and Activities:

1. Manage for a population of 10,000 adult moose (i.e., excluding calves) by 1993, with 4,000 in Subunit 20B West, and 6,000 distributed over Subunits 20B Central and East.

    1a. "Superstratify" portions of Subunit 20B Central and West in November 1992.

2. Manage for a minimum of 20 bulls:100 cows in each count area and at least 30 bulls:100 cows overall.

3. Sustain an annual harvest of 300-400 bull moose until the population objective is reached.

    3a. Monitor harvest from the general season with harvest report cards and hunter check stations.

    3b. Provide additional moose hunting opportunity within the Fairbanks Management Area with Registration Hunt 986 for bowhunters.

    3c. Limit the moose hunting opportunity in Minto Flats to Tier II hunters if necessary.

Work Accomplished During the Project Segment Period:

1. We did not conduct moose surveys in Subunit 20B during this report period. Record snowfall and cold temperatures in September 1992 resulted in the leaves being retained on deciduous trees throughout the winter, reducing sightability to unacceptable levels. We estimated that in November 1990 the Subunit 20B

contained approximately 7,600 adult moose (9,800 total), including 2,500 adults (3,400 total) in Subunit 20B West; 3,300 adults (4,200 total) in Subunit 20B Central; and 1,800 adults (2,200 total) in Subunit 20B East. The objective for 10,000 adult moose by 1993 will be met if the adult population increased an average of 9% per year since 1990.

3. We contacted hunters along the entire Steese Highway during Labor Day weekend, including 25 hunters in 11 groups. None of the hunters had been successful yet, and only 2 of the groups had seen a moose. The record snowfall in the latter part of the season probably changed moose movements and hunter success.

In 1992-93, hunters reported killing 341 bull moose in Subunit 20B, which is substantially lower than the reported harvest of 430-493 bulls per year during the previous 3 years. The 1992-93 harvest included 276 bulls taken by 2,330 hunters during the general season (12% success), 23 bulls taken by 317 participants of Registration Hunt 986 for bowhunters in the Fairbanks Management Area, and 42 bulls (22 in September, 20 in January or February) taken by 108 participants of Tier II Hunt 985 in the Minto Flats Management Area.

Only 317 of the 453 permittees for the Fairbanks Management Area registration hunt actually hunted. These hunters harvested 21 bulls in September and 2 bulls in November, resulting in a success rate of 7% (23/317). Of the bulls whose antler spreads were reported, 78% (18/23) had antlers ≤30 inches.

Progress Toward Meeting Project Objectives: To meet the objective of 10,000 adult moose by 1993, the adult moose population would have to have increased an average of 9% per year since the last estimate in 1990. The annual growth rate between 1985 (5,700 adults) and 1990 (7,600 adults) was calculated as approximately 7% per year. Winters were much milder during this earlier period than since 1990. Therefore, it is improbably that there will be at least 10,000 adult moose in Subunit 20B by fall 1993. We recommend revising the objective to reach this population size by 1995. We plan to superstratify portions of Subunit 20B in November 1993 to obtain current density and composition data.

We met the objective for an annual harvest of 300-400 bulls (341 reported killed in general and permit hunts in 1992-93). We will review this harvest quota after current density and composition data are obtained.

Many bowhunters are now participating in the FMA hunt and it is growing in popularity. Bowhunter education classes are still being filled and the available classes are not able to meet the demand from bowhunters.

The Minto Flats Management Area can sustain a higher harvest than we have had during the last few years. We issued 150 Tier II permits per year during the last 3 years to provide a harvest quota of 50 bulls. Harvests have only ranged from 28 to 42. We calculated a new harvest quota of 100 bulls and recommended that the Board of Game authorize us to issue up to 250 permits, which they did. The ADF&G will issue 200 for the 1993-94 season.

Subunits 20C and 20F

Project Objectives and Activities:

1. Estimate hunting mortality and document nonhunting mortality when possible.

2. Maintain an annual posthunting sex ratio of at least 30 bulls:100 cows.

3. Estimate moose densities by 1991.

4. Promote moose habitat enhancement by allowing natural fires to alter vegetation.

5. Establish definitive population objectives by 1992.

Work Accomplished During the Project Segment Period:

1. In Subunit 20C, 311 hunters reported taking 66 moose during 1992-93. This harvest is substantially lower than in 1991 when 376 hunters took 142 moose. We attribute unseasonably cold temperatures and early snow to the decline in moose harvest through the Interior. During the previous 7 years (1984-90), 280-308 hunters per year reported taking 70-116 bull moose.

   In Subunit 20F, 130 hunters reported taking 26 moose during 1992-93. From 1984 to 1991, 81-155 hunters per year reported taking 15 to 42 moose. Three bulls harvested in 1992-93 were reported taken during the December season. Three other bulls were reported taken within the 16-25 September time period, so we assume that they were hunting as federal subsistence hunters. A federal subsistence season was open in Subunit 20F from 1-25 September 1992 (10 days longer than the state season). Federal subsistence hunters were required to register (Hunt 990) if they were hunting within the Dalton Highway corridor. Two local residents reported participating in the registration hunt but were not successful.

   Permits to harvest up to 3 moose for the Nuchalawoyya Potlatch were sent to the Acting Executive Director of the Native Village of Tanana who will issue them to hunters in September 1993. The 1993 potlatch will be held later than normal because of deaths and illnesses of several people in Tanana.

Progress Toward Meeting Project Objectives: Relatively little information has been gathered on moose in Subunits 20C and 20F because of greater information requirements in more intensively utilized areas. Overall moose densities are low, but some areas have medium or high densities. Harvest and hunting pressure have not adversely impacted moose populations. Because of these reasons, we recommend that objectives 3 and 5 be deleted.

Subunit 20D

Project Objectives and Activities:

1. Manage for a posthunt population of 4,000-6,000 moose, with 1,200-2,200 in northern Subunit 20D, 2,000-2,500 in southwestern Subunit 20D, and 1,000-1,500 in southeastern Subunit 20D.

2. Manage for a posthunting season bull:cow ratio of 30:100.

3. Manage for a calf:cow ratio of no less than 30:100.

4. Increase the bull age structure in southwestern Subunit 20D so that by 1993 at least 20% of the bulls observed after the hunting season have an antler spread of $\geq$ 50 inches.

Work Accomplished During the Project Segment Period: During fall 1992, project objectives were assessed by conducting population trend count surveys in the Donnelly and Knob Ridge Trend Count Areas (TCA) in southern Subunit 20D and in the Central Creek TCA in northern Subunit 20D, and a composition survey in the Robertson River drainage of southern Subunit 20D. Reported harvest was analyzed for the subunit. Public meetings were held and regulation proposals were written to adjust moose seasons and bag limits.

Progress Toward Meeting Project Objectives: It was not possible to determine progress toward population size objectives because we did not conduct population estimation surveys in Subunit 20D.

Bull:cow ratios meet the objective in the Central Creek (53:100) and Knob Ridge TCAs (38:100), but were slightly below the objective in the Donnelly TCA (27:100) and Robertson River survey (28:100).

Calf:cow ratios meet the objectives in the Donnelly TCA (44:100) and Robertson River survey (38:100), but were below the objective in the Central Creek TCA (4:100). Calf:cow ratios were also below the objective in the Knob Ridge TCA (16:100), however poor survey conditions may have biased calf:cow ratios during this survey.

The bull age structure increased to 12% large bulls in southwestern Subunit 20D, and regulation proposals were adopted to change the definition of a 50-inch antlered bull and help accomplish the age structure objective.

Subunit 20E

Project Objectives and Activities:

1. Increase the moose population from an estimated 2,000-3,000 to 8,000-10,000 with an annual harvestable surplus of at least 3% by the year 2000 in the remainder of Subunit 20E.

   1a. Conduct population censuses in portions of Subunit 20E.

   1b. Conduct browse transect surveys to ensure habitat is capable of sustaining increasing moose densities.

2. Increase the overall hunter success rate to at least 35%, while increasing hunter participation from 200 to 800 hunters by the year 2000 in the remainder of Subunit 20E.

3. Maintain a posthunting bull:cow ratio of at least 40 bulls:100 cows in all areas.

Work Accomplished During the Project Segment Period:

1a. During December 1992, we conducted two censuses in Subunit 20E. In the Mosquito Flats area (central portion of the subunit), we estimated the density as 0.44 moose/mi^2. In the Ladue River area, (eastern 20E), the density was estimated at 0.88 moose/mi^2. The Ladue River area is currently dominated by early seral communities caused by two large wildfires.

1b. During FY93, we conducted browse use surveys in 3 areas in Subunit 20E. We evaluated 151 shrubs and found low browsing rates in all 3 areas which indicates that food availability is not limiting moose population growth in Subunit 20E.

2. During September 1992, preliminary harvest data indicate that 221 hunters, 178 of which were residents, 7 nonresidents, and 36 hunters of unknown residency, harvested 68 bull moose. The 5-year average annual harvest has been 60 bull moose. Local resident hunters (n = 43) reported taking 14 bulls (21% of the harvest) for a 33% hunter success rate. Other Alaskan resident hunters (n = 135) took 41 bulls for a 30% success rate. Seven nonresidents participated in the hunt, killing 3 bulls. Harvest total and hunter success rate have increased substantially

since the season was extended by 5 days to 15 September. Mean antler width was 48 inches which is comparable to the 3-year mean of 47.3 inches.

3. The posthunt sex ratio was 59 bulls:100 cows and 78:100 cows in the Mosquito Flats and Ladue River areas, respectively. There were 11 yearling bulls:100 cows in the Mosquito Flats area and 15:100 in the Ladue River area. The overall subunit bull:cow ratio approximates the ratio determined by sex and age trend counts conducted during the past 3 years and meets the population objective.

   The Mosquito Flats calf:100 cows ratio was 17:100 compared to the Ladue River ratio of 27:100. There has been a substantial difference across the subunit in calf survival to 5 months for the past two years. The average calf:cow ratio in the western portion has been 19:100 compared to 30:100 in the eastern portion. Factors causing the difference are not currently known.

Progress Toward Meeting Project Objectives: The moose population in central Subunit 20E has declined since 1988 but has increased in the eastern portion of the subunit. Overall, the moose population remains at low density (0.4-0.5 moose/mi^2). Wolf and bear predation are the primary limiting factors. At the present predator levels, the moose population will not reach the population or human use objectives by the year 2000. Project objectives will need to be refined if active predator management is not initiated. The Board of Game rejected an Area-Specific Wolf Management Plan during its January 1993 meeting. Depending on the management plan the board adopts for Subunit 20E, the subunit's management objectives for moose may have to be refined in FY94.

Subunits 21B, 21C, 21D, and Unit 24

Project Objectives and Activities:

Subunit 21B:

1. Increase the overall moose population in Subunit 21B to 4,000 to 4,500 moose by 1995.

The floodplain areas of the Yukon and Novi Rivers:

1. Maintain or increase November moose densities to 2.5-4.0 moose per square mile.

2. Maintain a average annual harvest of 40 moose from the desired population of 1,000-1,600 moose.

3. Determine the extent and sources of moose calf mortality from May 1988 through May 1990.

Remainder of the Novi Drainage:

1. Maintain or increase November moose densities to 0.5 moose per square mile.

2. Maintain an average annual harvest of 20 moose from the desired population of 1,100-1,300 moose.

Remainder of Subunit 21B:

1. Maintain or increase November moose densities to 0.5 moose per square mile.

2. Maintain a minimum annual harvest of 30 moose from the desired population of 1,600-1,700 moose.

Subunit 21C:

1. Increase the moose population to 2,500-3,00 in the Melozitna River drainage to increase hunting opportunities.

2. Maintain the moose population of 550-750 in the Dulbi River drainage to sustain hunting opportunities.

Subunit 21D:

1. Maintain a population of at least 4,000 moose south and east of the Koyukuk River, including the Three-day Slough floodplain.

2. Maintain an early winter density of at least 4.0 moose per square mile within the Three-day Slough floodplain.

3. Maintain a post-hunting ratio of 30 bulls:100 cows in the population being monitored within the Three-day Slough trend count area.

4. Develop guidelines for maximum winter browse use within the Three-day Slough area.

5. Maintain a moose population level of 900-1,000 in the Kateel River drainage and develop a population level for the Gisasa River by 1991.

6. Maintain an early winter density of at least 3.0 moose per square mile in floodplain areas along the Yukon River that are subject to both the September and February hunting seasons.

7. Develop a population level and density estimate by 1994 for the remainder of the subunit, including the Yuki and Nulato Rivers.

Unit 24:

1. Manage a moose population at the current level of 3,000-4,000 in the area south of Hughes, including the Koyukuk Controlled Use Area.

2. Increase the moose population to 5,000-6,000 in the area from Hughes to Bettles, including the Kanuti Controlled Use Area and the South Fork drainage.

3. Increase the moose population north of Bettles, excluding the Gates of the Arctic National Park, to 3,000-3,500.

4. Maintain the population in the Gates of the Arctic National Park at 1,300-1,500.

Work Accomplished During the Project Segment Period: We flew fall moose composition surveys during November 1992. In Subunit 21B we classified 313 moose in 140 mi^2 along the Novi River for a density of 2.2 moose/mi^2. The bull:cow ratio at 19:100 was lower than previous years suggesting a decline, calf:cow ratio was 39:100, and the yearling percent in the herd was 2%. In Subunit 21D within the Three-day Slough trend count area the observed density of moose was 13 moose/mi^2. Productivity in the area was good with excellent calf recruitment. The bull:cow ratio was 35:100, the calf:cow ratio was 31:100 with 12% yearlings in the herd. In the Dulbi River count area the bull:cow ratio was 41:100 the calf:cow ratio 43:100 with 6% yearlings in the herd. In the Kaiyuh Slough count area the bull:cow ratio was 37:100, the calf:cow ratio 25:100 with 26% yearlings in the herd.

In May 1993 we conducted a moose calf twinning survey to see the percentage of cows producing twins. The twinning rate was 44%. Numbers lower than 20% usually indicate environmental stress either from hard winters or poor forage conditions. Calving was later than normal perhaps because of unusual fall conditions interfering with rut.

In Subunit 21B, 98 hunters reported taking 42 bull moose. We operated a moose hunter check station at the mouth of the Nowitna. Thirty-four moose were taken by 125 hunters within the drainage which includes part of Subunit 21A. Twenty-four hunters were unit residents, 53 were Alaska residents, and 10 were nonresidents. The number of hunters using the Nowitna has remained stable.

Four moose were taken by 19 hunters in Subunit 21C. Six hunters were nonresidents, with 2 hunters residency was unknown, and 11 were Alaska residents.

In Subunit 21D, preliminary harvest data shows 264 hunters taking 185 moose of which 170 were bulls and 15 were females. Harvest has been slowly increasing within the

subunit with the majority coming from the Koyukuk River. We operated a moose hunter check station on the Koyukuk River and checked 330 hunters through. They took 165 moose with residency and harvest as follows: 149 unit residents took 51 moose, 153 Alaska residents took 96 moose, and 28 nonresidents took 19 moose. A severe cold spell from the middle of the hunting season until the end greatly reduced hunting success by forcing hunting out of the field early.

The total reported harvest in Unit 24 was 128 moose by 220 hunters. The number of hunters using the Dalton Highway for access has stabilized at 100 and they took 27 moose, a reduction over the past 5 years.

Progress Toward Meeting Project Objectives: In Subunit 21B, moose populations within the Nowitna drainage have reversed their decline but remain 23-42% below the population objectives, and evidence indicates that bull:cow ratios are depressed. The sources of calf mortality are known, and USFWS is working on adult winter mortality rates.

The moose population is currently at or above the population management objective level in Subunits 21C and 21D. A stratification of the relative density of moose in Subunit 21C was attempted but only 20% was completed because of bad weather. Population estimates were not done for the Gisasa, Yuki and Nulato rivers.

The continuation of winter browse surveys will aid in preparing the guidelines for maximum allowable levels within the Three-day Slough area.

In southern and northern Unit 24, the moose population is currently at or above the objective level. In central Unit 24, the population is 66% below the population objective. Predation and excessive harvest is keeping the population low and until the predator:prey ratios are altered the population objective will probably not be reached.

Subunits 25A, 25B, and 25D

Project Objectives and Activities:

Unit 25 Overall:

1. Estimate subsistence needs and harvest levels by 1991 and reduce the harvest of cow moose by 5-10% annually beginning in 1990.

Subunit 25A:

1. Ensure that the mean annual antler spread of harvested bulls does not drop below 50 inches.

2. Maintain a posthunting sex ratio of at least 50 bulls:100 cows.

3. Determine population size, composition, and distribution by 1991.

Subunit 25B:

1. Determine population size, composition, and distribution by 1991.

Subunit 25D West:

1. Increase the population to 1,300 moose by 1990; prevent the annual harvest from exceeding 50 bulls; and determine the effect of recent and older burns on moose distribution, movements, production, and survival by 1992.

2. Determine population size, composition, and distribution by 1990; maintain a stable population of approximately 2,300 moose; and determine productivity.

Work Accomplished During the Project Segment Period: The USFWS obtained funding for a moose census in Subunit 25D West, and ADF&G provided support for this effort, which occurred in early November 1992. The census yielded an estimate of 600 moose in a 4,500-mi^2 area, indicating that moose density continues to be low in this area. The ADF&G also assisted USFWS biologists in completing a composition survey of moose in the East Fork of the Chandalar River, which also revealed low densities of moose. No composition surveys were conducted in Subunits 25A, 25B, or 25D during this period.

Other activities related to moose management included presentations in village schools about moose and other wildlife, working with USFWS Yukon Flats Refuge staff to develop a challenge grant agreement to produce two educational videos on moose management, and writing scripts and obtaining pictures for these videos. We contacted numerous moose hunters in Fort Yukon during September through a week-long check station effort.

Harvest data for all subunits are being analyzed, and final figures will be available in July 1993. The number of moose harvested in the area will probably be lower than previous years as a result of extensive flooding in May and unusually cold weather during September 1992.

Progress Toward Meeting Project Objectives: Little progress was made toward meeting existing objectives for Subunits 25A and 25B because of lack of funds. However, objectives for antler size and bull:cow ratios are being met in Subunit 25A. In Subunit 25D a census provided information on population size and composition. The objective of harvesting no more than 50 bulls in Subunit 25D is being met, but additional effort should be focused on reducing the illegal take of cow moose. The educational videos being

produced will focus on the effects of shooting cow moose and should be helpful in educating local residents.

Revised objectives for moose in Subunits 25A, 25B, and 25D are as follows:

Unit 25 Overall

1. Continue efforts to communicate with and educate local residents about moose management.

2. In cooperation with USFWS, monitor moose population status as funding permits.

Subunit 25A

1. Evaluate the possible effects of increasing hunting on moose along major drainages along the Brooks Range.

2. Educate local residents regarding the importance of not taking cow moose.

3. Cooperate with USFWS in periodically determining population status.

Subunit 25B

1. Plan for and conduct biannual trend counts in selected areas for comparison with previous trend counts.

2. Educate local residents regarding the importance of not taking cow moose.

Subunit 25D

1. In cooperation with USFWS, plan for and conduct periodic moose population surveys in the eastern and western portions of the subunit.

2. Educate local residents regarding the importance of not taking cow moose.

Subunit 25C

Project Objectives and Activities:

1. Estimate moose density and composition in Subunit 25C by 1993.

   1a. Cooperate with BLM to "superstratify" approximately 1,000 mi^2 in central Subunit 25C in November 1992.

2. Provide for a sustained annual harvest of 30 - 50 bull moose.

2a. Monitor harvest with harvest report cards and hunter check stations.

3. Manage for a moose population with an overall ratio of 30 bulls:100 cows.

3a. Collect composition data during the superstratification of central Subunit 25C during November 1992.

Work Accomplished During the Project Segment Period: We did not conduct the moose surveys we had planned for Subunit 25C in November 1992. Record snowfall and cold temperatures in September 1992 resulted in leaves being retained on deciduous trees, which reduced sightability of moose to unacceptable levels. These conditions also probably contributed to the lower harvest of moose in 1992-93 (119 hunters reported killing 36 moose). During the previous hunting season (1991), 164 hunters reported taking 46 moose.

Progress Toward Meeting Project Objectives: We postponed the survey plans for Subunit 25C during November 1992 because the trees still had leaves on them, which hampered visibility. However, we plan to stratify or survey a portion of central Subunit 25C/northcentral Subunit 20B in November 1993 to collect density and composition data.

Harvest objectives are currently being met and no changes in regulations are proposed at this time.

Subunits 26B and 26C

Project Objectives and Activities:

1. Determine population distribution, composition, density, and trends by 1991.

2. Determine movements and habitat use in heavily harvested drainages beginning in 1991.

3. Maintain an annual posthunting season sex ratio of at least 50 bulls:100 cows.

4. Maintain a mean annual antler spread of at least 50 inches among bull moose harvested during the general season.

5. Maintain an annual hunter success rate of at least 40%.

6. Determine subsistence needs and harvest levels by 1991.

Work Accomplished During the Project Segment Period:

1. We did not conduct surveys in Subunits 26B and 26C during this period. Planned surveys by USFWS could not be conducted because of weather and conflicting priorities elsewhere.

2. No browse utilization studies or radio-telemetry studies were conducted in Subunits 26B and 26C during this report period.

5. Harvest data are being compiled and analyzed. It is likely the 1992 harvest in both subunits will be lower than previous years because of unusually early cold and snow during September.

Progress Toward Meeting Project Objectives: Budget and time constraints allowed only minimal progress toward project objectives. However, objectives relating to posthunting sex ratio, antler spread, and hunter success continue to be met. No survey work was accomplished in Subunits 26B and 26C by USFWS because of inclement weather.

Revised management objectives for Subunits 26B and 26C are as follows:

1. Continue to work with USFWS to monitor moose population status through trend counts.

2. Attempt to maintain a population composition that will continue to support the harvest of relatively large bull moose, a hunter success rate of at least 40%, and a ratio of at least 50 bulls:100 cows.

Segment Period Project Costs:

	Personnel	Operating	Total
Planned	138.9	109.5	248.4
Actual	147.2	70.5	217.7
Difference	- 8.3	+39.0	+30.7

Explanation: Poor snow conditions throughout much of Interior Alaska prevented staff from completing the Holitna census and some surveys in Subunits 20A and 20B.

Submitted by:

Kenton P. Taylor
Regional Management Coordinator

Project Title: **Western and Arctic Alaska Moose Survey and Inventory**

Project Location: Unit 18 (42,000 mi^2)
Yukon-Kuskokwim Delta

Project Objectives:

1. Increase the moose population in Unit 18 by 10% a year while maintaining a population goal for the Yukon River population of 3,000 moose. A population goal for the Kuskokwim River population has not been set. The bull:cow ratio for both populations will be maintained at a minimum of 30 bulls:100 cows.

   1a. Conduct fall sex and age composition surveys and winter recruitment surveys of the Yukon River population annually.

   1b. Conduct fall and/or mid-winter surveys of the major drainages of the Kuskokwim and main Kuskokwim River to assess the status and population size of the Kuskokwim River population.

2. Improve harvest reporting and compliance with hunting regulations.

3. Develop updated population objectives and a management plan in consultation with the public and other agencies.

Work Accomplished During the Project Segment Period: We completed an aerial survey of the moose population on the Yukon River during February 1993. No change in distribution was evident from a census conducted the previous year. We did a census of the moose population on the main Kuskokwim River during March 1993 between lower Kalskag and Kwethluk. We used 4 fixed-wing aircraft to census a 648 mi^2 area.

The ADF&G and the USFWS continued to monitor the moose that were collared during March 1991, and observed 7 calves: 11 collared cows along the Kuskokwim River drainages in mid-June 1993. The 10 radio-collared moose along the lower Yukon River will be relocated during July 1993.

A hunter check station on the Yukon River during September 1992 was used to collect harvest and age information of moose taken in Unit 18 and Subunit 21E. Two hundred hunters went through the check station. Of the 74 moose reported harvested, 49 were sampled for antler measurements and for aging by extracting an incisor.

We collected additional harvest statistics from harvest reports turned in by hunters. In Unit 18, 377 hunters returned harvest reports, and 77 male moose were reported harvested. Successful hunters took an average of 6 days to harvest a moose. Fifty-nine

hunters used boats for transportation, 13 used snowmachines, and 5 used aircraft. Fifty (65%) moose were harvested in the Yukon River drainage, and 27 (35%) were harvested along the Kuskokwim drainage.

Progress Towards Meeting Project Objectives: During the past 7 years, estimated recruitment rates obtained from aerial survey data ranged from 12-25% for the Yukon River. Steady increases in density along the lower Yukon River drainage have occurred since 1985. The size of the Yukon moose population is estimated at 1,000 moose. Fall composition counts have been unattainable because of poor snow conditions.

This is the first year that the Kuskokwim River drainage had a census completed. The results of this census indicates that the lower Kuskokwim moose population, along the main river is not doing very well and is estimated at less than 200 moose. The riparian corridor of the main Kuskokwim River between Kalskag and Kwethluk yielded an estimate of 174.2 moose $\pm$ 26.56% at 80% confidence. In the way of comparison, the Yukon census conducted in February 1992 using similar methodology yielded an estimate of 994 moose $\pm$ 12.5% at 80% confidence.

Improved harvest reporting and compliance with regulations is being achieved through hunter contacts at the check station, radio and newspaper announcements, law enforcement activities, and community meetings. Harvest ticket returns have increased dramatically over the last few years.

Project Location: Unit 22 (25,230 mi^2)
Seward Peninsula and that portion of the Nulato Hills draining west into Norton Sound

Project Objectives and Activities: The overall population management objective is to maintain a minimum population of 5,000-7,000 moose throughout the unit. In Subunit 22A, the objective is to increase population size from the current estimate of 400-600 moose to at least 800-1,000 moose. In Subunits 22B and 22D, the objective is to maintain the population at 1,500-2,500 and 2,500-3,000 moose, respectively, with a minimum bull:cow ratio of 30:100. In Subunit 22C, the objective is to maintain the existing population of 350 with a minimum bull:cow ratio of 20:100. In Subunit 22E, the objective is to maintain the existing population of 250-350 moose.

These objectives will be attained through the following management activities:

1. Estimate abundance, sex and age composition, and recruitment to yearling age and determine trends in population size and composition.

1a. Conduct aerial surveys throughout the Unit during late fall and early spring to provide an index of population status and trends, sex and age composition, and yearling recruitment.

1b. Conduct moose censuses in each of the 5 subunits to estimate abundance.

2. Monitor human and natural mortality factors affecting the population.

2a. Evaluate hunting mortality by analyzing all harvest data.

2b. Improve harvest reporting through public contacts and improved communication.

3. Develop a moose management plan, with special emphasis on areas adjacent to the road system.

Work Accomplished During the Project Segment Period: The known harvest from Unit 22 was 287 moose (217 males and 70 females). A breakdown of that harvest by Subunit is as follows: 22A - 16; 22B - 64; 22C - 25; 22D - 164; and 22E - 18. Six hundred forty hunters participated in this year's hunt, and 89% were Alaska residents. Hunter success rate for the season was 45%.

Insisorform teeth from 117 hunter-killed moose were collected and analyzed in an effort to determine age and the cause of the unusually high incident of tooth breakage among Seward Peninsula moose.

Adequate snow conditions during fall 1992 allowed us the opportunity to conduct moose surveys in portions of Subunits 22B, 22C, and 22D.

In spring 1993, we conducted a moose census in 2 areas of Subunit 22D. The calculated density estimate in the Kuzitrin census area was 1,096 moose ($\pm$ 8% at the 80% CI). We calculated short yearling recruitment at 14%. The calculated density estimate in the American census area was 483 moose ($\pm$ 11% at the 80% CI). Short yearling recruitment was calculated at 16%. We also were able to conduct spring surveys within some drainages of Subunits 22B and 22C.

A school program developed several years ago explaining the importance of wildlife management concepts, rules, and regulations continues to be used throughout Unit 22 schools. Staff made several trips to villages explaining the need for regulations and harvest reporting as well as assisting local license vendors. Considerable time is expended by staff answering and making phone calls, writing articles, mailing regulation material, and assisting the unit's license vendors.

Progress Towards Meeting Project Objectives: The unreported harvest of moose in Unit 22 is considerable. We attribute much of this harvest to hunters who do not purchase licenses or pick up harvest tickets rather than to those who hunt outside of current season dates. Efforts to inform the public of the importance of wildlife conservation and the need for regulations are thought to be having an effect in some communities because the number of individuals purchasing licenses and/or picking up harvest tickets has increased. Additional contact with local residents, particularly with village residents, needs to occur if complete compliance with current moose regulations is to be forthcoming.

Discussions about a moose management plan took place on several occasions with other agency staff and the public throughout the year. However, the actual ground work for development of a moose management plan was not initiated.

Project Location: Unit 23 (43,000 mi^2)
Kotzebue Sound and the Western Brooks Range

Project Objectives and Activities: The population management objective of Unit 23 is to maintain the moose population at existing levels, and the bull:cow ratio at a minimum of 40:100. These objectives will be attained through the following management activities:

1. Draft a moose management plan for Unit 23 by June 1994, and finalize by December 1996.

2. Conduct a census using methods developed by Gasaway et al. (1986) in the Squirrel River drainage.

3. Conduct annual surveys in established trend areas to monitor population composition and recruitment and monitor harvest.

Work Accomplished During the Project Segment Period: We completed fall composition surveys in the middle Noatak, Tag River, Bear Creek, and Inmachuk River trend count areas during November 1992:

Trend Count Area	Large bulls per 100 cows	All bulls per 100 cows	Calves per 100 cows	Total moose
Middle Noatak River	10	31	7	325
Tagagawik River	20	53	21	476
Buckland River	16	48	19	143
Inmachuk River	40	65	33	109

Moose density in the middle Noatak increased from 0.65 moose/mi^2 in 1992 to 1.4 moose/mi^2 in 1993. This density is still below that observed in 1991 of 1.87 moose/mi^2. The lower density probably still reflects the substantial overwinter mortality of moose that occurred during winter 1990-91.

The Squirrel River and a portion of the Kobuk River and Kiana Hills (1,440 mi^2) was censused in November 1992. The overall density of moose was 0.95 moose/mi^2 with 32 calves:100 cows and 37 bulls:100 cows. At the 90% confidence level the population estimate was 1,372 moose ± 23.4%.

During April 1993, the first year of a cooperative moose telemetry project in the middle Noatak River drainage was completed and a progress report prepared. Twenty-two more moose were radio-collared in April 1992 to replace moose that had died during the first year of the study. We relocated collared moose monthly. Total mortality for collared moose after capture was 29%. We attributed 20% of this mortality to natural predation, 7% to hunting, and 2% to rut-related injuries.

Progress Towards Meeting Project Objectives: The Noatak moose telemetry project allowed improved assessment of harvest and natural mortality rates, and productivity. Due to the extremely high mortality rates observed for collared moose and declining trends in numbers observed during surveys on the middle Noatak, a 2-week closure during September and a shortened cow moose season in the Noatak River drainage was proposed to the Board of Game and passed. Surveys of trend count units indicated management objectives were being met in the remainder of Unit 23. A census using methods developed by Gasaway et al. (1986) is planned for the middle Noatak in November 1993.

Literature Cited:

Gasaway, W. C., S. D. DuBois,D. J. Reed, and S. J. Harbo. 1986. Estimated moose population parameters from aerial surveys. Biol. Papers of the Univ. of Alaska, Fairbanks. 108pp.

Project Location: Subunit 26A (53,000 mi^2)
Western North Slope

Project Objectives:

1. Maintain the Subunit 26A moose population at the current level, with a minimum population of 1,500 moose and a minimum bull:cow ratio of 30:100.

    1a. Conduct late winter trend counts annually to monitor population trends and short yearling recruitment. The population will be completely surveyed at 7-year intervals.

1b. Conduct fall surveys to monitor sex and age composition trends.

2. Manage for a hunter success rate of not less than 50%.

3. Manage the harvest for spatial and temporal separation of recreational and subsistence hunters.

3a. Monitor the harvest through field contacts and hunter harvest reports.

Work Accomplished During the Project Segment Period: Fall sex and age composition surveys were completed in the Colville, Anaktuvuk, and Chandler river drainages during November 1992. Of the 248 moose observed, 50 were bulls (36 bulls:100 cows), 140 were cows, and 58 were calves (23% calves). The estimated antler size classification for bulls was as follows:

Inches	<30	30-39	40-49	50-59	60+
Percent	20	14	14	40	12

We conducted a survey to determine population trend and short yearling recruitment during April 1993 in trend count areas on the Colville, Anaktuvuk, and Chandler River drainages. We counted 668 moose (567 adults and 101 calves) yielding a short yearling recruitment rate of 15%.

Harvest data were compiled from harvest reports submitted by hunters. Hunters reported killing 52 bulls and 8 cows during the 1992 hunting season. The chronology of the harvest was as follows: 25-31 Aug. (5), 1-7 Sep. (35), 8-14 Sep. (12), 15-21 Sep. (2), 22-28 Sep. (4), 29 Sep.-4 Nov. (1), and 13 Nov. (1). The harvest was distributed throughout the Colville River drainage, and the largest numbers of moose were taken from the Chandler River (27%), the Colville River from the mouth of the Killik River to the Anaktuvuk River (22%), the Anaktuvuk River (15%) and the Killik River (13%). Antler sizes and percentage of animals having those sizes were as follows: <25" (0%), 25-29.99" (1.8%), 30-34.99" (0%), 35-39.00" (3.5%), 40-44.99" (1.8%), 45-49.99" (5.3%), 50-54.99" (12.3%), 55-59.99" (36.8%), 60-64.99" (17.5%), >65" (7.0%).

Eighteen percent of the hunters were residents of Unit 26, 36% were nonlocal Alaska residents, 41% were nonresidents, and 5% were of unknown residency. The average hunt lasted 6.1 days, and the hunter success rate was 58%.

Progress Toward Meeting Project Objectives: Fewer moose were observed during both the fall (325 in 1991 versus 248 in 1992) and spring (828 in 1992 versus 668 in 1993) surveys in the trend count areas. The short yearling recruitment rate decreased from 18% to 15%. The hunter success rate decreased from 66% to 58%. Moose movements can affect these numbers, but the population may actually be decreasing. We need to continue

moose population surveys and examine predation and hunting pressure to determine their affect on the population.

The goal of spatial and temporal separation of recreational and subsistence hunters was realized for the most part. Subunit 26A is a controlled use area where aircraft cannot be used to hunt during August, allowing local people using boats to complete much of their hunting activities before recreational hunters arrive. In addition, local hunters tended to concentrate their efforts on the lower part of the Colville River, while recreational hunters generally flew to the upper portions of the drainage.

We saw 36 bulls:100 cows during fall composition surveys in 1992 compared to 40 bulls:100 cows in 1991. Before the 1991 survey, there had been a decreasing trend with the number of bulls:100 cows dropping from 54 to 33 bulls:100 cows between 1983 and 1990. Fall surveys will be conducted each year to monitor this situation.

Segment Period Project Costs:

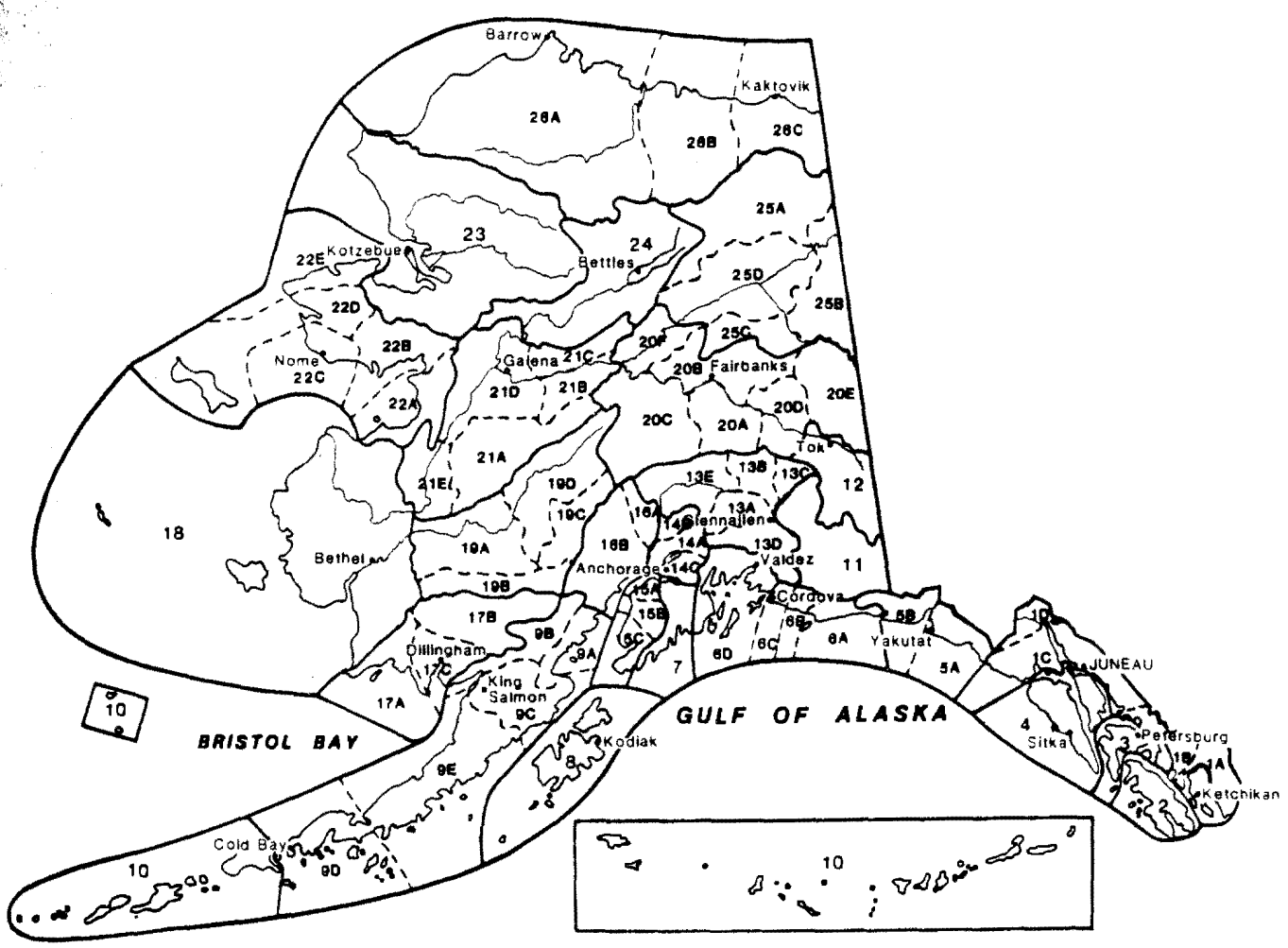
	Personnel	Operating	Total
Planned	71.3	92.1	163.4
Actual	71.3	109.6	180.9
Difference	0	17.5	17.5

Explanation: Declining moose numbers in Units 22 and 23 required additional funds for surveys and censuses. Also, funds from other agencies were not available as originally planned.

Submitted by:

Steve Machida
Survey-Inventory Coordinator

Alaska's Game Management Units



Federal Aid in Wildlife Restoration

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a formula based on each state's geographic area and the number of paid hunting licensehold- ers in the state. Alaska receives 5% of the revenues collected each year, the maximum allowed. The Alaska Department of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be reponsible hunters. Seventy-five percent of the funds for this project are from Federal Aid.