



Federal Aid in Wildlife Restoration  
Annual Performance Report  
Survey-Inventory Activities  
1 July 1996- 30 June 1997

# MOOSE

Mary V Hicks, Editor



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1996-97

Pat Costello

Grant W-24-5  
Study 1.0  
October 1997

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**Tony Knowles, Governor**

**DEPARTMENT OF FISH AND GAME**  
**Frank Rue, Commissioner**

**DIVISION OF WILDLIFE CONSERVATION**  
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**Project Title:** Southeast Moose Population Management

**Project Location:** Unit 1A (5,000 mi<sup>2</sup>)  
Ketchikan area including mainland areas draining into Behm and Portland canals.

**Overview:** Moose are found on the Southeast Alaska mainland 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 Objectives and Activities:**

1. Measureable management objectives for Unit 1A include the following:

Posthunt moose numbers	35
Annual hunter kill	3
Numbers of hunters	20
Hunter days of effort	90
Hunter success (%)	15

2. Complete winter sex and age composition surveys and monitor harvests.

**Work Accomplished During the Project Segment Period:** For the fourth consecutive season, we monitored the moose harvest using registration permits issued out of the Ketchikan office. We did not fly any aerial surveys during this report period.

**Progress Meeting Project Objectives:** We issued 63 registration permits during this report period, a decline from 78 last season. Four bulls were killed along the Unuk River by the 36 permittees that hunted. The 11% hunter success rate was up from last season's 4% success rate. Numbers of hunters afield nearly doubled our objective, numbers of moose killed was slightly above our objective, and hunter success rate nearly met our objective. Antler spreads for the 3 of the 4 bulls for which measurements were provided were 26, 30, and 34 inches, for an average of 30 inches. This was down only slightly from last season's average of 33.5 inches.

**Project Location:** Unit 1B (3,000 mi<sup>2</sup>)  
Southeast mainland from Cape Fanshaw to Lemesurier Point

Unit 3 (3,000 mi<sup>2</sup>)  
all islands west of Subunit 1B, north of Unit 2, south of the centerline of Frederick Sound, and east of the centerline of Chatham Strait

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## **Project Objectives and Activities:**

### **1. Management objectives for Stikine River moose include the following:**

Posthunt moose numbers	300
Annual hunter kill	30
Number of hunters	250
Hunter days of effort	1750
Hunter success	12%

### **2. Management objectives for Thomas Bay moose include the following:**

Posthunt moose numbers	200
Annual hunter kill	20
Number of hunters	160
Hunter days of effort	675
Hunter success	12%

### **3. Management objectives for Unit 3 moose include the following:**

Posthunt moose numbers	200
Annual hunter kill	20
Number of hunters	200
Hunter days of effort	1400
Hunter success	10%

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

**Work Accomplished During the Project Segment Period:** A rutting survey was conducted on the Stikine River in early October. Thirty-four moose were classified; 6 (18%) were calves and 4 were bulls (2 of which would be legal under current antler regulations). We observed 157 moose along the Stikine River during a late winter survey. Thirty-five (22 %) of these moose were calves. We observed an average of 47 moose per hour of survey time.

Unit 1B, Unit 3, and that portion of Unit 1C south of Point Hobart were included on a single registration permit. We issued 766 registration permits: 490 to Petersburg residents and 194 to Wrangell residents.

We collected 64 incisors from harvested moose to determine age. Thirty-five (54%) of the harvested moose were yearlings or calves, 22 (34%) were between 2 and 4 years of age, and the remaining 7 (11%) were between 5 and 10 years of age. We measured and photographed antlers from harvested moose.

**Progress Meeting Project Objectives:** Most project objectives were met. A total of 608 permittees hunted 3733 days, for a success rate of 11%. In Unit 1B, 25 moose were harvested in the Thomas Bay area and 17 were harvested in the Stikine River area. Two moose were harvested

from Unit 1C south of Point Hobart, and 23 were harvested from Unit 3. Of the 67 moose harvested, 2 were illegal. One additional cow moose was killed in Farragut Bay in defense of life or property (DLP).

**Project Location:** Unit 1C (7,600 mi<sup>2</sup>)  
Southeast mainland and the islands of Lynn Canal and Stephens Passage  
lying between Cape Fanshaw and the latitude of Eldred Rock, including  
Sullivan Island and the drainages of Berners Bay

**Project Objectives and Activities:**

1. Management objectives for Taku River moose include the following:

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

2. Management objectives for Berners Bay moose include the following:

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

3. Management objectives for Chilkat Range moose include the following:

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

**Work Accomplished During the Project Segment Period:** We issued 396 registration and 17 drawing permits for the 3 moose hunts in Unit 1C, an increase from last season of 11 registration permits and 2 drawing permits. Two hundred eighty-one hunters participated in these hunts. Permit results for hunters reporting the location of their hunt were as follows:

<u>Management Area</u>	<u>Hunters</u>	<u>Success</u>	<u>Days Hunted</u>
Chilkat Range (includes Gustavus)	177	27%	791
Taku River	94	16%	360

<u>Management Area</u>	<u>Hunters</u>	<u>Success</u>	<u>Days Hunted</u>
Berners Bay (bulls)	7	100%	14
(cows)	7	100%	21
Entire Subunit	285	27%	1186

No aerial surveys were flown in Unit 1C during the winter of 1996-97 due to poor snow conditions.

Unit 1C hunters were required to submit lower jaws of harvested moose. Matson's Laboratory (Milltown, MT) determined ages. Hunters were later informed about the age of the moose they harvested.

**Progress Meeting Project Objectives:** Management objectives for the Berners Bay herd were met. All 14 of the permittees who hunted harvested moose, surpassing the objective of 80% success. In addition, the desired effort in hunter days was not met. Since no aerial surveys were completed, posthunt size of the population is unknown.

All of the Chilkat Range herd management objectives were not met. The 47 moose harvested exceeded our goal of 10; the 177 hunters who hunted exceeded our goal of 65; the 791 hunter days expended far surpassed our objective of 195 days; and the hunter success rate of 17% was slightly above our 15% objective. A high take in the Gustavus area (30 moose) for the fourth consecutive season contributed to the success rate for the Chilkat Range. No aerial surveys were flown, so the posthunt population size is unknown.

Management objectives for the Taku River moose population were not met. The number of hunters climbed to 94 but fell short of the 100 stated in our objectives. Hunter success remained at 16% for the second consecutive season, and the number of hunter days increased to 360. Because no aerial surveys were flown, the posthunt population size is unknown.

**Project Location:** Unit 1D (2,700 mi<sup>2</sup>)  
Southeast mainland north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay

#### **Project Objectives and Activities:**

1. Management objectives for Unit 1D moose include the following:

Posthunt moose numbers	450
Posthunt bull to 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:** In 1996 the Chilkat Valley moose hunt was held for the fourth time since the Board of Game established a spike-fork/50-inch requirement for this Tier II hunt. Two hundred permits were offered and all were issued. Staff monitored the hunt, measured antlers, and collected incisors for aging. An aerial survey of moose winter habitat in the entire Chilkat drainage was flown in early December 1996. During the survey we counted 207 moose, including 15% calves and a bull:cow ratio of 39.7.

Unit 1D hunters were required to submit lower jaws from harvested moose. Matson's Laboratory (Milltown, MT) determined the ages of moose. Hunters were later informed about the age of the moose they harvested the previous season.

**Progress Meeting Project Objectives:** The 1996 Tier II moose hunt in Unit 1D resulted in the harvest of 23 legal and 3 illegal moose, with 17% of the hunters successful. Although the success rate met management objectives, most other objectives, including the harvest level, were not met. Since hunt conditions only allowed for 200 hunters, the management objective for hunter participation was not met. Hunters spent 825 days hunting, surpassing the management goal of 500 days for the first time since the hunt was reopened with its current antler restrictions. It should be noted the management objectives contained in our strategic moose management plan predate the move to a Tier II hunt and should be revised to reflect the restrictions inherent in this hunt. Based on the aerial survey we flew in early winter, the posthunt population size is estimated at about 400 animals, with healthy proportions of bulls and calves.

**Project Location:** Unit 5 (5,800 mi<sup>2</sup>)  
Cape Fairweather to Icy Bay, eastern gulf coast

**Project Objectives and Activities:**

1. Management objectives for Yakutat Forelands moose include the following:

Posthunt moose numbers	850
Annual hunter kill	70
Posthunt bull to cow ratio	20:100
Number of hunters	250
Hunter days of effort	1025
Hunter success	28%

2. Management objectives for Nunatak Bench moose include the following:

Posthunt 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:

Posthunt moose numbers	250
Annual hunter kill	25
Posthunt bull to 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 issued 250 registration permits for Unit 5 moose hunts (195 for Unit 5A and 55 for Unit 5B), a decline of 22% from the previous season. Much of the decline was probably due to local Yakutat hunters participating in a new federal subsistence hunt before the opening of the state season. Staff from the Division of Wildlife Conservation and enforcement officials from the U.S. Forest Service monitored the hunts. We analyzed harvest and hunter data from registration permit reports. Teeth were collected for determining age.

Due to poor snow conditions and the fact that surveys had been flown in the area each of the previous 2 winters, no aerial surveys of the Yakutat Forelands, Nunitak Bench, or Malaspina Forelands were flown during this report period.

Unit 5 hunters were required to submit lower jaws from harvested moose. Ages were determined by Matson's Laboratory (Milltown, MT), and hunters were informed of the age of their harvested moose.

**Progress Meeting Project Objectives:** In the Yakutat Forelands herd, we estimate the post-hunt moose population is between 600 and 1000 animals. Hunter kill (32 from the State hunt, 1 cow moose taken under a federal ceremonial permit, and 24 bulls taken during the federal subsistence hunt) and the number of hunters (108 state hunters plus an unknown number permitted under the federal subsistence season) were lower than our objectives. Hunter effort (366 days during the state hunt) was lower than our objective of 1025 days. Hunter success (30% for state hunters) was above our objective of 28%, but it is not possible to calculate meaningful success rates without data from the federal subsistence hunt.

Management objectives for the Nunatak Bench area were not met. Although a hunt was held for the second time in recent years, no moose were harvested. Nineteen permits were issued, with 3 hunters expending 4 days unsuccessfully.

On the Malaspina Forelands, 16 moose were harvested, with 31 hunters spending 146 days afield. Therefore, hunter success (52%) was the only management objective met. No surveys were completed in this area during this report period, making it impossible to determine the posthunt population size or structure.



**Segment Period Project Costs:**

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	28.9	28.8	57.7
Actual	28.9	28.8	57.7
Difference	0.0	0.0	0.0

Submitted by:

Doug Larsen  
Acting Management Coordinator

**Project Title:** Southcentral Alaska Moose Population Management

**Project Location:** Unit 6 (10,150 mi<sup>2</sup>)  
Prince William Sound and north Gulf Coast

**Project Objectives:**

Unit 6A(East): Maintain a posthunting population of 300-350 moose and a minimum bull:cow ratio of 30:100.

Unit 6A(West): Maintain a posthunting population of 300-350 moose and a minimum bull:cow ratio of 15:100.

Unit 6B: Maintain a posthunting population of 300-350 moose and a minimum bull:cow ratio of 15:100.

Unit 6C: Increase the posthunting population to 400 moose by 2006 and maintain a minimum posthunting bull:cow ratio of 15:100.

**Work Accomplished During the Project Segment Period:** We completed censuses in Units 6B and 6C. Estimates in each subunit were 307 moose, with 19 (6%) calves; and 259 moose, with 45 (17%) calves.

Total reported harvest in Unit 6 was 94 moose. In Unit 6A (East) 15 males were taken by 30 hunters who had a success rate of 50%. In Unit 6A (West) 24 males and 9 females were taken by 124 hunters who had a success rate of 27%. In Unit 6B 17 males and 6 females were harvested by 81 hunters, with a success rate of 28%. In Unit 6C 17 males and 5 females were taken by 22 hunters who had a success rate of 100%. In Unit 6D 1 male was taken by 13 hunters.

**Progress Meeting Project Objectives:** We achieved our total population objective in Unit 6B. No progress was made toward achieving our objective to increase the population in Unit 6C. Calf survival over the last 2 years in that unit was lower than expected. Progress in other subunits will be measured by censuses planned in the coming year.

**Project Location:** Unit 7 (3,520 mi<sup>2</sup>)  
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:** Good weather conditions allowed us to survey desired composition count areas. We surveyed 198 moose in 5 survey areas. Bull to cow ratios ranged from 16 bulls:100 cows to 90 bulls:100 cows with a mean of 41 bulls:100

cows. Fall calf:cow ratios averaged 13:100 cows. The moose population seems stable between 1000 and 1500 animals.

The winter of 1996-97 was considered mild with light snow pack in lower elevations. Overall winter mortality was minimal, including 27 by motor vehicle and 8 by train. There were no reported cases of starvation.

Preliminary harvest statistics indicated that approximately 328 hunters reported hunting in Unit 7 during the 20 August-20 September season and harvested 59 bull moose. Twenty (34%) hunters reported taking spike-fork bulls (less than 35") compared to 39 (66%) hunters who harvested large bulls (greater than 39"), defined as those with a 50-inch antler spread or with 3 brow tines on at least 1 antler. Three additional moose were reported but not classified.

**Progress Meeting Project Objectives:** The selective harvest program initiated in 1987 has increased and stabilized the bull:cow ratio. The current bull:cow ratio meets the management objective of a minimum of 15:100. However, any management changes in Unit 7 should extend to Unit 15 to avoid shifts in hunting pressure.

Increased logging activities in Unit 7 to combat spruce bark beetles (*Dendroctonus rufipennis*) may provide increased visibility and access for moose hunters. Habitat quality may also be affected when overstory is removed. We need to continue to monitor effects of logging on moose in Unit 7.

**Project Location:** Units 9 and 10 (36,000 mi<sup>2</sup>)  
Alaska Peninsula and Unimak Island

**Project Objectives:**

- To maintain existing moose densities in areas with moderate (0.5-1.5 moose/mi<sup>2</sup>) or high (1.5-2.0 moose/mi<sup>2</sup>) densities.
- To increase low-density populations (where habitat conditions are not limited) to 0.5 moose/mi<sup>2</sup> by 1999.
- To 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:** Poor snow conditions during this reporting period limited fall composition surveys to 2 trend areas in Unit 9E where 176 moose were classified.

Preliminary harvests were 6, 59, 58, and 85 moose for Units 9A, 9B, 9C and 9E, respectively.

**Progress Meeting Project Objectives:** Efforts to monitor moose density and composition were hampered in 1996 by poor snow conditions.

**Project Location:** Unit 11 (12,800 mi<sup>2</sup>)  
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:** Fall sex and age composition counts were conducted in 1 count area (CA-11) in Unit 11 during 1996. A total of 134 moose were counted at a rate of 29 moose per hour. The bull:cow ratio was 92 bulls:100 cows. Calves composed 10% of the moose counted. The observed density was 0.5 moose per mi<sup>2</sup>.

Preliminary harvest figures indicate hunters killed 37 moose in Unit 11 during the 1996-97 season. Of these, nonresidents took 5 (14%) moose; overall hunter success was 39%. The average hunt lasted 10.3 days, a 32% increase (2.5 days) over the time hunters spent in the field during the 1995-96 season and a 98% increase (5.1 days) compared with 1994-95. The mean antler size in the harvest was 45.6 inches. Harvest chronology figures show the last week of the season accounted for 46% ( $n = 17$ ) of the harvest. In 1996 4-wheelers became the most used means of transportation for moose hunters in Unit 11.

Staff discussed proposals on land-use patterns, access, and development with appropriate and administering agencies. We conducted an annual review and discussed proposed changes in the Copper River Fire Management Plan with participating agencies and landowners.

**Progress Meeting Project Objectives:** Composition data collected in Unit 11 during 1996 indicated moose numbers remain low with an observed density of only 0.5 moose/mi<sup>2</sup>. A more intensive Gasaway census conducted in 1993 by NPS personnel resulted in a slightly higher density estimate of 0.58 moose/mi<sup>2</sup>. Differences in density estimates between years are attributed to survey methods rather than changes in moose numbers from 1993 to 1996. The bull:cow ratio remained high in 1996 (92:100), and numbers of bulls, cows, and calves were similar to those in 1995. The calf:cow ratio remained relatively high but dropped from 25:100 in 1994 to 21:100 in 1995 and 1996. The moose-per-hour figure decreased slightly from 1995 to 1996 (34.3 compared with 29.8) and remains well below the moose-per-hour figures of the mid to late 1980s. With the exception of 1992, count data for the past 5 years indicate a stable or slightly increasing moose population in Unit 11. Data from the last 2 years show the highest yearling bull counts since 1988, which indicate calf survival rates have increased.

The bag limit and season dates for the state hunt in Unit 11 were changed in 1993. The definition of a legal bull changed from any bull to one with 50+ inch spread or 3 brow tines, and the season was lengthened by 15 days with season dates of 20 Aug.-20 Sept. Although the harvest increased initially by 30% under the new regulations, the total kill still remains very low and does not exceed harvest levels observed during the late 1980s. Although the season was lengthened, the

conservative bag limit may keep the total harvest low. Harvest chronology figures for 1993 through 1996 indicate the most opportune time to hunt moose is the 5-day extension of the season in September when moose are more vulnerable because of leaf drop and the onset of rut.

The current harvest level is considered sustainable, and human harvests have minimal effect on moose numbers in the unit. Wolf predation on moose continues to be relatively high and wolf sightings are common. During winter moose are the most important food source for wolves because there is a scarcity of an alternate prey species, especially since the Mentasta caribou herd has been moving out of Unit 11 into Unit 12 to winter. Snow depths in Unit 11 averaged 29.7" during the winter of 1996-97, 16% above the 1964-1996 average of 25.6 inches.

**Project Location:** Unit 13 (23,400 mi<sup>2</sup>)  
Nelchina Basin

**Project Objectives:** To increase the moose population to an estimated 20,000-25,000 with yearly sex and age ratios of 30 calves:100 cows, 10 yearling bulls:100 cows, 25-30 bulls, and yearly harvests between 1200 and 2000 moose.

**Work Accomplished During the Project Segment Period:** Staff conducted fall sex and age moose counts in 12 count areas located throughout the unit. A total of 5929 moose were counted at a rate of 49 moose per hour. The overall bull:cow ratio was 19 bulls:100 cows with 13 adult bulls:100 cows. Calves composed 18% of the herd.

Twinning rate surveys flown on 2 June 1997 in Units 13B and 13C produced twinning rates of 33% and 42%, respectively, and surveys on 11 June 1997 in Unit 13E showed 12% twins. Sample size was small on these counts, limiting the usefulness of these results. The twinning rate in Unit 13E (upper Susitna River) was the lowest ever observed.

Hunting season dates and bag limits remained unchanged from last year, extending from 20 Aug.-20 Sep. for a bull having 50+ inch antler spread or 3 brow tines or a spike or forked antler on one side. In addition to the general hunt, we issued 150 Tier II drawing permits.

Snow depths were recorded throughout the basin to determine a winter severity index for moose. Snow depths varied throughout the unit but were slightly above the 34-year average; the winter was moderate.

Preliminary harvest figures show hunters killed 1006 bull moose in Unit 13 during the 1996-97 season, an 11% increase compared with 1995 ( $n = 908$ ). A breakdown of the moose harvest shows 964 bulls were taken during the state-regulated fall season, while 42 bulls were taken under a federally regulated fall subsistence hunt held on federal land in Unit 13 for unit residents.

We discussed land-use proposals regarding potential effects on moose habitat. Staff attended DNR meetings on forest practices and uses for Unit 13 and submitted comments on habitat improvement for moose.

Staff reviewed the Copper River Fire Management Plan.

**Progress Meeting Project Objectives:** Moose numbers declined by an estimated 25-30% in Unit 13 between 1988 and 1991. This decline followed a 9-year period (1978-87) when moose numbers increased at an estimated 5% per year. Analysis of composition data indicated this decline occurred in all sex and age classes. Fall composition count data show moose numbers increased slightly in 1996, compared with those in 1995 for Unit 13, but are still well below numbers observed in the late 1980s. The percent of yearling bulls in 1996 was moderate, compared with figures throughout the 1990s, while the percent calves in the herd and calves:100 cows was up in 1996. Slight increases for the number of young bulls in recent counts indicate winter survival may have increased, which could help the depressed moose population recover or at least stop declining. The current bull:cow ratio (19:100) is below the management objective for Unit 13. Spring 1997 twinning rates ranged from 42% in Unit 13C, 33% in Unit 13B to 12% in Unit 13B. These data show a slight overall increase from 1996 when recorded twinning rates were 33% in Unit 13C, 20% in Unit 13B, and 33% in Unit 13E. However, the respective sample sizes (12 and 9) for 13C and 13B during 1997 were insufficient to determine conclusive trends.

Based on snow depths, we consider the winter of 1996-97 moderate in Unit 13 with a winter severity index rating of 25.3 compared with the historic unit average of 24.9. Snow depths ranged from 3% below the historic average in Unit 13D to 10% above the historic average in Unit 13B. Weather conditions have been favorable for calf production and survival during the last 2 winters, following 7 consecutive winters classified severe by the department's winter severity index.

The 1996-97 bull harvest increased by 9% compared with last year's harvest. There were 5297 reported hunters in Unit 13 with a success rate of 18%. Hunting pressure increased 5% over last year's and is approaching the heaviest ever reported in the unit. Hunter success has been 18% for the last 2 seasons and is approaching the lowest ever observed. Initial indications are the spike-fork 50-inch regulation may be successful in limiting the harvest of large bulls enough to maintain a minimum bull:cow ratio and still allow unlimited hunting. The reason for the decline in the bull:cow ratio has been low calf survival. Even though the last 2 winters were moderate to mild and winter survival may have increased, the hunting season should be shortened to reduce the harvest until recruitment can keep pace with natural and hunting mortality rates on bulls. Drawing permit hunts for cows should be eliminated until calf recruitment increases.

The 1996 fire season was uneventful in Unit 13 despite dry conditions in the Copper River Basin. No major fires occurred in the unit during 1996. The last large fire was in 1991 when 5500 acres burned in Unit 13D. Wildfire is the only feasible means of enhancing moose habitat in most of Unit 13.

**Project Location:** Unit 14 (6,600 mi<sup>2</sup>)

Unit 14A

Upper Cook Inlet

**Project Objectives:** To maintain a population of 5000-6000 moose with a posthunting sex ratio of no less than 20 bulls:100 cows. To achieve and maintain an average annual moose harvest of 750 moose.

**Work Accomplished During the Project Segment Period:** Fall surveys were conducted between 13-16 November and on 2 December. We classified 1017 moose in the Matanuska River Valley during November and 1273 in the remainder of the subunit during December. We estimated a subunit fall composition of 42 calves and 23 bulls:100 cows or 25% calves. During 8-9 April we classified 226 moose in the Matanuska River, Palmer Hay Flats, and Pt. McKenzie areas and observed 23% short-yearlings. Overwinter calf survival indicated a mild winter.

Hunter harvest totaled 841 moose. A total of 3954 people reported hunting "spike-fork /50-inch" bulls in the 20 Aug.-20 Sep. and 20 Nov.-15 Dec. general seasons; 493 (12%) were successful. Forty-one percent of these animals were spike- or fork-antlered bulls taken in the new late general season. Of the 116 people hunting with any-bull drawing permits, 61 (53%) were successful. Of the 514 individuals hunting on antlerless drawing permits, 292 (57%) were successful. In drawing permit hunts the success rate was 97% for late-season hunters.

Between May 1996 and April 1997, a minimum of 17 moose were killed by trains, and between 1 September 1995 and 30 June 1996, 183 moose were killed by automobiles. The number of moose killed illegally was 25-50, while 3 were reported killed in defense of life or property (DLP).

**Progress Meeting Project Objectives:** Based on the recent population trend and consecutive mild winters, we assume both the population size and bull:cow ratio meet our objectives. Human - use objectives, an average annual harvest of 750 moose, will probably be reached during 1997 with the high, single year harvest this year. This year's success was due primarily to higher cow harvest and the late spike-fork hunt. With normal snow patterns during November and December 1997, we can expect a similarly high harvest which should bring the 3-year average to 750 moose.

**Project Location:** Unit 14B  
Western Talkeetna Mountains

**Project Objectives:** To increase the moose population to an estimated 2500 by 1999 with a posthunting sex ratio of no less than 20 bulls:100 cows. To achieve and maintain an average annual harvest of 200-300 moose by 1997.

**Work Accomplished During the Project Segment Period:** No aerial surveys were conducted due to infrequent snowfall and higher survey priorities in other areas. We monitored harvest of moose during the general early and late hunts and the any-bull drawing hunts.

Hunter harvest totaled 80 bull moose. Examination of harvest reports indicates 555 hunters harvested 59 bulls (11% success) during the general season. Eighteen of these were spike- or fork-antlered bulls taken during the late season. Of the 110 people hunting with any-bull drawing permits, 31(28%) were successful. The success rate (70%) was considerably higher for permittees hunting during the early November season. At least 7 moose were killed by trains, and 10 were killed by automobiles. Unreported/illegal harvest probably included 10-20 moose.

**Progress Meeting Project Objectives:** Our last survey was conducted during fall 1994, and at that time the moose population was near the objective level (although the confidence interval was large). The winters of 1995-96 and 1996-97 were very mild, so we assume the population has increased. A stratified random census to evaluate objectives and management strategies is overdue in this subunit.

The human-use objective was not met. Although we expect harvest for general season to increase (after the decline resulting from the spike-fork /50-inch selective harvest strategy), it may be very difficult to reach the objective under this harvest regime. However, access continues to improve in this area, so general season and permit hunters should become more effective.

**Project Location:** Unit 14C  
Anchorage area and the Placer and Portage 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 population size and composition for Unit 14C by aerial surveys flown during October and November. We observed 717 moose. Several drainages were not counted due to a limited budget or low priority due to no open hunting season. The ratios of bulls and calves per 100 cows were 45 and 31, respectively. The current subunit population is increasing, with an estimated 1650 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.

Hunters harvested 105 moose in 1996-97. Cows composed 15% of the total harvest, or 16 animals. All cows were killed during special permit hunts. Hunters took 89 bulls, of which 23 came from the general season and 66 during special permit hunts. Of bulls taken during the general season hunt, 7 were spike-forks, 7 were over 50-inches, and 9 had at least 3 brow tines (mean length = 43.4 inches, range 36-49 inches). Overall, hunters ( $n = 507$ ) were 21% successful. Hunters with drawing permits and general-season harvest tickets ( $n = 376$ ) were 27% successful, while those with Eklutna archery registration permits ( $n = 131$ ) were 3% successful. A large proportion of harvested moose (46%) were taken on either Fort Richardson or Elmendorf Air



Force Base with an additional 23% taken in the Portage area hunts. Bowhunters took 43% and muzzleloaders 8% of the total harvest in primitive-weapon hunts. Seasons ran continuously in various parts of the subunit from 20 August through 15 January, excluding 16 November to 14 December. Vehicles killed 129 moose in the subunit between 1 June 1996 and 23 April 1997. An estimated 7 more moose were killed by vehicles in late April and May, bringing the kill attributed to vehicle collisions to 136. An additional 11 moose were killed by trains in the subunit between 1 June 1996 and 30 April 1997.

**Progress Meeting Project Objectives:** Aerial surveys conducted during 1996 found an overall ratio of 45 bulls:100 cows, above the project objective of 25 bulls:100 cows. No surveys were flown in 1995 due to poor snow conditions. The estimated 1996 population of 1550 moose was 25% lower than in fall 1994. The decline is due to severe winter snow conditions during the winter of 1994-95. The winter of 1995-96 was milder than average, possibly allowing the population to rebound.

**Project Location:** Unit 15 (4,900 mi<sup>2</sup>)  
Subunit 15A  
Northern Kenai Peninsula

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

**Work Accomplished During the Project Segment Period:** The winter of 1996-97 was relatively mild for Kenai Peninsula. Favorable survey conditions developed early, allowing fall surveys in Unit 15A. Seven of 13 count areas in Unit 15A were flown during the 1996 fall sex and age composition surveys, resulting in the following totals and ratios: 1467 moose classified, 39 calves:100 cows, and 26 bulls:100 cows; calves composed 24% of observed moose. A total of 1337 moose were classified in the general hunt areas in Unit 15A. Totals and ratios were 329 calves, 181 bulls, and 827 cows; 40 calves:100 cows, 22 bulls:100 cows. Calves composed 25% of observed moose. Skilak Loop Management Area was counted separately and revealed the following totals and ratios: 130 moose classified, 18 calves, 50 bulls, and 62 cows; 29 calves:100 cows, 81 bulls:100 cows, and calves composed 14 % of observed moose.

A preliminary total of 1334 hunters reported hunting Unit 15A during the 10 August to 17 August archery season and August 20 to September 20 general 1996 season, harvesting 252 bull and 3 cow moose. Twenty-nine archery hunters were successful during the pre-season archery-only portion of the hunt. The harvest comprised 141 (59%) spike-fork antlered bulls and 98 (41%) bulls with an antler spread of 50-inches or greater, or possessing at least 3 brow tines on one antler. Sixteen successful hunters failed to report antler spread or illegally harvested a cow. Hunter success rate was 19 percent.

Skilak Loop Special Management Area (SLSMA) was not open in fall 1996. The management objective for this area requires that a minimum of 130 moose are counted before the season can be opened. Since no survey was conducted in fall 1995, the season was not opened in fall 1996.

Fall 1996 surveys revealed 130 moose in the Skilak Area, allowing for a spike-fork bull season 21 September to 30 September 1997 for 20 permits. Since we observed only 130 moose, the cow hunt will not be held in 1997. This area also has a minimum bull to cow ratio of 40:100. The ratio observed in the 1996 count was 81:100.

**Progress Meeting Project Objectives:** The Selective Harvest Program, enacted in 1987, has allowed the moose population in Unit 15A to exceed the department's objective of 15 bulls:100 cows. Surveys completed in 1996 indicated the bull to cow ratio averaged 26:100, compared to 13:100 before the Selective Harvest Program.

The department would like to maintain the population at 3600 moose in Unit 15A. Loss of habitat through human development and deterioration from natural plant succession are primary factors controlling moose density. On May 11, 1991 wildfire burned 5200 acres in the Hidden Lake area of Skilak Loop Special Management Area. Attempts to enhance areas through prescribed burning by the U.S. Fish and Wildlife Service and the department have been unsuccessful due to restrictions necessary to safely burn on the Kenai Peninsula.

The winter of 1996-97 was mild, compared with previous winters in Unit 15A. Snow came early but accumulations were less than 18 inches over large portions of the subunit. Mortality due to starvation was low in 1996-97, compared to 178 in 1994-95. One hundred-sixty moose were reported killed on the road system last winter. The moose population in Unit 15A should have increased moderately due to the mild winter conditions in 1996-97. The fall population is projected to be 3000 animals.

No change in season or bag limit is recommended for fall 1997. The selective harvest program has again gained support during the 1996 season and should protect mid-sized bulls that survived the severe winter of 1994-95.

**Project Location:** Unit 15B  
Central Kenai Peninsula

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

**Work Accomplished During the Project Segment Period:** Due to the mild weather in fall of 1996, we surveyed only 4 of the 9 count areas. Surveys were conducted in general hunt areas with the following results: 224 moose classified, 39 calves:100 cows, 33 bulls:100 cows; calves composed 23 percent of observed moose. Unit 15B East was not counted this fall. The most recent sex and age composition surveys were conducted in Unit 15B East in 1994. We classified 489 moose, resulting in the following ratios: 29 calves and 57 bulls per 100 cows; calves composed 15 percent of observed moose.

Preliminary harvest reports indicate 306 hunters reported hunting in Unit 15B West during the 20 August to 20 September 1996 season, resulting in the harvest of 53 bulls and 1 cow. Hunter success rate was 18%.

The bag limit for Unit 15B West was 1 bull with a spike-fork or 50-inch antlers. The 1996 harvest comprised 34 (68%) spike-fork antlered bulls and 16 (32%) bulls with an antler spread of 50-inches or greater or possessing at least 3 brow tines on 1 antler. Antler measurements were not reported for 4 bulls, and 1 cow was taken illegally.

Hunting for moose in Unit 15B East was allowed by permit-only with a bag limit of 1 bull with 50-inch or larger antler spread. Staff issued 100 permits, from 2399 applications, resulting in the harvest of 23 bulls. The average antler spread was 53 inches and ranged from 41.0 to 70.5 inches. Successful hunters averaged 4 days hunting and observed an average of 3 illegal and 3 legal bulls. The number of bulls observed by successful hunters ranged from 1 to 12.

**Progress Meeting Project Objectives:** The Selective Harvest Program initiated in 1987 was designed, in part, to increase the bull to cow ratio. Since only some count areas in Unit 15B West were surveyed during 1996, an assessment of the entire subunit's population status and trend cannot be determined. Due to selective harvest, the bull to cow ratio in Unit 15B West exceeds 15:100 and is probably in excess of 50:100 in Unit 15B East. Staff observations and comments from permittees hunting the area indicate moose are becoming more difficult to find and trophy-sized bulls are less common, compared to 5 years ago. Additionally, commercial transporters are now charging the same price for successful and unsuccessful hunts. This change in costs encourages hunters to take the first legal moose they see to avoid paying the cost of packing without a moose.

Moose habitat in Unit 15B is deteriorating through natural plant succession and human suppression wildfire. Since recent censuses have not been conducted, an accurate assessment of population trend is not available. However, the 1989-1990, 1991-1992, and 1994-1995 winters were severe, causing higher than normal winter mortality, especially in the calf and older bull age classes. The winters of 1992-1993, 1993-1994, 1995-96, and 1996-97 were mild, allowing for normal calf and older bull survival.

In addition to reported harvest, highway vehicles killed 80 moose in Unit 15B West. No moose were documented as winter mortality during the past 2 years, compared to 35 in 1994-95. No change is recommended for Unit 15B for the 1996 season. We should continue the Selective Harvest (15B West) and Permit Drawing (15B East) Programs, designed to protect the male segment of the population from overharvest following a severe winter.

**Project Location:** Unit 15C  
Southern 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:** Poor survey conditions precluded completion of composition counts. We attempted 1 partial survey of the Caribou hills in Unit 15C (CA21). We counted 343 moose in the alpine portion of this area. We canceled the rest of the

survey due to poor snow conditions in the subalpine and forested portions. Bull:100 cow and calf:100 cow ratios were 37:100 and 28:100, respectively.

The winter of 1996-97 was considered mild with light snow pack; however, early snowfall caused moose to migrate from postrut areas to winter areas earlier than usual. Winter mortality included 44 by motor vehicle. There was only 1 reported case of starvation in the Homer area this winter. Survey results indicate the moose population, near 2500 animals, is stable.

Preliminary harvest statistics indicated approximately 1378 people hunted in Unit 15C during the 20 August-20 September season and took 337 moose. This represented the highest bull harvest since 1969. The overall hunter success rate was 24%. We classified 207 (61%) moose in the spike-fork category and 131 (39%) moose in the 50+ category. In addition, 13 moose had either illegal or unknown antler sizes. These statistics may change when final harvest reports are out.

Two drawing permit hunts for antlerless moose were established near Homer in 1995. A total of 40 permittees were chosen from 1022 applicants for these two hunts in 1996. Residents of the Kenai peninsula composed 80% and 85% of the permittees for DM549 and DM550, respectively. Hunters were not required to be assisted by department personnel this year; however, staff continued to monitor the hunt. Thirty four hunters reported hunting and 22(65%) were successful.

**Progress Meeting Project Objectives:** The Selective Harvest Program initiated in 1987 has increased and stabilized the bull:cow ratio. Hunter reports and general field observations indicate bulls are abundant in Unit 15C and the regulations are generally well supported by a variety of wildlife users.

The current bull:cow ratio meets the management objective of a minimum of 15:100. We recommend maintaining the spike-fork/50-inch restriction to the bag limit. Any management changes to the general season in Unit 15C should follow Unit 7 and the remainder of Unit 15 to avoid shifts in hunting pressure. During the spring 1997 Board of Game meeting, the BOG changed the season dates for DM549 and DM550. DM549 will run 1 November through 15 November and DM550 will run 16 November through 30 November.

Increased logging activities in Unit 15C to combat spruce bark beetles (*Dendroctonus rufipennis*) may provide increased visibility and access for moose hunters. Approximately 25,000 acres are scheduled for timber sale in 1997-98, including large parcels near the communities of Port Graham and Nanwalek. Habitat quality may be affected when overstory is removed. We need to continue to monitor effects of logging on moose on the Kenai Peninsula.

**Project Location:** Unit 16 (12,300 mi<sup>2</sup>)  
Unit 16A  
West side Susitna River valley, Yentna-Kahiltna rivers to Chulitna-Tokositna rivers

**Project Objectives:** To achieve a fall population of 3500-4000 moose by 1999 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:** No surveys were conducted. Total harvest was 200 (198 bulls). Harvest reports indicate 723 hunters harvested 137 bulls (19% success) during the 58-day (August 20-September 20 and 20 November-15 December) general seasons. Thirty-five moose were reported taken during the November 20-December 15 spike-fork hunt. Of the 164 individuals hunting with any-bull drawing permits, 63 (38%) were successful. The success rate for those hunting during 1-15 November (53%) was substantially higher than for those hunting during 20 August-20 September (23%). An additional 4 moose were reported killed by vehicle collisions.

**Progress Meeting Project Objectives:** Given the 2 consecutive mild winters, we assume the population is at the objective, with a bull:cow ratio well above the desired level. Harvest is well below the objective level, primarily due to the combination of difficult access in many parts of the subunit and the spike-fork /50-inch selective harvest strategy.

**Project Location:** Unit 16B  
West side of Cook Inlet

**Project Objectives:** Maintain a population of 6500-7500 moose with a November sex ratio of not less than 25 bulls:100 cows including no more than 40 moose on Kalgin Island with a minimum bull:cow ratio of 15:100. Human-use objectives are to maintain a minimum annual average harvest of 650 moose in Unit 16B and no less than 5 moose from Kalgin Island.

**Work Accomplished During the Project Segment Period:** We conducted an 8-9 November aerial composition survey in the southern portion of the subunit, including Kalgin Island. The observed composition on the mainland was 32 bulls and 14 calves: 100 cows. Kalgin Island was estimated to have 50-55 moose with an observed composition of 67 bulls and 60 calves: 100 cows. We visited Kalgin Island to evaluate status of winter browse availability and found fewer than 200 stems of browse species per acre in the best areas on the island.

During the general spike-fork /50-inch antlered bull season, 662 hunters took 197 bulls for a 30% success rate. A total of 182 (70%) Tier II permittees went afield and killed 96 bull moose. Of the 50 hunters awarded antlerless moose permits on Kalgin Island, 36 hunted and 8 were successful. In total, 303 moose were taken from the subunit, including 10 bulls from Kalgin Island.

**Progress Meeting Project Objectives:** The total moose population is probably near the low end of the objective range and remaining stable. The bull:cow ratio in the southern portion of the subunit was well above objective levels. The population on Kalgin Island may be above objective levels, warranting concern for habitat degradation. However, the human-use objective for Kalgin Island was met. The harvest for the rest of Unit 16B was far below the objective level. Given recent declines in numbers and spike-fork /50-inch selective harvest strategy, it is unlikely this human-use objective will be met. It may be important to maintain this management strategy, at the expense of human harvest, to protect a segment of the bull population as the overall population declines. Fall surveys will be necessary to monitor trends in bull:cow ratios; if ratios remain adequate, the harvest regime should be reconsidered.

**Project Location:** Unit 17 (18,800 mi<sup>2</sup>)  
Northern Bristol Bay

**Project Objectives:**

- To establish a minimum population of 100 moose in Unit 17A.
- To achieve and maintain a density of 1 moose/mi<sup>2</sup> on habitat considered to be good moose range in Unit 17B.
- To maintain a minimum density of 0.5 moose/mi<sup>2</sup> in areas considered to be moose habitat in Unit 17C.

**Work Accomplished During the Project Segment Period:** No moose surveys were flown during this reporting period due to snow levels that were extremely low to nonexistent throughout the area. We monitored fall harvest by personal interviews and by analysis of harvest ticket returns. Data from harvest tickets returned by June 1997 indicated that 542 hunters killed 215 bulls during the 1996-97 general season. No moose were harvested in Unit 17A; 167 were taken in Unit 17B, and 37 in Unit 17C. Eleven were harvested in unspecified areas. Hunter success was 33% (19/58) for local residents, 31% (50/161) for other Alaska residents, and 45% (143/316) for nonresidents. Aircraft provided the most common mode of transportation (71%). Eighty-two percent of the moose that were harvested had antlers 50" or larger.

Harvest data from Registration Hunt 583 indicated that 546 permittees harvested an additional 177 bulls during the 1996-97 season. No moose were reported as harvested in Unit 17A; 36 were taken in Unit 17B, and 90 in Unit 17C. Fifty-one were harvested in unspecified areas. Hunter success among responding permittees was 44% for local residents (118/270) and 40% for other Alaska residents (59/149). Nonresidents were not eligible to participate in this hunt. Boats were the most common means of access (65%). Seventy-two (43%) moose were killed in August, 77 (46%) in September, and 19 (11%) in December. Thirty-one percent of the moose harvested had antlers 50" or larger.

**Progress Meeting Project Objectives:** Moose in Unit 17 experienced another extremely mild winter in 1996-97. Overall survival was high, and there were few reports of winter-killed moose. Moose populations were stable in most portions of the unit, in spite of increasing harvests by hunters and predators.

Moose populations in Unit 17A were probably between 150 and 200 moose. The illegal harvest in Unit 17A during 1996-97 was 15 moose. The Federal Subsistence Board rejected 2 proposals to open a fall moose season in Unit 17A, but will take up a special action proposal in July 1997. The Board of Game authorized a registration hunt in the subunit for 1997-98. Continued work with local Advisory Committees and staff from the Togiak National Wildlife Refuge on moose management guidelines resulted in a change in our management objective for Unit 17A. It is now our intent to manage the area to establish and maintain a population of 600-1000 moose.

A female calf moose was found next to the Aleknagik Lake Road near Dillingham's Nerka subdivision in May 1997. The day-old calf was in relatively good condition. Attempts to reunite the calf with her mother were hampered by loose dogs, traffic, and well-intentioned neighbors. We finally captured the calf and sent her to the Anchorage Zoo.

**Segment Period Project Costs:**

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	246.6	107.2	353.8
Actual	246.6	99.0	345.6
Difference	0	8.2 <sup>a</sup>	8.2

<sup>a</sup>Lack of adequate survey conditions prevented some moose surveys from being flown.

Submitted by:

Michael G. McDonald  
Assistant Management Coordinator

**Project Title:** Interior Moose Population and Habitat Management

**Project Location:** Unit 12 (9678 mi<sup>2</sup>)  
Upper Tanana and White River drainages

**Project Objectives and Activities:** Maintain a minimum bull:cow ratio of 40:100 east of the Nabesna River and a minimum of 20 bulls:100 cows in the remainder of the unit.

- a. Conduct fall sex and age composition counts in selected trend count areas.
- b. Census northwestern Unit 12 once every 3 years.
- b. Monitor hunting pressure and review harvest report data.
- c. Conduct browse surveys to evaluate winter range condition.

**Work Accomplished During the Project Segment Period:** During November 1996 we completed 7 standard contour (sex and age composition) surveys in Unit 12; 3 in the Tok River valley, and 4 along the north face of the Nutzotin Mountains between the Nabesna River and the Yukon border. Within the Tok River valley, the calf, yearling bull, and bull:100 cows ratios were 31:100, 7:100, and 24:100, respectively. In 1992 the harvest limit within the Little Tok River was restricted to 1 bull with either spike-fork or >50-inch antlers or 4 brow tines. That regulation has increased the bull:cow ratio from the low 20s to 30 bulls:100 cows. Within the Tok and Dry Tok valleys, the bull:cow ratio remains in the low 20s. Calf recruitment to 5-months has been in the high 20s to low 30s since 1993, but yearling bull recruitment has been low (5-9:100 cows). Moose per hour counts indicate moose numbers in the Tok River drainages are stable. Harvest is maintaining the bull population at a low level but above the population objective.

Along the Nutzotin Mountains the calf, yearling bull, and bull:100 cow ratios were 36:100, 13:100, and 75:100, respectively. Calf survival to 5-months was the highest since 1989, exceeding the 15-year average of 27:100. Yearling bull numbers have declined since 1991 and are at a level indicating a population at a low-density equilibrium. The bull:cow ratio is well above the minimum population objective and indicates that harvest is having little effect. Moose numbers in this area are expected to remain at low density. This area supports the greatest density of wolves in the unit, and the grizzly bear population is naturally fluctuating.

The 1996-97 reported moose harvest was 123 bulls with a 25% success rate, equaling last year's harvest. These are the highest reported harvests in over 12 years, exceeding the 10-year average by 28 bulls. During the past 8 years, the Unit 12 success rate for moose ranged between 15% and 27% and averaged 23%. About 500 hunters reported hunting moose in Unit 12. Hunter participation has increased since 1992 as a result of greater harvest restrictions throughout southcentral Alaska. The greatest harvest occurred along the Tok and Tanana rivers. Composition data indicate harvest has caused the bull:cow ratio to decline near the population minimum in western and northwestern portions of the unit. The number of moose harvested for funeral and memorial potlatches has increased. Reporting has been poor, but I estimate 40-50 moose, primarily cows, are taken each year. Next year, I will census the most harvested area to determine effects.



Browse transect surveys were conducted within 3 important wintering areas along the Tok River, 1 each in the Porcupine Creek and Tok burns, and along the Tanana River in Unit 12. Preferred browse species were *Salix alaxensis*, *Populus balsamifera*, (< 6' in height) and *S. arbusculoides*. Browsing rates have not yet been calculated but were estimated moderate for *S. alaxensis* (50-60%) and light for *P. balsamifera* (30%) and *S. arbusculoides* (20%).

**Progress Meeting Project Objectives:** Both units' bull:100 cows objectives are being met. However, along the north side of the Alaska Range and in the upper Tok River, the bull population has declined due to harvest. If the trend continues, antler restrictions may be enacted. The bull:cow ratio in the remote areas of Unit 12 exceed 70:100 cows. In 1995-96, an early season for spike or fork antlered moose was offered in Unit 12. Under this regulation, we had hoped to shift more harvest to this age class, historically underrepresented in the harvest, without causing a decline in the bull:cow ratio. During the first 2 years of the hunt, only 4-5 yearlings were harvested during the early season. Hunter interest is high but most would like the season to occur earlier in August. Near villages moose numbers are declining, probably due to high harvests of cow moose for potlatches. However, based on composition data, the primary limiting factor in the remainder of the unit is still predation on calves 5-12 months old. Due to land ownership patterns and the loss of same-day-airborne wolf hunting, wolf and grizzly bear populations are expected to remain at current levels and continue to limit the unit's moose population at low density (0.2-1.0 moose/mi<sup>2</sup>).

During 1996-97, 2 programs will be implemented to enhance habitat quality in the Tok River valley: 1) a 1000 acre prescribed burn along the upper Tok River and 2) localized logging designed to mimic natural disturbances in the boreal forest and enhance willow regeneration in an important moose wintering area where fire is not an option.

**Project Location:** Units 19, 21A and 21E  
Kuskokwim River drainages, Middle Yukon River, and Nowitna River  
drainage

**Project Objectives and Activities:**

1. Develop statistically sound population estimates for select portions of the area as an ongoing objective.
2. Annually assess population status and trend in portions of the unit where harvest levels significantly affect moose populations.
3. Maintain unitwide reported harvests of at least 500 moose for Unit 19, 150 for Unit 21A, and 125 for Unit 21E.
4. 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.

**Work Accomplished During the Project Segment Period:** Summer moose calf surveys were completed during both 1996 and 1997 in a portion of the Unit 19D-East Intensive Management Zone to assess twinning percentages and to document timing of calf losses in the area. Winter severity indices were updated based on data from the National Weather Service. Mortality of wintering moose was monitored during January-March 1997 in a portion of Unit 19D-East. Fall composition and trend data were collected from traditional survey areas in the Kuskokwim and Yukon drainages. A reconnaissance flight was conducted in the Aniak River drainage in spring 1997 to assess the area's suitability for a traditional composition/trend area. Hunter harvest was monitored through check station efforts in Unit 19C (Farewell), and hunter harvest ticket returns were analyzed during the period. Efforts were escalated during summer 1997 to monitor wildfires in the area and provide input to Alaska Department of Natural Resources concerning those fires. Following Board of Game deliberations in March 1997, plans for upcoming check stations and hunter education were completed.

**Progress Meeting Project Objectives:** We spent 55.5 hours during June-September 1996 and 37.2 hours during May-July 1997 aerially monitoring moose populations in Unit 19D-East in the Intensive Management Zone. Twinning percentages were 8.3 and 17.6, based on samples of 357 and 488 observations in 1996 and 1997, respectively. As with most other summer calf mortality studies in Alaska, greatest declines were during the first 5-6 weeks postcalving.

Following a period of very severe winters during the late 1980s through mid 1990s, winters of 1995-96 and 1996-97 were more like the 30-year average. These winters with less snow accumulation resulted in reduced moose mortality, especially in the calf and yearling cohorts. Resultant yearling recruitment observed during summers should serve to stabilize the moose population, albeit at relatively low densities ( $<0.50$  moose per  $\text{mi}^2$ ). Aerial moose mortality surveys conducted during January-March 1997 revealed no starvation mortality.

Early winter population trend data were collected during November on 11 trend areas in the Kuskokwim and Yukon drainages. A total of 2062 moose were classified, and population parameters were compared with earlier data from the same survey areas. Although highly variable from area to area, general trends indicated that moose populations are stable in the McGrath area. Overall calf:cow ratios were 32.5:100 and bull:cow ratios were 36.3:100. Moose per hour observed during trend surveys was 88.2.

A preliminary survey of a portion of the Aniak River drainage was completed in March 1997. A total of only 1.03 hours was spent actually surveying moose, with a total of 310 moose tallied, including 57 calves (18.4% calves, twinning percent 14, moose per hour 300.1). We surveyed 36 linear miles of riparian corridor, equating to about 18  $\text{mi}^2$  of actual acreage. Moose density was 17 moose/ $\text{mi}^2$ .

A hunter check station was operated at Farewell in Unit 19C during September 1996 to monitor the moose and bison harvest and to assist hunters. Approximately 60 hunters were contacted. Harvest ticket returns were analyzed during summer 1997. Statistics revealed no significant changes in numbers of hunters, extent of the harvest, or access methods.

Since the summers of 1990 and 1991 when extensive wildfires burned throughout the McGrath area, acreage burned has been minimal. During summer 1997, however, the trend apparently reversed, and 100 wildfires were recorded in the Southwest Area, covering almost 880,000 acres. The largest wildfire, Inowak, burned a mosaic pattern in the Stony River-Sleetmute-Red Devil area. Because of the varied fuels, weather, aspect, and vegetation, I suspect that regeneration will progress through the grass-shrub-tree stages, providing a tremendous increase in available forage for moose. Other smaller fires will result in varying benefits for moose populations. Daily contact was maintained with Department of Natural Resources personnel on a local level to insure that potential benefits to wildlife would be realized.

**Project Location:** Unit 20A (6796 mi<sup>2</sup>)  
Tanana Flats, Central Alaska Range

**Project Objectives and Activities:**

1. Manage for a November adult population (i.e., excluding calves) of 10,000 to 12,000 adult moose.
  - Annually monitor twinning rates of parturient cows in late May.
  - Estimate the moose population size on the Tanana Flats and western foothills in November.
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.
  - Monitor composition of moose population in these areas in November.
3. Allow appropriate harvests of cow moose when the population is above the population objective of 10,000 adult moose.

**Work Accomplished During the Project Segment Period:**

We conducted surveys to determine the proportion of calves in the population in February 1996. Calf percentages averaged 28% for surveys on the flats and central and western foothills.

We conducted short yearling surveys on 2 May 1996 in a 200 mi<sup>2</sup> area in the north-central Tanana Flats and classified 258 moose as 152 cows, 56 short-yearlings (or 22% 11 months old), and 50 bulls. The short-yearling ratio of 37:100 was higher than the 33:100 observed in 1995.

We conducted twinning surveys in the same area on 20-26 May 1996. Twinning rates ranged from 9-19% during 4 surveys.

We conducted a population estimate survey in November 1996 that indicated 11,500 moose were present in Unit 20A. We observed 23 bulls:100 cows in the Ferry Trail Management Area and 39:100 overall, ratios higher than our objectives.

According to preliminary reports from the 1996 harvest, moose hunters harvested 588 bull moose in Unit 20A (37% success rate). In addition, we issued 300 antlerless permits from which 63 cows were harvested. For comparison, the estimated total harvest  $[(588 \times 1.15) + 63]$  is the second

highest on record (964 in 1973). However, in 1973 over 50% of the harvest was female. In 1996, females composed less than 10% of the harvest.

**Progress Meeting Project Objectives:** We completed all surveys scheduled for 1996. We implemented an antlerless hunt consistent with management objectives. We are continuing to meet our objectives for bull:cow ratios. In March 1996 the Board approved a reduction in antler restrictions in the Ferry Trail Management Area and the Yanert Controlled Use Area from spike-fork or 50" or 4 brow tines to spike-fork or 50" or 3 brow tines. The Board also approved a November drawing permit hunt for muzzleloading rifles to be held in the Wood River Controlled Use Area.

We recommend all objectives remain current for 1998. However, we expect to surpass our objective (1) of maintaining 10,000-12,000 adult moose. The limited hunt for cow moose (300 permits) will probably not stabilize the population. Additional discussions regarding long-term objectives for Unit 20A are warranted during the upcoming Board cycle.

**Project Location:** Unit 20B (9114 mi<sup>2</sup>)  
Drainages into the north bank of the central Tanana River

**Project Objectives and Activities:**

1. Manage for a population of 10,000 adult moose, with 4000 in Unit 20B West, and 6000 distributed over Units 20B Central and East.
  - Complete population and/or composition surveys in Unit 20B in November.
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.
  - a. Monitor harvest from the general season with harvest report cards and hunter check stations.
  - b. Provide additional moose hunting opportunity within the Fairbanks Management Area with bowhunts with drawing permit hunts for antlerless moose when appropriate.
  - c. Limit the moose hunting opportunity in Minto Flats to Tier II hunters and allow for general hunts when possible.
4. Minimize human-moose conflicts near Fairbanks, while accommodating moose for viewing.

**Work Accomplished During the Project Segment Period:** We completed a recruitment survey in the Minto Flats Management Area. Calves composed 28% of a sample from wintering areas taken in February 1996. In addition, we completed a population estimation survey in November 1996. We estimated the density at nearly 3 moose/mi<sup>2</sup>. We observed 47 calves:100 cows.

In 1996 preliminary reports from all hunts, hunters harvested 674 moose in Unit 20B. This harvest included approximately 617 bulls taken in the general season (2805 hunters) and 7 cows taken in the FMA drawing permit archery hunt (DM 788). In addition, 100 permittees harvested 27 bulls and 23 cows in the Tier II Hunt TM785 for the Minto Flats Management Area (MFMA). If we

assume that hunters reporting by harvest ticket had an 85% reporting rate, the estimated total harvest in Unit 20B was about 775 moose.

**Progress Meeting Objectives:** Because of the lack of recent moose population surveys in Unit 20B East and West, we are unable to determine whether we are meeting our population objectives. However, the trend observed in harvests and survey results from the MFMA indicate we are making progress. Results from November 1994 surveys in Central 20B should be supplemented with surveys in these areas.

We have been above our harvest objectives for 300-400 bulls in 7 of the last 8 years. However, we do not plan to reevaluate harvest objectives until we have better information on composition and population objectives.

We have reduced some of the human-moose conflicts near Fairbanks by working with the public to deter moose from invading gardens, to avoid motor vehicle collisions with moose, and to be aware of the danger of approaching moose too closely. We made substantial progress in analyzing moose/vehicle accident data.

**Project Location:** Units 20C, 20F, and 25C (23,318 mi<sup>2</sup>)  
Drainages into the south bank of the Tanana River west of the Nenana River, the west bank of the Nenana River, and the south bank of the Yukon River

**Project Objectives and Activities:**

1. Estimate hunting mortality and document nonhunting mortality when possible.
2. Estimate moose densities in Units 20C, 20F, and 25C by 1998.
  - a. Cooperate with BLM to superstratify approximately 1000 mi<sup>2</sup> in central Unit 25C in November 1997.
3. Promote moose habitat enhancement by allowing natural fires to alter vegetation.
4. Establish moose population objectives for Units 20C, 20F, and 25C by 2000.
5. Provide for a sustained yield harvest of these low-density populations until specific population management guidelines have been established.

**Work Accomplished During the Project Segment Period:** In Unit 20C preliminary data indicate 363 hunters reported taking 126 bulls during 1996. Harvest is similar to last year (119) and less than the 1994 high harvest of 150 bulls, while hunter numbers have remained stable. From 1986 to 1995 the number of hunters ranged from 224-373, and harvest ranged from 56-150 bulls.

In Unit 20F preliminary data indicate 137 hunters reported taking 34 moose during 1996. From 1986 to 1995 the number of hunters ranged from 64 to 129, and harvests ranged from 20 to 38 moose.

In Unit 25C preliminary data indicate 210 hunters reported killing 54 moose in 1996. From 1986 to 1995 the number of hunters ranged from 97 to 192, and harvest ranged from 26 to 55 moose. Harvest has remained stable from 1994 to 1996 (54-55), while hunter numbers have increased from 155 in 1994 to 210 in 1996.

The village of Tanana did not hold the Nuchalawoyya Potlatch in 1997. They are planning to hold it in 1998.

There is a federal subsistence season within the Dalton Highway corridor in Unit 20F (Hunt 990). No hunters registered for the hunt in 1996.

No surveys were conducted in Units 20F and 20C. A trend area count was conducted in the O'Brien Creek drainage in Unit 25C. It had been 8 years since the last trend survey in this area. The bull:cow ratio was 129 bulls:100 cows and the calf:cow ratio was 11 calves:100 cows. Comparisons with the 1988 data indicate a 59% decrease in moose numbers. However, moose distribution may have caused this decrease; we will monitor the apparent decrease closely.

Staff conducted no activities toward objectives 2-5 this reporting period.

**Progress Meeting Project Objectives:** We are meeting our objective to estimate hunting mortality and to document nonhunting mortality when possible. We are accomplishing this using harvest ticket reports and the Department of Public Safety moose/motor vehicle collision logs.

We have not collected any density or composition information in Units 20F or 20C since 1989. We will attempt at least some trend area counts in Units 20F, but survey plans have not yet been finalized for the fall 1997 surveys.

We will probably conduct a cooperative moose survey with BLM during fall 1997 in Unit 25C. However, plans for moose surveys were not final at the time of this report.

We are meeting our objective of promoting moose habitat by allowing natural fires to alter the vegetation. This has been accomplished through input by our Fire Management Liaison working on an interagency fire management team.

We are in the process of establishing definitive moose population objectives. To do this, we must collect, at a minimum, moose composition data for each unit to give a baseline for our objectives. Information from recent surveys and upcoming fall 1997 surveys will help formulate those population objectives.

We are meeting our objective to provide for a sustained yield harvest in Units 20C, 20F, and 25C. Reported harvest data indicate stable hunter success ratios with some increases in hunter effort. Overall, low-density populations are providing moose hunting opportunity to local and some nonlocal hunters.

I recommend the following changes to the objectives and activities: "2. Estimate moose densities in Units 20C, 20F, and 25C by 2000."

**Project Location:** Unit 20D (5,637 mi<sup>2</sup>)  
Central Tanana Valley near Delta Junction

**Project Objectives and Activities:**

1. Increase the fall moose population to 8,000-10,000 moose, with a sustainable harvest of 240-500 moose by the year 2002.
2. Manage for a posthunting ratio of 30 bulls:100 cows.
3. Manage for at least 20% hunter success as long as moose populations are stable or increasing.

**Work Accomplished During the Project Segment Period:** In November 1996 a population estimation survey was conducted in the Goodpaster and Shaw Creek drainages of northern Unit 20D. The survey resulted in a preliminary mean estimate of 1143 moose (32.8%). Population parameters from the survey resulted in mean estimates of 47.3 bulls:100 cows, 24.3 calves:100 cows, and 3.7 yearling bulls:100 cows, and mean density of 0.6 moose/mi<sup>2</sup>. No surveys were flown in southern Unit 20D because all funds were expended during the Goodpaster/Shaw Creek survey.

Preliminary 1996 harvest was analyzed for the subunit. Reported total harvest increased to 210 moose during the 1996-97 hunting season. During the general hunting season, 693 hunters took 207 moose. Drawing permit hunt DM790 in the Delta Management Area resulted in 3 moose killed by 5 hunters. In Subsistence hunt TM787, 7 hunters killed 1 moose.

**Progress Meeting Project Objectives:** A population estimation survey was conducted in the Goodpaster and Shaw Creek drainages of northern Unit 20D to contribute to an overall unit population estimate and determine compliance with herd size goals. Herd density and composition ratios were also calculated from survey data. Harvest data was analyzed. Hunting season harvest was monitored and hunter success met the management goal. No changes in hunting regulations are recommended at this time.

**Project Location:** Unit 20E (10,681 mi<sup>2</sup>)  
Charley, Fortymile, and Ladue River drainages

**Project Objectives and Activities:**

1. Maintain a posthunting bull:cow ratio of at least 40 bulls:100 cows in all areas.
  - a. Conduct periodic population estimate surveys in portions of Unit 20E.
  - b. Conduct browse transect surveys to ensure habitat is capable of sustaining increasing moose densities.
  - c. Conduct annual composition and trend count surveys within traditional count areas.

**Work Accomplished During the Project Segment Period:** During November 1996 we conducted a population estimate in a 735 mi<sup>2</sup> area in southeastern Unit 20E. Our methods followed the standard Gasaway techniques, except we were able to stratify the area from count data collected during previous surveys. By using the historic count data and foregoing a stratification plane, we were able to save about \$4,000. We estimated a population size of 944 ± 26% (90% CI) and a density of 01.3 moose/mi<sup>2</sup>. Moose numbers in this area have increased an estimated 13% since 1992. We also conducted 3 standard contour counts (sex and age composition) in central Unit 20E. The combined calf, yearling bull, and bull:100 cow ratios were 27:100, 10:100, and 56:100, respectively. Calf survival was 15:100 in 1995.

We conducted browse surveys in 2 moose wintering areas in Unit 20E. Similar to Unit 12, moose selected primarily *Salix alaxensis* and *S. arbusculoides*. Browse rate data has not been analyzed, but our estimates indicate low browsing pressure (< 20% of the twigs of preferred species).

During 1996-97 preliminary harvest data indicate 401 hunters harvested 116 bull moose (29% success). The average annual hunter participation rate and harvest during the previous 5 years was 414 hunters and 109 bull moose, respectively. The average success rate was 26%. The number of hunters and moose harvested has been increasing the past 5 years. Probable causes for the higher harvest are 1) the Fortymile caribou season is open concurrently with the moose season, attracting hunters for both species, 2) regulations restricting harvest to bulls with spike-fork or antlers >50-inches throughout southcentral Alaska caused a displacement of hunters into the area, and 3) several little known moose concentration areas were found and are being hunted intensely. The bull:cow ratios in the most popular area declined due to increased harvest.

**Progress Meeting Project Objectives:** Based on survey results since 1992, we believe the moose population in central and western Unit 20E remained relatively stable and is currently at a low-density (0.2-0.6 moose/mi<sup>2</sup>). The population density in the eastern portion of the unit ranges between 0.8 and 1.3 moose/mi<sup>2</sup> and, based on calf recruitment the past 2 years, the population is beginning to stabilize. Overall, the moose population in Unit 20E remains at low-density (0.4-0.5 moose/mi<sup>2</sup>). Past and ongoing research demonstrated that wolf and bear predation is the primary limiting factor on the moose population, and hunting and habitat quality have little effect. Under current predator levels, the moose population in Unit 20E will remain at a low-density. Managing for significant growth of Unit 20E's moose population is not a long-term management goal; however, it is desired by most local residents. If in the future the political and social attitudes become more accepting of active predator management or if different management tools become available, management objectives and activities should be developed to increase the area's moose population.

The bull:cow ratio in Unit 20E is above the management objective. However, the bull:cow ratio declined in one of the most popular hunting areas. To protect against an excessive decline in bull numbers in a portion of Unit 20E, the Alaska Board of Game established the Ladue River Controlled Use Area in the eastern portion of the unit at the spring 1994 meeting. Under this use designation, the bull population has adequate protection during the fall; this use has allowed additional hunting opportunity during early winter. Beginning in 1995, 2 drawing permit hunts have allowed hunters to hunt this area under very wild and aesthetic conditions without



jeopardizing the bull population goal. During the first 2 years, harvest was low at 6 to 10 bulls per year.

**Project Location:** Unit 21B (4,871 mi<sup>2</sup>)  
Lower Nowitna River and Yukon River between the Melozitna and Tozitna rivers

**Project Objectives and Activities:**

*The floodplain Areas of the Yukon and Nowitna Rivers:*

1. Maintain or increase November moose densities to 2.5-4.0 moose per square mile.
  - Conduct annual trend area surveys.
2. Maintain an average annual harvest of 40 moose from the desired population of 1000-1600 moose.
  - Monitor harvest with harvest reports and check stations.

*Remainder of the Nowitna Drainage:*

1. Maintain or increase November moose densities to 0.5 moose per square mile.
  - Conduct annual trend area surveys.
2. Maintain an average annual harvest of 20 moose from the desired population of 1100-1300 moose.
  - Monitor harvest with harvest reports and check stations.

*Remainder of Unit 21B:*

1. Maintain or increase November moose densities to 0.5 moose per square mile.
  - Conduct annual trend area surveys.
2. Maintain a minimum annual harvest of 30 moose from the desired population of 1600-1700 moose.
  - Monitor harvest with harvest reports and check stations.

**Work Accomplished During the Project Segment Period:** Fall moose composition surveys were flown in cooperation with FWS during November 1996. In Unit 21B 490 moose were classified in 187.0 mi<sup>2</sup> for a density of 2.62 moose per mi<sup>2</sup>. The bull:cow ratio at 21:100 was similar to the past few years, the calf:cow ratio was 23:100, and the yearling percent in the herd was 9.6.

Preliminary analysis of moose harvest reports from Unit 21B indicates 153 hunters reported taking 51 bull moose. One hundred and twenty-nine of those hunters took 34 bull moose in a registration hunt in the Nowitna River drainage of Unit 21B. ADF&G and FWS staff operated a mandatory check station at the mouth of the Nowitna.

**Progress Meeting Project Objectives:** In Unit 21B moose populations within the Nowitna drainage are at the lowest end of the population objectives. Depressed bull:cow ratios are hindering recovery. The Nowitna drainage continues to provide an annual harvest of about 40 bulls. The major sources of calf mortality are undocumented.

**Project Location:** Unit 21C (3,761 mi<sup>2</sup>)  
Dulbi River above Cottonwood Creek and Melozitna River above Grayling Creek

1. Increase the moose population to 2500-3000 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.
  - Monitor harvest with harvest reports.
3. Develop a population level and density estimate by 1998 for the Melozitna River drainage by conducting a moose stratification survey.

**Work Accomplished During the Project Segment Period:** No moose surveys were conducted in Unit 21C during this reporting period. Preliminary analysis of moose harvest reports from Unit 21C indicates 15 hunters reported taking 10 moose.

**Progress Meeting Project Objectives:** The moose population is at or above the population management objective level in Unit 21C.

**Project Location:** Unit 21D (12,113 mi<sup>2</sup>)  
Yukon River from Blackburn to Ruby and Koyukuk River drainage below Dulbi Slough

**Project Objectives and Activities:**

1. Maintain a population of at least 4000 moose south and east of the Koyukuk River, including the Three-day Slough floodplain.
2. Maintain an early winter density of at least 6.0 moose per square mile within the Three-day Slough floodplain.
  - Conduct annual trend area surveys.
3. Maintain a posthunting ratio of 30 bulls:100 cows in the population being monitored within the Three-day Slough trend count area.
  - Monitor harvest with harvest reports and check stations.
4. Develop guidelines for maximum winter browse use within the Three-day Slough area.
  - Conduct browse surveys.
5. Maintain a moose population level of 900-1000 in the Kateel River drainage and develop a population level for the Gisasa River by 1997.
  - Conduct a moose stratification survey.
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.
  - Conduct annual trend area surveys.
7. Develop a population level and density estimate by 1996 for the remainder of the subunit, including the Yuki and Nulato rivers.
  - Conduct a moose stratification survey.

8. Forage dynamics of moose will be determined by defining the choice of browse species during winter, measuring the nutritive quality of winter browse, estimating browse consumption as a proportion of current annual growth, and assaying moose body condition by urinary chemistry or ultrasound.
9. Determine the number and residency of hunters using the Koyukuk River to access the Three-day Slough area by operating a moose hunter check station at Ella's cabin.

**Work Accomplished During the Project Segment Period:** In Unit 21D within the Three-day Slough trend count area, the observed density of moose was 11.1 moose per square mile. The bull:cow ratio was 24:100, the second lowest ratio since 1981, the calf:cow ratio was 23:100, and the yearling:percent in the herd was 11%. In the Kaiyuh Slough trend count area, the observed density of moose was 2.2 moose per square mile, the bull:cow ratio was 70:100, the calf:cow ratio 70:100, and the yearling percent in the herd was 11%.

In May 1997 we conducted a moose calf twinning survey to determine the percentage of cows producing twins at Three Day Slough. The twinning rate was 23%. Numbers lower than 20% usually indicate environmental stress either from hard winters or poor forage conditions.

Preliminary analysis of moose harvest reports from Unit 21D indicates 698 hunters reported taking 408 moose. Six hundred and fifteen of those hunters took 346 moose in a registration hunt in the Koyukuk River of Unit 21D. ADF&G staff operated a mandatory check station on the Koyukuk River. Harvest has been slowly increasing within the subunit with most of the harvest coming from the Koyukuk River.

**Progress Meeting Project Objectives:** The moose population is at or above the population management objective in most of Unit 21D; however, the bull:cow ratio in the Three Day Slough trend count area was below management objectives for the second year in a row. A study to investigate the foraging dynamics of moose in the Three-day Slough area was completed. Population estimates were not done for the Gisasa, Melozitna, Yuki, and Nulato rivers.

**Project Location:** Unit 24 (26,055 mi<sup>2</sup>)  
Koyukuk River drainage above Dulbi River

**Project Objectives and Activities:**

1. Manage a moose population at the current level of 5000-7000 in the area south of Hughes, including the Koyukuk Controlled Use Area.
2. Increase the moose population to 5000-6000 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 3000-3500.
4. Maintain the population in the Gates of the Arctic National Park at 1300-1500.
  - Conduct annual trend area surveys.
5. Determine harvest.
  - Monitor harvest with harvest reports and check stations.

**Work Accomplished During the Project Segment Period:**

In Unit 24 within the Dulbi Slough count area, the observed density of moose was 5.9 moose/mi<sup>2</sup>. The bull:cow ratio was 20:100, the calf:cow ratio was 41:100, and the yearling:percent in the herd was 5%.

Preliminary analysis of moose harvest reports from Unit 24 indicates 182 hunters reported taking 129 moose. Eighty of those hunters took 29 moose in a registration hunt in the Koyukuk River, downstream from Huslia. ADF&G staff operated a mandatory check station on the Koyukuk River. Registration permits were also issued in Huslia.

**Progress Meeting Project Objectives:** In southern and northern Unit 24, the moose population is at or above the management objective. Predation and perhaps out-of-season harvests have kept the population low, but recent fires and caribou as alternate prey are helping the moose population recover in the central part of the unit.

**Project Location:** Units 25A, 25B, and 25D (48,000 mi<sup>2</sup>)  
Upper Yukon River Valley

**Project Objectives and Activities:***Unit 25 Overall:*

1. Continue efforts to communicate with and educate local residents about moose management.
2. In cooperation with FWS, monitor moose population status as funding permits.

*Unit 25A:*

1. Evaluate possible effects of increasing hunting moose on major drainages along the Brooks Range.
2. Educate local residents regarding the importance of not taking cow moose.
3. Cooperate with FWS in periodically determining moose population status.

*Unit 25B:*

1. Plan 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.

*Unit 25D:*

1. In cooperation with FWS, plan and conduct periodic moose population surveys in the eastern and western portions of the unit.
2. Educate local residents regarding the importance of not taking cow moose.

**Work Accomplished During the Project Segment Period:** We conducted a population estimate survey in Unit 25D west during November 1996. This resulted in an estimate of 666 moose in a 1500 square mile area. We discussed the status of the Unit 25D moose population and potential benefits of local involvement in developing a moose management plan with the Yukon Flats Advisory Committee and local community governments. There are local concerns about the future of the moose population and positive interest to maintain or enhance moose numbers. Weather and logistic limitations precluded composition surveys in Unit 25A. FWS staff continued a cooperative study of moose population identity in Unit 25A. The movements of 57 radiocollared

moose are being monitored to determine seasonal movements and habitat use. Results show a high proportion of moose wintering in northern Unit 25A migrate to the Old Crow Flats in Canada in the spring and return to Alaska in the fall.

**Progress Meeting Objectives:** Our management objectives were met, except that surveys in Units 25A were not completed due to weather and funding did not allow conducting surveys in Unit 25B.

**Project Location:** Units 26B and 26C (25,800 mi<sup>2</sup>)  
North Slope of the Brooks Range and Arctic Coastal Plain east of the  
Itkillik River

**Project Objectives and Activities:**

1. Conduct trend count surveys with the FWS to monitor moose population status.
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.

**Work Accomplished During the Project Segment Period:** FWS conducted composition surveys in Units 26B and 26C during October 1996. These surveys showed the decline in moose numbers had stabilized with improved calf survival. A composition survey in April 1997 showed that overwinter calf survival was good.

Radiotelemetry studies were conducted in the southern portions of Units 26B and 26C beginning March 1995 when moose were radiocollared by FWS on winter range in the Kongakut and Firth drainages. This study is continuing and has yielded interesting results regarding migration patterns.

We are compiling and analyzing harvest data. In view of the decline in moose numbers, a regulation establishing a 50-inch minimum antler size for resident hunters took effect in fall 1995, and the season was closed in fall 1996.

**Progress Meeting Project Objectives:** We have made substantial progress meeting objectives. Population status and habitat conditions were monitored. However, objectives relating to hunter success cannot be met in view of the dramatic decline in moose numbers during the last few years and the closing of the moose season in 1996.

**Segment Period Project Costs:**

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	149.2	110.3	259.5
Actual	95.6	96.2	191.8
Difference	53.6	14.1	67.7

*Explanation:* Personnel costs were lower than expected because of staff position vacancies and increased nonfederal aid charges for regional office staff. Operating expenditures were less than predicted because a cooperating agency paid for surveys in Unit 25C, supplementary surveys in Unit 24 were not accomplished, and excellent survey conditions in Units 20E and 12 resulted in lower costs.

Submitted by:

David James

Management Coordinator

**Project Title:** Western Alaska Moose Population Management

**Project Location:** Unit 18 (42,000 mi<sup>2</sup>)  
Yukon-Kuskokwim Delta

**Project Objectives:**

1. Increase the moose population in Unit 18 by 10% a year to maintain a population goal for the Yukon River population of 1000-3000 moose. The population goal for the Kuskokwim River population is to increase the population from 200 to 1000 moose. The bull:cow ratio for both populations will be maintained at a minimum of 30 bulls:100 cows.
  - a. Conduct fall sex and age composition surveys and winter recruitment surveys of the Yukon River population annually.
  - b. Conduct fall and/or midwinter surveys of the Kuskokwim River and its major drainages to assess the status and population size of the Kuskokwim River population.
  - c. Conduct a moose census on the Yukon River every 5 years.
  - d. Conduct a moose census on the Kuskokwim River every 5 years.
2. Improve harvest reporting and compliance with hunting regulations.
3. Finalize a cooperative moose management plan with local communities along the Yukon River, especially addressing the population goal of 3000 moose for the Yukon River.
4. Continue working with the Association of Village Council Presidents (AVCP), Kuskokwim Native Association (KNA), The Kuskokwim Corporation (TKC), U.S. Fish and Wildlife Service (FWS), Unit 19 area biologist, the Lower and Central Kuskokwim Fish and Game advisory committees, and local moose hunters to resolve allocation conflicts between upriver and downriver uses.

**Work Accomplished During the Project Segment Period:** During moose aerial survey work in November 1996 the area biologist was killed in a plane crash. Consequently, no further work was accomplished during the reporting period.

Harvest summaries are not yet available for this period.

**Progress Meeting Project Objectives:** We are improving harvest reporting and compliance with regulations through hunter contacts at the Paimiut check station on the Yukon River, the newly initiated checkstation on the Kuskokwim River south of Lower Kalskag, radio and newspaper announcements, law enforcement activities, and community meetings. Harvest ticket receipts and returns have been consistent for the last 8 years.

**Project Location:** Unit 22 (25,230 mi<sup>2</sup>)  
Seward Peninsula and eastern Norton Sound

**Project Objectives:** The overall population management objective is to maintain a minimum population level of 5000-7000 moose in Unit 22. In Unit 22A, the objective is to increase population size from the current estimate of 400-600 moose to at least 800-1000 moose. In Units 22B and 22D, the objective is to stabilize the population at 1500-2500 and 2500-3000 moose, respectively, with a minimum bull:cow ratio of 30:100. In Unit 22C, the objective is to maintain the existing population of 350 with a minimum bull:cow ratio of 20:100. In Unit 22E, the objective is to maintain the existing population of 250-350 moose. These objectives will be accomplished 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.
  - a. 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.
  - b. Conduct moose censuses in each of the 5 Units (on a yearly rotational basis) to estimate abundance.
2. Monitor human and natural mortality factors affecting the population.
  - a. Evaluate hunting mortality by analyzing all harvest data.
  - b. Improve harvest reporting through public contacts and improved communication.
  - c. Evaluate mortality factors affecting moose populations in Unit 22 through the use of radiotelemetry.
3. Develop updated moose management objectives, with special emphasis on areas adjacent to the Nome road system.

**Work Accomplished During the Project Segment Period:**

*Harvest monitoring*

The known harvest from Unit 22 was 198 moose (176 males, 20 females and 2 unknown). The reported harvest by subunit was 22A - 10; 22B - 61; 22C - 25; 22D - 83; and 22E - 19. Of the 456 individuals who reported hunting in Unit 22, 419 (92%) were residents of Alaska, and 392 (86%) were residents of Unit 22. Hunter success rate was 43%.

Incisorform teeth from 66 hunter-killed moose were collected to determine age and the cause of the unusually high incidence of tooth breakage among Seward Peninsula moose.

*Population monitoring*

A moose census of Unit 22D was completed during March 1997. The portion of 22D including the Kuzitrin, Kougarok and Pilgrim River drainages yielded an estimated population of 1251 moose  $\pm$  13.9% at the 90% confidence interval. Calf recruitment was 18.5%. The census of the American River drainage yielded an estimate of 578 moose  $\pm$  12.7% at the 90% confidence interval. Calves composed 22% of the estimate. The estimates for these areas have not changed significantly since the last Unit 22D census in 1993 and are below desired 1988 population levels.



### *Radiotelemetry studies*

Work continued on the moose telemetry study initiated in 1995 in the western part of Unit 22B to investigate the low recruitment rates in the Fish and Niukluk river drainages. Specific objectives of the study are to determine calving success during June and the timing of calf mortality during the remainder of the year. Twenty-seven cows were radiocollared in the Niukluk and Fish River drainage during early April 1995 and an additional 10 cows were radiocollared in the upper Niukluk and Boston Creek drainage in April 1996.

Between 4 June and 21 June 1996, 16 of the 32 remaining radiocollared cows were observed with newborn calves (8 with a single calf and 8 with twin calves). By the end of June, 7 of the 24 calves had disappeared and by mid August only 12 remained. Six calves were still accompanying radiocollared cows in mid May 1997. Two cows died of unknown causes during the reporting period, one in June and the other in the early winter of 1996.

### *Public interactions*

We made several trips to Unit 22 villages to explain the need for regulations and harvest reporting as well as to assist local license vendors with their duties. Considerable time was devoted to answering questions from the public, writing articles, and mailing information and regulatory materials.

**Progress Meeting Project Objectives:** The unreported harvest of moose in Unit 22 is considerable. Much of this harvest is likely attributable 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 having an effect in some communities because the number of individuals purchasing licenses and/or picking up harvest tickets has increased. However, additional contact with local residents needs to occur if we are to achieve better compliance with current moose regulations.

The antlerless moose season was closed in Unit 22B west of the Fish River and in the Kougarok, Kuzitrin, and Pilgrim River drainages in Unit 22D to facilitate population recovery. The antlerless moose season is open December 1-31 in the remainder of Unit 22B and 22D.

Since 1987 the objective of completing a census of 1 subunit in Unit 22 each year has been achieved. However, because of poor weather, unsuitable snow conditions, and conflicts with competing projects, not all of the aerial recruitment and composition surveys planned for spring and fall in Unit 22 were completed during this reporting period. Efforts are continuing to develop updated management objectives in consultation with the public and other agencies.

**Project Location:** Unit 23 (43,000 mi<sup>2</sup>)  
Kotzebue Sound and Western Brooks Range

**Project Objectives:** The population management objective of Unit 23 is to maintain the moose density at or above 1 moose/mi<sup>2</sup>, and the bull:cow ratio at a minimum of 40:100.

1. Conduct modified Gasaway censuses in established census areas to monitor population composition and recruitment.

2. Monitor harvest.
3. Collect recruitment information in the Noatak River drainage.
4. Collect data on moose movement patterns, distribution, and evaluate sources and rates of mortality in the Noatak and Selawik River Drainage.

**Work Accomplished During the Project Segment Period:**

*Population monitoring*

Selawik Spring Census. ADF&G assisted FWS in conducting a census in March 1997. The census area encompassed 1009 mi<sup>2</sup>. We estimated the population to be 1314 moose  $\pm$  14.74% (90% CI). The calf to adult ratio was 0.24  $\pm$  13.3% (90% CI).

Noatak Census. To assess recruitment of calves into the Noatak moose population, ADF&G staff surveyed 578.8 mi<sup>2</sup> of a 1,628 mi<sup>2</sup> study area. The calf:adult moose ratio was 0.07  $\pm$  69.03% (0.02 to 0.13). We conducted the census in early May and observed 390 moose. Pilot and observer teams censused 44 units (36 high and 8 low density). Stratification was based on the past distribution of moose rather than a stratification flight. Our objective was to obtain a calf:adult ratio, rather than a population estimate.

Harvest monitoring. In Unit 23, 353 hunters harvested 160 moose during the 1996-1997 season. Thirty seven of these hunters resided within the unit. One hundred and seventy-eight nonlocal state residents and 135 nonresidents reported hunting moose. We monitored the harvest using the statewide harvest reporting system.

Radiotelemetry Studies. The department and federal agency staff completed the sixth year of a cooperative moose telemetry project in the middle Noatak River drainage and the fourth year of a similar study in the Tagagawik River drainage. In both studies, we relocated radiocollared moose throughout the year. The objective of relocating moose was to determine seasonal mortality rates and track seasonal movements. We tracked moose before and after the fall hunting season.

Noatak. Total mortality for radiocollared moose in the Noatak study from April 1996 to April 1997 was 19%. In April 1997, we recollared 26 moose that had been initially collared in 1992-1994. We also removed the collar on 1 moose and collared an additional 14 moose. This increased the number of radiocollared moose to 78 (48 cows and 30 bulls) for the April 1997 to April 1998 year.

Selawik. In the Tagagawik moose study, total mortality in 1996 (Apr 1996-Apr 1997) was 15%. In April 1997, FWS collared an additional 18 moose. Sixty moose had radiocollars at the beginning of the 1997-1998 study year.

**Progress Meeting Project Objectives:** Data from the radiotelemetry projects and census results indicate population objectives are being met in some areas of Unit 23. Moose densities in the Noatak (1993) and upper Kobuk (1995) are below our objective of 1 moose per mi<sup>2</sup>, based on our last complete census in these areas. Bull:cow ratios (the number of bulls per 100 cows) are below 0.40 in the Squirrel (0.37) and above 0.40 in the Noatak (0.43) and Upper Kobuk (0.62). Telemetry projects are providing valuable information on causes and extent of hunting and natural mortality. We are improving population data by moving away from trend count areas and by using

statistically rigorous censuses on a rotational basis throughout the unit with modified census techniques in the intervening years.

**Project Location:** Unit 26A (53,000 mi<sup>2</sup>)  
Western North Slope

**Project Objectives:**

1. Monitor the moose population in Unit 26A.
  - a. Conduct late winter trend counts annually to monitor population trends and short yearling recruitment. A unit wide census will take place every 4 years.
  - b. Conduct fall surveys to monitor sex and age composition trends and summer calf survival.
2. Study the factors causing the population to decline.
  - a. Examine and collect samples from dead moose to test for pregnancy status, disease, mineral deficiencies, and contaminants.
  - b. Use radiotelemetry to examine mortality rates and causes of mortality in adults and calves.
  - c. Continue monitoring predator populations.
  - d. Continue the moose browse study.
3. Minimize hunting mortality.

**Work Accomplished During the Project Segment Period:** Fall sex and age composition surveys were conducted in trend count areas in the Colville, Anaktuvuk, and Chandler river drainages during November 1996. During these surveys, 161 moose were observed. Of these, 47 were bulls (60 bulls:100 cows), 79 were cows, and 35 were calves (22% calves). The estimated antler size of the bulls was as follows:

Inches	<30	39-40	40-49	50-59	60+
Percent	0%	0%	38%	45%	17%

All drainages in Unit 26A containing moose habitat were surveyed to conduct a census and short yearling recruitment count during April 1995. A total of 757 moose (746 adults and 11 calves) were counted, yielding a short yearling recruitment rate of 1%. This represents a 51% decline since the 1991 census when 1535 moose were counted.

A survey to determine population trend and short yearling recruitment was conducted during April 1997 in trend count areas on the Colville, Anaktuvuk, and Chandler River drainages. A total of 188 moose (145 adults and 43 calves) were counted, yielding a short yearling recruitment rate of 23%. We saw 5 pairs of twins during the survey. This indicates a great improvement in short yearling survival as there were 3%, 2%, and <1% short yearlings counted in 1994, 1995, and 1996, respectively; no twins were seen during any of those years.

In a cooperative study with the North Slope Borough, we captured and radiocollared 30 female and 5 male moose from 22-25 April 1995 to determine causes for the declining calf survival and

moose population. Each moose was given a physical examination; we collected blood, fecal, and hair samples to test for pregnancy status, disease, mineral deficiency, and contaminants. Blood samples indicated that 23 of 28 females were pregnant. In addition, 6 of 33 animals sampled tested positive for exposure to brucellosis, a bacterial disease. Through laboratory analysis it was later determined the bacteria is *Brucella suis*, which is common in caribou on the North Slope. Another 6 animals tested positive for exposure to leptospirosis, another bacterial disease that can cause poor calf production and weak calves.

Surveys to locate radiocollared moose were flown periodically. As of 4 April 1997, 3 adults (1 female and 2 males) had died, and there were 11 surviving short yearlings. One of the dead bulls was sampled, and it was determined he had an active case of brucellosis. The brucella organism was cultured and is now available for further testing. This bull had not tested positive for brucellosis the previous spring.

We again used a Hughes 500 helicopter and tranquilizer darts to capture moose and attach radio-collars to 15 moose on 10-14 April 1997. Ten of those tested positive for pregnancy, 3 tested not pregnant, and 2 may have been pregnant. Two tested positive for exposure to brucella. In addition, 8 moose that had been examined in 1996 were recaptured in 1997. Five of these had tested positive to exposure to brucella in 1996, and they all had high titers again in 1997, indicating the disease was still active. Of the 8 recaptured, 7 were pregnant.

All radiocollared moose were observed during 3-6 June to determine whether they had calves. We saw 29 calves with the 44 cows, including 4 sets of twins.

We collected willow samples from the Anaktuvuk, Chandler, and Colville rivers while on a dog sled trip between Anaktuvuk Pass and Umiat. A moose browse specialist will analyze these samples for the food content and digestibility.

Because of the declining moose population, restrictive regulations were established and there were no reports of moose being harvested.

**Progress Meeting Project Objectives:** We captured moose in 1996 and used radiotelemetry to try to determine the reason for high adult mortality and poor calf recruitment. Samples taken from the captured moose indicated the moose had a high incidence of the diseases brucellosis and leptospirosis and found most were copper deficient. However, the radiotelemetry results indicated the adult mortality was low (3 out of 35 collared adults died) and calf survival was high (23% short yearlings) during 1996-1997. Survival, calf production, and calf survival for the moose with positive titers for brucellosis were as good as the rest of the population. For the first time in 4 years the population increased.

Fall composition counts indicated that oversummer calf survival was much better than during the previous 4 years. We also saw a preponderance of mature bulls and very few in the 2-4 year range. It will be necessary to restrict bull harvest until bulls from the 1996-1997 age class and, hopefully, future age classes grow into mature bulls.

From the moose captured in 1997, the pregnancy rate was adequate and brucellosis is still active in the 5 moose that had high titers for brucella in 1996. Calving surveys indicated calf production was fairly good in 1997. Further surveys will be needed to determine calf survival.

There will be very little hunting mortality because the Board of Game closed nearly the entire North Slope to moose hunting. Only a section of the lower Colville River will be open for bull moose during August, when airplanes are not permitted for hunting.

**Segment Period Project Costs:**

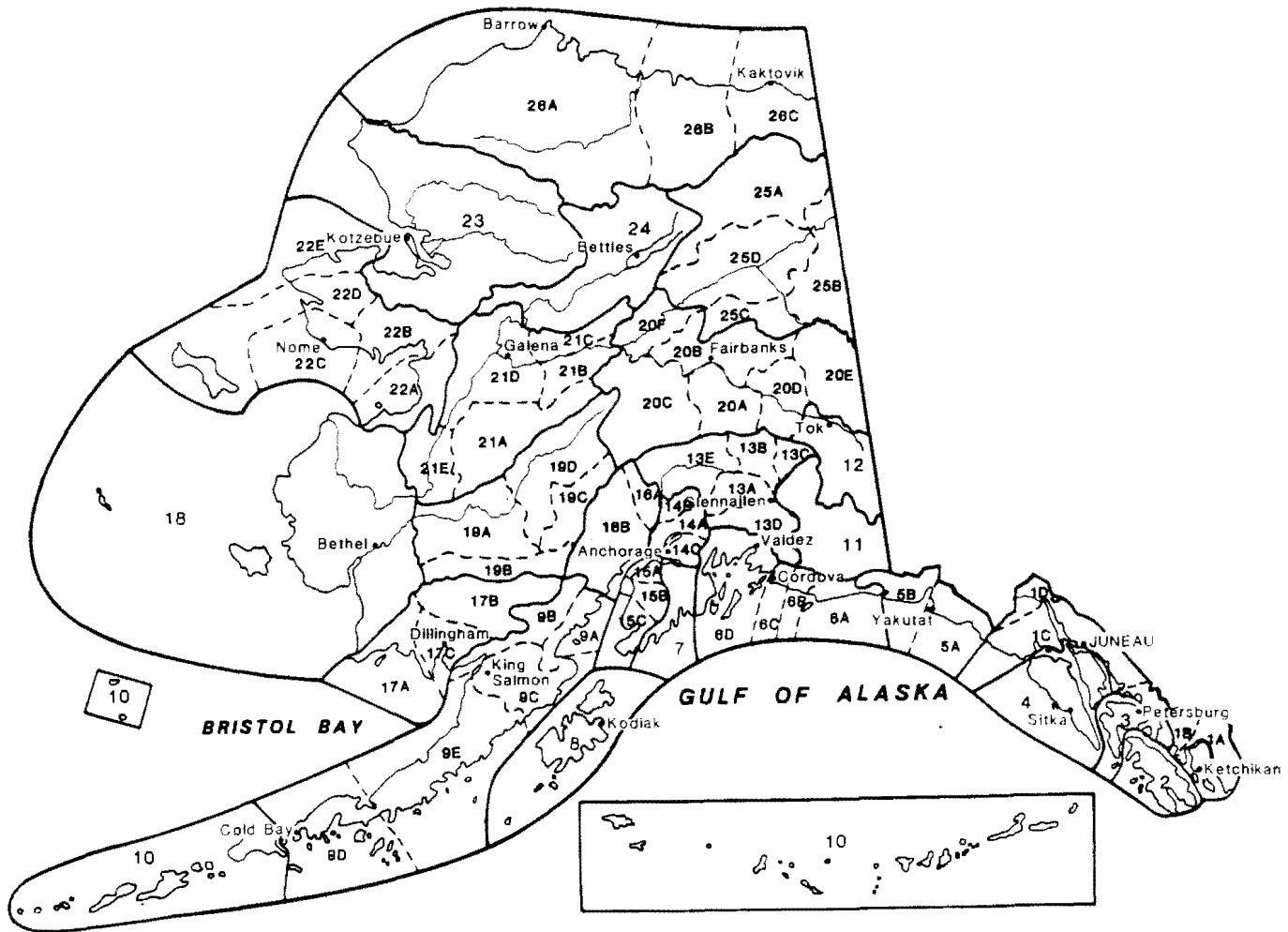
	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	57.4	41.9	99.3
Actual	41.5	106.6	148.1
Difference	15.9	-64.7	-48.8

*Explanation:* Cost summary is approximate. Region V did not have administrative support for a fiscal summary at the close of the reporting period. Unit 18 activities were not completed after the accidental death and subsequent vacancy of the Unit 18 Area Biologist. This resulted in surplus personnel monies at the close of the reporting period. Operating costs for moose research in Unit 22 and 26A were higher than expected.

Submitted by:

Peter Bente  
Survey-Inventory Coordinator

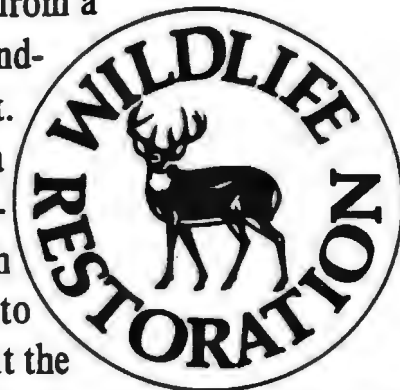
# Alaska's Game Management Units



**ARLIS**

Alaska Resources  
Library & Information Services  
Anchorage, Alaska

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 allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve, and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes for responsible hunting. Seventy-five percent of the funds for this report are from Federal Aid.



Pat Costello