

Alaska Department of Fish and Game
Division of Wildlife Conservation



Federal Aid in Wildlife Restoration
Annual Performance Report
Survey-Inventory Activities
1 July 1998 - 30 June 1999

MOOSE

Mary V. Hicks, Editor



SK
367.2
.M6
1998-99

Grant W-27-2
Study 1.0
October 1999

STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
Frank Rue, Commissioner

DIVISION OF WILDLIFE CONSERVATION
Wayne L. Regelin, Director

Persons intending to cite this material should receive permission from the author(s) and/or the Alaska Department of Fish and Game. Because most reports deal with preliminary results of continuing studies, conclusions are tentative and should be identified as such. Please give authors credit.

Free copies of this report and other Division of Wildlife Conservation publications are available to the public. Please direct requests to our publications specialist:

Mary Hicks
Publications Specialist
ADF&G, Wildlife Conservation
P.O. Box 25526
Juneau, AK 99802
(907) 465-4190

The Alaska Department of Fish and Game administers all programs and activities free from discrimination on the bases of race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfield Drive, Suite 300, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 907-465-3646, or (FAX) 907-465-2440.

ARLIS
Alaska Resources
Library & Information Services
Anchorage, AK

367.2
.116
1998-99

Project Title: Southeast Moose Population Management

Project Location: Unit 1A (5,000 mi²)
Ketchikan area including mainland areas draining into Behm and Portland Canals.

Project Objectives and Activities:

Management objectives for Unit 1A moose include the following:

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

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

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

Progress Meeting Project Objectives: We issued 53 registration permits during this report period, down 6 from last season. Of those, 24 hunters reported they did not go into the field. Three bulls were killed along the Unuk River by the 29 permittees that hunted. The 10% hunter success rate was nearly identical to last season's 11% success rate. The number of hunters afield (29) was substantially higher than our objective, numbers of moose killed met our objective, and the hunter success rate was below our objective. Hunter-days of effort was 189 days, which is equivalent to 6.5 days per hunter. Antler widths for the 3 bulls were 28, 31, and 35 inches, for an average of 31 inches. This was nearly identical to last season's average of 30.5 inches.

Project Location: Unit 1B (3,000 mi²)
Southeast mainland from Cape Fanshaw to Lemesurier Point.

Project Objectives and Activities:

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	1,750
Hunter success (%)	(12)

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)

- Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: The moose hunt for Unit 1B, Unit 3, and that portion of Unit 1C south of Point Hobart was included on a single registration permit. We issued 941 registration permits, 535 to Petersburg residents and 253 to Wrangell residents.

We collected 43 incisors from harvested moose in Unit 1B to determine age. Twenty-one (49%) of the harvested moose were long yearlings, 19 (44%) ranged from 2–4 years of age, and the remaining 3 (7%) were 5–7 years of age. We measured and photographed antlers from harvested moose.

On February 24, 1999 a helicopter survey was conducted on the Stikine River drainage. We counted 135 moose, 24% of which were calves. Moose were observed at a rate of 44 moose per hour.

The moose habitat improvement project at Thomas Bay was completed. Four units of second growth totaling 380 acres were selected and thinned to improve browse plant production.

Progress Meeting Project Objectives: A total of 194 permittees hunted 1236 days and harvested 24 moose in the Stikine River area for a success rate of 12%. The percent of successful hunters in the Stikine was the only management objective met. A total of 127 permittees hunted 819 days and harvested 24 moose in the Thomas Bay area for a success rate of 19%. Total harvest and percent of successful hunters were higher than the management objectives. Of the 48 moose harvested in Unit 1B, 3 were illegal.

Project Location: Unit 1C (7,600 mi²)

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: Because of increasing moose numbers and subsequent harvest growth in the Gustavus area, we divided the Chilkat Range into 2 management areas with the Gustavus area being managed with a separate set of management objectives. We also adjusted the harvest objectives for the other 3 hunt areas in Unit 1C based on more recent information on moose herds there.

Management objectives for Taku River moose include the following:

Posthunt moose numbers	100 (revised from 150)
Annual hunter kill	10 (revised from 20)
Number of hunters	50 (revised from 100)
Hunter-days of effort	225 (revised from 450)
Hunter success (%)	(20)

Management objectives for Berners Bay moose include the following:

Posthunt moose numbers	90 (same)
Annual hunter kill	18 (revised from 8)
Posthunt bull to cow ratio	25:100 (same)
Number of hunters	20 (revised from 10)
Hunter-days of effort	40 (revised from 30)
Hunter success (%)	(80) (revised from (90))

Management objectives for Chilkat Range moose include the following:

Posthunt moose numbers	200 (revised from 150)
Annual hunter kill	20 (revised from 10)
Number of hunters	90 (revised from 65)
Hunter-days of effort	270 (revised from 195)
Hunter success (%)	(22) (revised from (15))

Management objectives for the Gustavus Forelands moose include the following:

Posthunt moose numbers	250
Annual hunter kill	40
Number of hunters	120
Hunter-days of effort	360
Hunter success (%)	(33)

Work Accomplished During the Project Segment Period: We issued 435 registration permits and 15 drawing permits for the 4 hunt areas in Unit 1C in 1998. A total of 292 hunters participated in these hunts. Permit results for hunters reporting the location of their hunt are shown in the following table:

Management Area	Hunters	Moose Killed	Success	Days Hunted
Chilkat Range	86	28	33%	275
Gustavus	118	48	41%	394
Taku River	62	14	23%	278
Berners Bay (bulls)	8	8	100%	14
(cows)	7	7	100%	15
Total	281	105		

Heavy snowfall that began in mid-December and continued throughout the winter allowed us to conduct aerial surveys for moose throughout Unit 1C, but due to advanced antler drop, we were unable to obtain reliable sex and age information. We conducted an aerial survey of Endicott River moose on December 22, counting 72 moose, including 6 antlered bulls, 15 cows, 16 calves, and 35 of unidentified sex and age. We conducted an aerial survey of Gustavus Forelands moose on February 9, counting 185 moose, including 54 calves, 48 cows, and 83 of unidentified sex and age. We conducted a Taku River aerial survey on December 23, counting only 5 moose, including 1 calf, 1 cow, and 3 of unidentified sex and age. We conducted an aerial survey of Berners Bay moose on December 19, counting 70 moose, including 14 antlered bulls, 9 cows, 10 calves, and 37 of unidentified sex and age.

Unit 1C hunters were required to submit the lower jaws of the moose they killed. Matson's Laboratory (Milltown, MT USA) determined ages.

Progress Meeting Project Objectives: Management objectives for the Berners Bay moose population and hunt were met. Fifteen permittees harvested moose, surpassing the old objective of 10, and the hunter success rate was 100%. The posthunt population size is probably near 100 (exceeding the target of 90); we counted 70 moose during the survey and saw an abundance of moose tracks immediately adjacent to thick stands of timber that probably hid additional moose from our view.

All of the previous management objectives for the Chilkat Range moose population were exceeded. The kill of 76 moose (48 at Gustavus) exceeded the goal of 10, and 204 hunters (118 at Gustavus) surpassed the goal of 65. A total of 669 hunter days were expended (394 at Gustavus) compared to the objective of 195, and hunter success was 37% compared to the objective of 15% (41% for Gustavus area hunters and 33% for the remainder of the Chilkat range hunters). A high take in the Gustavus area (48 moose) for the fourth year in a row was the main contributor to the success rate for the Chilkat Range.

Most management objectives for the Taku River moose population and hunt were not met, and the adjusted management objectives reflect our concern for this herd. The number of hunters declined from 105 (406 hunter days) in 1997 to 62 (278-hunter days) in 1998, probably due to the poor success rate by moose hunters in 1997 (8%). Hunter success, however, climbed dramatically in 1998 to 23%. Because of a lack of recent sex and age composition data for the Taku River herd, management objectives have been adjusted to a more conservative harvest until we have better population information.

Project Location: Unit 1D (2,700 mi²)

Southeast mainland north of the latitude of Eldred Rock, excluding Sullivan Island and the drainages of Berners Bay.

Project Objectives and Activities:

Management objectives for Unit 1D moose include the following:

Posthunt moose numbers	350 (revised from 450)
Posthunt bull to cow ratio	25:100 (same)
Annual hunter kill	25 (revised from 30)
Number of hunters	200 (revised from 250)
Hunter-days of effort	600 (revised from 500)
Hunter success (%)	(12)

- Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: Two hundred Tier II permits were issued. Staff monitored the hunt, measured antlers, and collected incisors for aging. An aerial survey of Chilkat winter habitat was conducted on 3 December 1998. During the survey we counted 171 moose, 15% of which were calves. We were unable to obtain reliable sex and age composition data. Unit 1D hunters were required to submit lower jaws of moose killed. Ages were determined by Matson's Laboratory (Milltown, MT USA).

Progress Meeting Project Objectives: The 1998 Tier II moose hunt in Unit 1D resulted in the harvest of 17 legal moose and 2 illegal moose, with 10% of the hunters being successful. Both

the number of moose harvested and the percent success were below the previous management objectives of 30 and 12%, respectively. Hunters spent a total of 1055 days hunting, surpassing the hunt objective of 500 for the third time since the hunt was reopened as an antler-restriction hunt. It should be noted that the previous management objectives in our strategic moose management plan predated the move to a Tier II hunt and have been revised to reflect the restrictions inherent in this hunt. Based on aerial survey results, the posthunt population size is estimated at 350–400 animals.

Project Location: Unit 3 (3,000 mi²)

All islands west of Unit 1B, north of Unit 2, south of the centerline of Frederick Sound, and east of the centerline of Chatham Strait.

Project Objectives and Activities:

Management objectives for Unit 3 moose include the following:

Posthunt moose numbers	400
Annual hunter kill	40
Number of hunters	470
Hunter days of effort	2300
Hunter success	10%

- Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: Unit 1B, Unit 3, and that portion of Unit 1C south of Point Hobart were included on a single registration permit. We issued 941 registration permits, 535 to Petersburg residents, and 253 to residents of Wrangell.

We collected 41 incisors from harvested moose in Unit 3 to determine age. Twenty-two (54%) of the harvested moose were long yearlings, 14 (34%) were 2–4 years of age, and the remaining 5 (12%) ranged from 5–9 years of age. We measured and photographed antlers from harvested moose.

No Unit 3 moose surveys were conducted.

Progress Meeting Project Objectives: A total of 466 permittees hunted 2395 days and harvested 42 moose, for a success rate of 9%. Twenty-five of the moose were harvested on Mitkof Island, 15 on Kupreanof Island, and 2 on Zarembo Island. All the management objectives were either met or very close to being met. Two of the moose harvested in Unit 3 were illegal.

Project Location: Unit 5 (5,800 mi²)
Cape Fairweather to Icy Bay, eastern gulf coast.

Project Objectives and Activities:

Management objectives for Yakutat Forelands moose include the following:

Posthunt moose numbers	900 (revised from 850)
Annual hunter kill	70
Posthunt bull to cow ratio	20:100
Number of hunters	200 (revised from 250)
Hunter-days of effort	800 (revised from 1,025)
Hunter success (%)	(35) revised from (28))

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)

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)

- Conduct winter sex and age composition surveys and monitor the harvest.

Work Accomplished During the Project Segment Period: We issued 215 registration permits for Unit 5 moose hunts (172 for Unit 5A and 43 for Unit 5B). An additional 141 federal

subsistence permits were issued for Unit 5A. Division of Wildlife Conservation staff and enforcement officials from the U.S. Forest Service monitored the hunts. Harvest and hunter data were analyzed from registration permit reports. Teeth were collected for age determination.

Due to marginal snow cover in fall 1998, we were unable to conduct aerial moose surveys until late January 1999. On the Yakutat Forelands we counted 416 moose during January 29-30 and February 19. On Nunatak Bench we counted 33 moose and on the Malaspina Forelands we counted 35. Due to the late timing of these surveys, reliable sex and age composition data was not available.

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

Progress Meeting Project Objectives: Most of the previous management objectives for the Yakutat Forelands herd were met. The posthunt moose population is estimated to be between 600 and 1000 animals. The hunter kill was below the objective of 70 moose, with hunters killing 51 moose (28 under the state registration hunt and 23 under the federal hunt). Two additional moose were taken under federal ceremonial permits and 2 were also taken under state ceremonial permits. The number of hunters (161 under the state registration hunt; 141 permitted under the federal subsistence hunt) was higher than the objective of 250, but this number is deceiving as some hunters obtain both state and federal permits and are counted twice. Hunter effort under the state registration hunt (334 days) was lower than the objective of 1025 days. Hunter success was 17% under both the state registration and federal subsistence hunts, which is below the objective of 28%.

Management objectives in the Nunatak Bench area were not met. Although a hunt was held for the fourth time in recent years, only 1 moose was harvested. A total of 11 permits were issued, with 3 hunters expending 7 days to harvest 1 bull moose.

Our management objectives on the Malaspina Forelands were only partially met. The harvest of 10 bulls was below the objective of 25, and only 24 hunters participated in this hunt, expending 107 days compared to our objectives of 50 hunters using 200 days. Hunter success of 42% was near the objective of 50%.

Segment Period Project Costs:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	35.8	28.8	64.6
Actual	60.5	19.0	79.5
Difference	24.7	9.8	14.9

More was spent on line 100 due to repair work on Unit 1B administrative cabins, Thomas Bay moose browse enhancement, and more field presence during moose season.

Submitted by:

Bruce Dinneford
Management Coordinator

Project Title: Southcentral Alaska Moose Population Management

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

Project Objectives:

We monitored fall harvest by personal interviews and by analysis of harvest ticket returns. Preliminary data from harvest tickets returned by June 1999 indicated that 422 hunters killed 149 bulls during the 1998–99 general season. No general moose hunting season was open in 17A, 112 bulls were taken in 17B, and 27 were taken in 17C. Ten bulls were harvested in unspecified areas of Unit 17. Hunter success was 39 (13/33) for local Unit 17 residents, 27% (31/114) for other Alaska residents, and 38% (105/274) for nonresidents. One hunter did not report residency and was not successful. Aircraft provided the most common mode of transportation (66%). Eighty-one percent of harvested moose had antlers 50" or larger.

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: Total 1998 reported harvest in Unit 6 was 82 moose. In Unit 6A (East) 13 bulls were taken. In Unit 6A (West) 32 hunters took 22 bulls for a success rate of 69%. In Unit 6B 134 hunters took 23 bulls for a success rate of 17%. In 6C, 24 hunters harvested 19 bulls and 5 cows, a success rate of 100%. According to our records, in Unit 6D no moose were harvested.

We conducted aerial surveys in Units 6B and 6C. The estimated number of moose in 6B was 320, with 9% calves. In 6C we estimated 334 moose with 24% calves. We could not estimate bull:cow ratios because some antlers were shed before snow conditions were adequate to conduct surveys.

Progress Meeting Project Objectives: We achieved our population objectives in Unit 6B. At the current growth rate, the population in 6C should reach 400 several years before the target year.

Project Location: Unit 7 (3,520 mi²)
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: We surveyed 3 count areas and classified 246 moose. Bull to cow and calf to cow ratios were 43 and 12, respectively.

The winter of 1998–99 was considered severe with record snow pack throughout most of the peninsula. Overall winter mortality was higher than average, including 46 moose killed by motor vehicle and 7 by train. There were a few reported cases of starvation, although records were not kept for Unit 7. The moose population probably decreased slightly during this reporting period.

Preliminary harvest statistics indicated that approximately 389 hunters reported hunting in Unit 7 during the 20 August–20 September season and harvested 46 bull moose, a 12% success rate. Residents of the Kenai Peninsula took most of the moose (67%). Fifty percent were residents of Unit 7 and only 3 moose (7%) were taken by nonresidents. Successful hunters averaged 8.2 days afield.

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 to 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 mi²)
Alaska Peninsula and Unimak Island

Project Objectives:

- To maintain existing moose densities in areas with moderate (0.5–1.5 moose/mi²) or high (1.5–2.0 moose/mi²) densities.
- To increase low-density populations (where habitat conditions are not limited) to 0.5 moose/mi² by 1995.
- 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: We conducted fall composition surveys in cooperation with the FWS in the 6 historic trend areas, 5 new areas in Unit 9E, and in 2 trend areas in 9B. Two other areas in northern 9B were not completed due to an aircraft accident. We classified 913 moose in Unit 9E and ratios were 65 bulls and 20 calves:100 cows. In 9B we counted 208 moose with ratios of 48 bulls and 19 calves:100 cows.

Preliminary 1998 harvests were 5, 42, 29, and 92 moose for Units 9A, 9B, 9C and 9E, respectively.

Progress Meeting Project Objectives: Efforts to monitor moose density and composition in 9E indicate we are meeting density objectives. Estimates of bull:cow ratios in all areas counted in recent years met or exceeded the desired ratios.

Project Location: Unit 11 (12,800 mi²)
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 1998. We counted 104 moose at a rate of 24 moose per hour. The bull:cow ratio was 111 bulls:100 cows. Calves composed 7% of the moose counted. The observed density was 0.4 moose per mi².

Preliminary harvest figures indicate hunters killed 27 moose in Unit 11 during the 1998–99 season. Of these, nonresidents took 2 (7%) moose; overall hunter success was 28%. The average hunt lasted 12 days, a 50% increase from the time (8.0 days) hunters spent in the field during the 1997–98 season. The mean antler size in the harvest was 45.3 inches. Harvest chronology figures show the last 2 weeks of the season accounted for 74% ($n = 20$) of the harvest. In 1998 moose hunters preferred 4-wheelers and highway vehicles as the most common means of transportation in Unit 11.

Staff discussed proposals on land-use patterns, access, and development with appropriate and administering agencies. We reviewed 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 1998 indicated moose numbers have declined over the last 3 years. Calf recruitment to fall has been especially low the last 2 years, with only 8 and 15 calves per 100 cows observed in 1997 and 1998. The reason for the decline in calves is unknown, but mild winters rule out weather conditions as cause for the decline. The bull:cow ratio declined from 128 bulls:100 cows observed in 1997 to 111:100 in 1998. The number of bulls counted each year has been relatively stable. The moose-per-hour figure declined slightly in 1998 from the previous year and remains well below the 40 moose-per-hour figure of the mid to late 1980s. Count data for the past 6 years fluctuate between years, but the overall trend is a stable to slightly declining population. Low calf

recruitment is a special cause for concern since winters have been relatively mild during the past few years.

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 spike-fork-50"+ spread or 3 brow tines, and the season was lengthened by 17 days with season dates of 20 Aug–20 Sep. 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. Even though the season was lengthened, the conservative bag limit has kept the total harvest low. Harvest chronology figures for 1993 through 1998 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 sustainable, and human harvests have minimal effect on moose numbers in the unit. Wolf predation continues to be relatively high on moose and wolf sightings are common. During winter moose is the most important food source for wolves because of a scarcity of 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 22 inches during the winter of 1998–99, 14% below the 1964–1997 average of 25.6 inches.

Project Location: Unit 13 (23,400 mi²)
Nelchina Basin

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

Work Accomplished During the Project Segment Period: Staff conducted fall sex and age moose counts in 10 count areas located throughout the unit. A total of 5496 moose were counted at a rate of 46 moose per hour. The overall bull:cow ratio was 18 bulls:100 cows with 14 adult bulls:100 cows. Calves composed 11% of the herd.

Hunting season dates and bag limits remained unchanged from last year for the general state harvest ticket hunt, 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, a Tier II state subsistence hunt was also held, with season dates of 1–19 August, and 150 permits were issued.

Snow depths recorded at permanent sites located throughout the unit are used to categorize the severity of winter. Winters in which the average snow depth is ≥ 30 inches are considered severe, when at or near the historic (1964–present) average, winters are considered moderate, and when well below the historic average, they are considered mild. Snow depths are determined by flying over the sites and recording the snow level on permanent markers. Historically, the average depth of readings for February, March, and April are used for a winter severity index. The flight is conducted on (or as near to) the first of each month. The 1999 readings produced a unitwide winter severity below the 34-year (1964–97) average and was considered mild to moderate.

Preliminary harvest figures show hunters killed 882 moose in Unit 13 during the 1998–99 season, a 6% decline compared to the 1997 harvest ($n = 937$) and 14% below the 1996 harvest of 1027. Hunters took 787 bulls, 4 cows, and 10 (sex-unknown) moose during the general state season. Thirty-seven bulls were taken during the State Tier II hunt and 44 bulls were taken under the federally regulated fall subsistence hunt held on federal land in Unit 13 for unit residents.

Land-use proposals were commented on 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 and worked on plans for a prescribed burn in the Alphabet Hills, scheduled for summer 2000.

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 declined slightly in 1998 in Unit 13 and are still well below numbers observed in the late 1980s. The bull:cow ratio has been relatively stable since 1994 and is well below both the 25–30 bulls:100 observed during the 1980s and the current management objective for bulls. The percent calves in the herd and calves:100 cows in 1998 were the lowest ever observed in Unit 13. Calf survival to fall has been extremely low in 4 of the last 5 years. Continued low calf recruitment will become a problem as a lack of young age classes among cows will mean a higher percentage of cows will be in older age classes, more susceptible to overwinter mortality during a severe winter. Additionally, continued low calf recruitment will result in fewer bulls being available for harvest.

The winter of 1998–99 was mild according to snow depth measurement in Unit 13. The unitwide severity index rating was 19.5, or 24% below the historic (1984–97) unit average of 25.5". Weather conditions have been favorable for calf overwinter survival during the last 3 winters following 7 consecutive winters that were classified severe (≥ 30) according to the department's winter severity index.

The 1998–99 bull harvest in the general state harvest ticket hunt declined by 9% compared to last year's harvest of 862 and 17% from the 1996 take of 943 bulls. In this hunt there were 4215 reported hunters for a success rate of 19%. Hunting pressure declined appreciably (24%) from 1997 but still remains high compared to late 1980s. Before this year hunter success was 16%, which was the lowest ever observed. It appears that the spike-fork 50-inch regulation has been unsuccessful in maintaining management objectives for the bull:cow ratio while providing a liberal season length. High harvests coupled with low calf survival have resulted in a lower bull:cow ratio during this 6-year period under the spike-fork 50" regulation. Until calf survival results in increased bull recruitment, harvests should be reduced. To accomplish this I recommend: 1) shortening the season by 5 days to 1–15 September; 2) reducing the bag limit by eliminating fork-horn yearlings and making only spikes and 50-inch or 3 brow tine bulls legal; 3) restricting participation on the road system by allowing hunters to hunt in only one roadside unit in any year.

The 1998 fire season was uneventful. It was a wet summer in Unit 13 and no major fires occurred in the unit. The last large fire was in 1991 when 5500 acres burned in Unit 13D. Wildfire or controlled burns are the only feasible means of enhancing moose habitat in most of Unit 13. The BLM is planning a controlled burn south of the Alphabet Hills for the summer of Year 2000 if burn prescription is met.

Project Location: Unit 14 (6,600 mi²)
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: We completed a fall survey between 11 November and 1 December 1998. The survey was a modification of a "Becker" survey; we surveyed 40 sample units previously surveyed in random-stratified surveys. We classified 1509 moose, including 318 calves and 160 bulls. We calculated a fall population of 4728+/-11% (80% CI) and a composition of 33+/-13% calves and 17+/-17% bulls:100 cows or 22% calves. During 12–18 March 1999 we classified 1178 moose between Pt. McKenzie and Kings River. Seventeen percent of the moose observed were calves; the highest percent calves seen was at Point McKenzie (22%) and the lowest (9%) was in the Knik River-Wolverine Creek area. Winter conditions were mild-moderate and survival of calves should have been relatively high. Higher than normal wolf numbers in 14A probably reduced overwinter survival.

The hunter harvest was 596 moose. A total of 3341 people reported hunting "spike/fork/50-inch" bulls in the 10–17 August, 20 August–20 September, and 20 November–15 December general seasons; 362 (11%) hunters were successful. Another 234 moose were harvested by drawing permit. Permittees (470) harvested 216 cow moose.

We monitored moose mortality unrelated to hunting. Between May 1998 and April 1999, a minimum of 15 moose were killed by trains, and between 1 September 1998 and 30 June 1999, a minimum of 130 moose were killed by automobiles. We believe 25–50 moose were killed illegally in the subunit.

We conducted no habitat enhancement.

Progress Meeting Project Objectives: This subpopulation and the bull:cow ratio are below objective levels, but elimination of antlerless moose permits and any-bull permits during Fall 1999 should remedy both failures. The human-use objective, a 3-year average annual harvest, exceeded the objective by reaching 728 moose.

Project Location: Unit 14B
Western Talkeetna Mountains

Project Objectives: To attain a posthunting moose subpopulation of 2500–2800 with a sex ratio of 20–25 bulls:100 cows. To achieve and maintain an average (3-year) annual harvest of 200–300 moose.

Work Accomplished During the Project Segment Period: We conducted fall sex and age composition in the western foothills of the Talkeetna Mountains during 20 November 1998. We classified 440 moose and observed 38 bulls and 11 calves:100 cows.

We monitored harvest of moose during the general early and late hunts and the any-bull drawing hunts that totaled 80 bull moose. During the general season 483 hunters harvested 61 bulls (13% success). Of the 102 people hunting with any-bull drawing permits, 19(19%) were successful.

Trains killed at least 18 moose and automobiles killed 15. Unreported/illegal harvest probably reached 10–20 moose.

Progress Meeting Project Objectives: During the fall composition survey, we observed a much reduced moose density than in years past. A stratified random census is overdue in this subunit to evaluate objectives and management strategies. We believe we are well below subpopulation objectives at this time.

The human-use objective was not met. Under current subpopulation trends it is unlikely that minimum harvest objectives will be met within the next decade. Predation has reached high levels and is not expected to decline.

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

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

Work Accomplished During the Project Segment Period: Herd population size and composition for Unit 14C were determined by aerial surveys flown in late November and early December 1998. We observed 1102 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 36 and 30, respectively. Some bulls shed antlers by late November; therefore, the survey included some antlerless bulls as cows, and actual ratios of bulls and calves per 100 cows are slightly higher. The population, currently estimated at 2100 moose, is increasing.

We flew 2 additional surveys in cooperation with the Forest Service and Fish and Wildlife Service. Because of concerns about deep snow, the Forest Service paid for a

survey of the Twentymile, Portage, and Placer river drainages in mid-January 1999. We counted 172 moose, including 29 calves (compared to 181 moose with 35 calves in late November 1998). Due to concerns about planned golf course and condominium development, the Fish and Wildlife Service paid for a survey of the Glacier Creek drainage in mid-April 1999. We counted 6 adult moose (compared to 5 adults in mid-January 1999).

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 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.

A total of 100 moose were harvested in 1998–99. Cows composed 25% of the harvest, or 25 animals. All cows were killed during special permit hunts. Hunters took 75 bulls, 21 of which came from the general season and 54 from special permit hunts. Of bulls taken during the general season hunt, 2 were spike-forks, 9 were >50 inches, 5 were <50 inches with at least 3 brow tines on 1 side (mean width for all bulls = 47.0 inches; range = 24–63 inches), and 5 had unreported antler widths. Hunters ($n = 417$) were 24% successful. Hunters with drawing permits and general-season harvest tickets ($n = 313$) were 31% successful, while those with Eklutna archery registration permits ($n = 104$) were 3% successful. Most of the moose (46%) were taken on either Fort Richardson or Elmendorf Air Force Base, with an additional 18% taken in the Portage area hunts. Bowhunters took 46% and muzzleloaders 6% of the total harvest in primitive-weapon hunts.

Seasons ran continuously in various parts of the unit from 20 August through 15 January, excluding only 16 November to 14 December. Vehicle-moose collisions killed 152 moose in the unit between 1 June 1998 and 31 May 1999. Six moose were shot in defense of life or property, 6 sick or injured (not in collisions with vehicles) moose were shot, and 1 moose was shot for a meat-care video during the same period. An additional 6 moose were killed by trains in Unit 14C between 1 May 1998 and 30 April 1999. Thus, known nonsport mortalities (171) exceeded hunting mortality by 71%.

Progress Meeting Objectives: Aerial surveys conducted during 1998 found an overall ratio of 36 bulls:100 cows, above the project objective of 25 bulls:100 cows.

Project Location: Unit 15 (4,900 mi²)
Unit 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 1998–99 was classified as severe for Kenai Peninsula with snow accumulation up to 40 inches. Favorable

survey conditions, however, did not develop in most count areas until late November, prohibiting a complete fall survey in Unit 15A. In 1998 we counted moose in The Skilak Loop Wildlife Management Area (SLWMA) area, comprised of 2 count areas, where we classified 164 moose. Ratios for the Skilak Loop area were 21 calves:100 cows; 43 bulls:100 cows, and calves composed 13% of the observed moose. Six of 13 count areas, including Skilak Loop, in Unit 15A were flown during the 1998 fall sex and age composition surveys, resulting in the following totals and ratios: 1528 moose classified; 27 calves:100 cows; 31 bulls:100 cows; and calves composed 17% of observed moose. Excluding moose counted in Skilak Loop, we derived ratios of 27 calves:100 cows, 30 bulls:100 cows, and calves comprised 17% of the moose observed.

A total of 1418 hunters reported harvesting 271 moose in Unit 15A during the August 10 to 17 archery and August 20 to September 20 general 1998 season. The harvest comprised 124 (63%) spike/fork antlered bulls, 73 (37%) bulls with an antler spread of 50 inches or greater, or possessing at least 3 brow tines on one antler ($n = 197$), and 74 unspecified bulls. Forty-seven (17%) of these moose were killed during the early archery season.

The department received 990 applications for 40 permits to hunt antlerless moose in Skilak Loop during the September 15 to 30, 1998 season. Thirty-six of the hunters, all residents, that won a permit hunted and 11 antlerless moose were harvested. Nonresidents were not permitted to apply for this hunt. The spike/fork bull moose hunt was not held in 1998.

For the second year subsistence hunters took no moose during the Aug 18 and 19 season.

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. Fall composition surveys indicate the mean bull to cow ratio is 30:100 in general hunt areas and 31:100 when Skilak Loop results are included. Bull to cow ratios range from 13:100 to 73:100, depending on moose density and hunter access. The mean calf to cow ratio for all areas counted in Subunit 15A during 1998 was low at 27:100. Surveys completed in 1996 indicated the mean bull to cow ratio was 26:100, compared with 13:100 before the Selective Harvest Program.

Additionally, the department would like to maintain the population at approximately 3600 moose in 15A. Winter severity, loss of habitat through human development or deterioration from natural plant succession and predation are the primary factors controlling moose density. On May 11, 1996 approximately 5200 acres burned in the Hidden Lake area of Skilak Loop Special Management Area, the result of a wildfire. Attempts to enhance areas through prescribed burning by the US Fish and Wildlife Service and the department have been unsuccessful because of restrictions necessary to safely burn on the Kenai Peninsula. No natural or prescribed burns of significant size occurred during this reporting period.

The winter of 1998-99 was long and severe compared to the previous winter in Unit 15A. Snow accumulations of 40 inches or greater were recorded over most of the western portions of the subunit. Mortality due to starvation was documented in 2 cases in 1997-98, compared to 200 in Units 15A and 15B (West) in 1998-99. Starved moose comprised 155 calves, 10 yearlings, 19 adults, and 16 of unreported age. The last severe winter was in 1994-95 and resulted in a documented winter mortality of 178 moose in the same area of the peninsula. One hundred thirty-

eight moose, primarily calves and adult cows, were reported killed by highway vehicles last winter in Unit 15A. The moose population in Unit 15A should have declined moderately due to the severe winter conditions in 1998-99. The fall population is projected to be between 2500 to 3000 animals.

No change in the general season or bag limit is recommended for fall 1999. The selective harvest program has again gained support during the 1998 season and should protect mid-sized bulls that survived the severe winter of 1998-99.

The antlerless and spike/fork bull moose season should be continued in 1999 in Skilak Loop to satisfy requirements of the interagency cooperative management agreement.

Project Location: Unit 15B
Central Kenai Peninsula

Project Objectives: To maintain the 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: Fall composition surveys were not completed in Unit 15B during 1998. Most of the unit is managed by a limited permit drawing, and the remainder of the unit is hunted under the Selective Harvest Program, reducing the need to survey it regularly. The most recent sex and age composition surveys were conducted in 15B East in 1996. We classified 224 moose in 15B West; this classification resulted in the following ratios: 39 calves and 33 bulls per 100 cows; calves composed 23% of the observed moose.

Preliminary harvest reports indicate 329 hunters reported hunting in 15B West during the 20 August to 20 September 1998 season resulting in the harvest of 57 bulls. Hunter success rate was 17%.

The bag limit for 15B West was 1 bull with a spike/fork or 50 inch antlers. The 1998 harvest comprised 31 (76%) spike/fork antlered bulls and 10 (24%) bulls with an antler spread of 50 inches or greater or possessing at least 3 brow tines on 1 antler. Sixteen successful hunters did not report the antler spread of the bull they harvested.

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 or at least three brow tines on one antler. From 1839 applications, staff issued 100 permits, resulting in the harvest of 17 bulls. The average antler spread was 52 inches and ranged from 39.0 to 64.8 inches. Successful hunters averaged 6 days hunting and observed an average of 3 legal bulls. The number of bulls observed by successful hunters ranged from 1 to 14.

Subsistence hunters reported taking 1 bull during the Aug 10-19 season.

Progress Meeting Project Objectives: The Selective Harvest Program initiated in 1987 was designed, in part, to increase the bull to cow ratio. Because no areas were surveyed during 1998,

we could not assess the unit's moose density and trend. Due to selective harvest, the bull to cow ratio is suspected to be in excess of 15:100 in Unit 15B West and in excess of 50:100 in Unit 15B East. Staff observations and comments from permittees hunting the area imply moose are becoming more difficult to find and trophy-sized bulls are less common compared to hunts 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 of wildfire. Because recent censuses have not been conducted, an accurate assessment of population trend is not available. The 1989-90, 1991-92, 1994-95 and 1998-99 winters were severe, however, causing higher than normal winter mortality, especially in the calf and older bull age classes. The winters of 1992-93, 1993-94, 1995-96 and 1997-98 were mild or normal, allowing normal calf and older bull survival.

The winter of 1998-99 was severe compared to the previous winter in Unit 15B. Snow accumulations of 40 inches or greater were recorded over most of the western portions of the unit. Mortality due to starvation was not documented in 1997-98, but 200 starvation-caused mortalities were recorded in Units 15A and 15B (West) in 1998-99. Starved moose comprised 155 calves, 10 yearlings, 19 adults, and 16 moose of unreported age. The last severe winter was in 1994-95 and in the same area of the peninsula, winter mortality totaled 178 moose.

In addition to reported harvest and winter-related mortality, highway vehicles killed 74 moose in Unit 15B West.

No change is recommended for Unit 15B for the 1998 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 moose population with a posthunting sex ratio of no less than 15 bulls:100 cows. To reduce the subpopulation of moose that winter in the Homer area to sustainable levels

Work Accomplished During the Project Segment Period: One partial survey of the Caribou hills was attempted in Unit 15C (CA21). We counted 104 moose in the alpine portion of this area. We canceled the rest of the survey due to poor weather and moose moving from the survey area. Bull:100 cow and calf:100 cow ratios were 61:100 and 33:100, respectively.

The Homer count area (15C-CA26) was counted after a large snowstorm in February. We observed 370 moose and because this was a late winter survey, only the percentage of calves in the herd was estimated. We observed 21% calves, the lowest percentage recorded since 1971.

The winter of 1998–99 was severe with record snow pack throughout most of the peninsula. Winter mortality included 76 by motor vehicle. There were 53 moose that died of starvation in the Homer area this winter in addition to 12 moose that were shot in defense of life or property and 5 that died from other causes. Additional winter mortality (13) was reported for the Ninilchik area. The moose population probably decreased slightly this reporting period.

Preliminary harvest statistics indicated approximately 1316 people hunted in Unit 15C during the 20 August–20 September season and took 283 moose. Hunter success was 21.5%. Successful hunters spent an average of 8.2 days afield to harvest a moose. Kenai Peninsula residents took 91% of the moose taken in Unit 15C. These statistics may change when final harvest reports are completed.

Two drawing permit hunts for antlerless moose were established for an area near the city of Homer in 1995. A total of 50 permittees were chosen from 1021 applicants for these 2 hunts in 1998. Residents of the Kenai peninsula composed 72% of the permittees for DM549 and DM550. Hunters were not required to be assisted by department personnel this year; however, staff continued to monitor the hunt. Thirty eight hunters reported hunting and only 11 (29%) were successful.

Progress Meeting Project Objectives: The selective harvest program initiated in 1987 seems to have increased and stabilized the bull:cow ratio. Hunter reports and general field observations indicate bulls are abundant in Unit 15C, and a variety of wildlife users support the regulations.

The current bull:cow ratio meets the management objective of a minimum of 15:100. We recommend maintaining the current 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.

The survey of the Homer area (15C-CA26) indicated the moose population has declined slightly. The management objective of reducing this local subpopulation is slowly being met. We recommend continuation of the antlerless permit hunts until we achieve a postseason estimated population of 365 moose. During the spring 1999 Board of Game meeting, the Board combined the hunts and moved the season to coincide with the general season of 20 August to 20 September. This regulation will become effective during the fall 1999 season.

Increased logging activities in Unit 15C to combat spruce bark beetles (*Dendroctonus rufipennis*) may provide increased visibility and access to moose hunters. Habitat quality may be affected when overstory is removed and during site preparation. We need to continue to monitor effects of logging on moose on the Kenai Peninsula and make recommendations to foresters that will improve moose habitat.

Project Location: Unit 16 (12,300 mi²)

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 with a posthunt sex ratio of 20–25 bulls:100 cows. The human-use objective is to achieve an average (3-year) annual harvest of at least 300 moose.

Work Accomplished During the Project Segment Period: We did not conduct aerial moose surveys of this subpopulation.

Total harvest was 169 bulls. Harvest reports indicate 775 hunters harvested 121 bulls (16% success) during the 58-day (August 20–September 20 and 20 November–15 December) general seasons. Of the 166 individuals hunting with any-bull drawing permits, 48 (29%) were successful.

During the report period an additional 10 moose were reported killed in collisions with autos. This figure is a minimum number.

Progress Meeting Project Objectives: The subpopulation reached the objective level during 1997, but we believe it fell below objective levels this winter. 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 20–25 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, in addition, no less than 5 moose from Kalgin Island.

Work Accomplished During the Project Segment Period: We conducted an aerial composition survey during 22 November in the southern portion of the subunit, and on 7 December we surveyed Kalgin Island. We classified 357 moose on the mainland, producing a composition ratio of 35 bulls and 8 calves: 100 cows. We observed 116 moose on Kalgin Island with 27 bulls and 53 calves:100 cows. We estimated the Kalgin Island population at 120–140 moose.

During the general spike/fork/50-inch antlered bull season on the mainland, 745 hunters took 179 bulls for a 24% success rate. On Kalgin Island 33 hunters, able to take any bull, harvested 18 bulls, representing 54% success. A total of 194 Tier II permittees reported going afield and killed 92 bull moose (47% success). Of the 50 hunters awarded antlerless moose permits on Kalgin Island, 17 hunted and 7 were successful. In total, 296 moose were taken from the subunit.

Research staff visited Kalgin Island during March 1999 and measured browsing patterns by the moose. Extremely poor habitat conditions for moose and browsing patterns indicated imminent mass starvation. Observations during activities on the island during April indicated a high loss of calves.

Progress Meeting Project Objectives: The total moose population is probably below the objective range and declining. The bull:cow ratio in the southern portion of the subunit was well above objective levels. The population on Kalgin Island far exceeded objective levels. The human-use objective for Kalgin Island was met but well below potential. The harvest for the rest of Unit 16B was far below the objective level. Given recent declines in numbers and the spike/fork/50-inch selective harvest strategy, it is unlikely this human-use objective will be met. However, local subsistence needs as established by the Board of Game were met.

Project Location: Unit 17 (18,800 mi²)
Northern Bristol Bay

Project Objectives:

- Establish a minimum population of 100 moose in Unit 17A.
- Achieve and maintain a density of 1 moose/mi² on habitat considered good moose range in Unit 17B.
- Maintain a minimum density of 0.5 moose/mi² in areas considered as moose habitat in Unit 17C.

Work Accomplished During the Project Segment Period: A survey in all drainages in Unit 17A was flown on 3 and 4 March 1999. We observed 511 moose in 15.5 hours of survey time. No surveys for moose in Unit 17B were completed during this fiscal year.

A moose population estimation survey for Unit 17C was flown March 17 through March 26, 1999; we surveyed 103 of 774 sample units, yielding an extrapolated estimate of 2955 moose, including 435 calves. Preliminary harvest data from registration hunt RM573 indicated that 43 of 48 permittees hunted and harvested 10 bulls during the August 20–September 15, 1998 hunt in 17A. All hunters obtaining registration permits for this hunt were Unit 17 residents. All successful hunters used boats.

Preliminary harvest data from registration hunt RM583 indicated that 437 of 545 permittees harvested 192 bulls during the August 20 through September 15, 1998 season. Hunters harvested

25 bulls in 17B and 132 in 17C. Thirty-five bulls were harvested in unspecified areas of Unit 17. Hunter success among responding permittees who reported hunting was 45% for local residents (159/355) and 40% for other Alaska residents (33/82). Nonresidents were not eligible to participate in this hunt. Boats were the most common means of transportation (88%). One hundred and sixteen (60%) moose were killed in August, and 75 (39%) were taken in September. Forty-eight (25%) of the moose harvested had antlers 50" or larger.

Preliminary harvest data from registration hunt RM585 indicated that 40 of 89 permittees hunted, harvesting 18 bulls during the December 1-31, 1998 season. Four moose were harvested in Unit 17B and 12 were taken in 17C. Two moose were harvested in unspecified areas of Unit 17. Hunter success among responding permittees who reported hunting was 52% for local residents (17/33) and 14% for other Alaska residents (1/7). Nonresidents were not eligible to participate in this hunt. Snowmachines were the most common means of transportation.

The reported harvest of moose for Unit 17 for all hunts combined was 369 bulls. Unit 17 residents took 199 bulls (54%), other Alaska residents took 72 (18%), and nonresidents took 105 (28%).

Progress Meeting Project Objectives: The winter of 1997-98 had record snowfall in the Bristol Bay region. Although many areas had extreme snow depths, overall survival seemed high, with few reports of winter-killed moose. Moose populations were stable to increasing in most portions of the unit, in spite of increasing harvests by hunters and predators.

Continued work with local advisory committees and staff from the Togiak National Wildlife Refuge on moose management guidelines brought change to our management objective for 17A. It is now our intent to manage the area to establish and maintain a population of 600-1000 moose. Based on the January 1998 survey in the Togiak drainage, the number of moose in Unit 17A is at least 400 to 500. During the March 1997 meeting of the Board of Game, a registration moose hunt was authorized for Unit 17A, and permits were issued in Togiak. The August 20 through September 15, 1998 season was the first legal moose hunting in Unit 17A in 17 years.

Efforts continue to develop moose survey and population estimation protocols that will work in 17B and 17C, despite variable weather conditions and unpredictable moose movements.

Segment Period Project Cost:

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	236.0	76.9	312.9
Actual	236.0	76.9	312.9
Difference	0	0.0	0.0

Submitted by:

Michael G. McDonald
Assistant Management Coordinator

Project Title: Interior Moose Population and Habitat Management

Project Location: Unit 12 (9978 mi²)
Upper Tanana and White River drainages

Objectives: Maintain a minimum posthunting sex ratio of 40 bulls:100 cows east of the Nabesna River and a minimum ratio of 20 bulls:100 cows in the remainder of the unit.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.

Activities Accomplished:

1. Worked with the Upper Tanana/Fortymile and Slana Advisory Committees to revise the Unit 12 moose population and harvest objectives to comply with the intensive management law. (These objectives will be presented to the Board of Game for approval in March 2000.)
2. Conducted aerial sex and age composition surveys in the southern and northwestern portions of the unit during October and November 1998.
3. Completed a population estimation survey in northeastern Unit 12 during November 1998.
4. Completed a browse survey in June 1999 in the area that was altered by mechanical crushing during February and March 1998.
5. Continued to work with the Division of Forestry to develop a logging/habitat enhancement project; presented the draft project plan to the Boreal Forest Citizen Advisory Committee and received unanimous support.
6. Monitored harvest and hunter distribution by aerial survey, hunter contacts in the field, and review of harvest reports.

Project Location: Units 19 (36,486 mi²); 21A and 21E (23,270 mi²)

All of the drainages into the Kuskokwim River upstream from Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers.

Objectives:

1. Annually assess population status, bull:cow ratios, and trend in portions of the area where harvest levels significantly impact moose populations.
2. Maintain an annual average antler spread measurement of at least 48 inches in Units 19B, 19C, and 21A.
3. Assess accuracy of harvest reporting in selected portions of the area.
4. Encourage landowners to reduce fire suppression efforts on wildfires that do not threaten human life, property, or valuable resources, so that fire can fulfill its natural role in maintaining young, highly productive, diverse habitats.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (objectives 1 and 2).
3. Operate a hunter checkstation on the Hoholitna River (objective 3).

Activities Accomplished:

1. Did not revise population management objectives.
2. Conducted fall trend surveys in several areas and a population estimate in Unit 19D East during February 1999; conducted calf surveys during May 1999 (objectives 1 and 2).
3. Operated a hunter checkstation on the Hoholitna River during September 1998 (objective 3).

Project Location: Unit 20A (6796 mi²)
Tanana Flats, Central Alaska Range

Objectives:

1. Manage for a November population of between 10,000 and 12,000 adult moose (i.e., excluding calves).
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 areas.
3. Allow harvest of cow moose when the population is above the population objective of 10,000 adult moose.
4. Document uses of moose in Unit 20A.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (all objectives).

Activities Accomplished:

1. Reviewed population management objectives.
2. Conducted fall moose population and trend surveys (objectives 1, 2 and 3).
3. Conducted moose twinning rate surveys (objective 1).
4. Conducted aerial surveys of radiocollared cows to determine mortality factors (objective 1).
5. Analyzed harvest report information (all objectives).

Project Location: Unit 20B (9114 mi²)

Drainages into the north bank of the Tanana River between Delta Creek and Manley Hot Springs

Objective: Manage for a minimum bull:cow ratio of 20:100 in each count area and an overall Unit 20B bull:cow ratio of at least 30:100.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.

Activities Accomplished:

1. Reviewed population management objectives.
2. Conducted fall moose population and trend surveys.
3. Conducted moose twinning rate surveys.
4. Analyzed harvest report information.

Project Location: Units 20C (11,902 mi²), 20F (6267 mi²), and 25C (5149 mi²)

Unit 20C includes drainages into the west bank of the Nenana River and into the south bank of the Tanana River west of the Nenana River. Most of Denali National Park and Preserve (DNPP) is within Unit 20C. Unit 20F includes drainages into the north bank of the Tanana River west of Manley and into the Yukon River approximately between the village of Tanana and the Dalton Highway bridge. Unit 25C includes drainages into the south bank of the Yukon River upstream from Circle to, but not including, the Charley River drainage. The subunit also includes the Birch Creek drainage upstream from the Steese Highway bridge, the Preacher Creek drainage upstream from and including the Rock Creek drainage, and the Beaver Creek drainage upstream from and including the Moose Creek drainage.

Objectives:

1. Provide for a sustained yield harvest of these low-density populations.
2. Estimate hunting mortality and document nonhunting mortality when possible.
3. Estimate moose densities in Units 20C, 20F, and 25C by 1998.
4. Cooperate with BLM to superstratify approximately 1000 mi² in central Unit 25C in November 1997.
5. Promote moose habitat enhancement by allowing natural fires to alter vegetation.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (objectives 1–4).

Activities Accomplished:

1. Reviewed management objectives.
2. Monitored harvest through harvest reports (objectives 1 and 2).

Project Location: Unit 20D (5,637 mi²)

Central Tanana Valley near Delta Junction

Objective: Increase the fall moose population to 8000–10,000 moose with an annual reported sustainable harvest of 240 to 500 moose per year by the year 2002.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.

Activities Accomplished:

1. Did not review population management objectives because the current objectives adopted by the Alaska Board of Game were not scheduled for review.
2. Conducted an aerial population estimation survey in southern Unit 20D during winter.
3. Compiled harvest data and reviewed hunt statistics for the general hunting season, Tier II hunt TM787, and drawing permit hunt DM790.
4. Conducted field observations to determine condition of moose browse.

Project Location: Unit 20E (10,681 mi²)
Charley, Fortymile, and Ladue River drainages

Objective: Maintain a posthunting ratio of at least 40 bulls:100 cows in all survey areas.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.

Activities Accomplished:

1. Worked with the Upper Tanana/Fortymile and Eagle Advisory Committees to revise the Unit 20E moose population and harvest objectives to comply with the intensive management law. (These objectives will be presented to the Board of Game for approval in March 2000.)
2. Completed a population estimation survey in the southern half of Unit 20E during October and November 1998.
3. Completed prescribed burns in the East Fork of the Dennison River (July 1998) and in the Mosquito Flats (May 1999) and completed an interagency prescribed burn plan to ignite additional fires during summers 1999 (Ketchumstuk Creek) and 2000 (Mansfield Lake).
4. Monitored harvest and hunter distribution by aerial surveys, hunter contacts in the field, and review of harvest reports.

5. Administered 2 drawing permit hunts.
6. Completed a browse survey in June 1999 within the area altered by the 1998 East Fork of the Dennison prescribed burn.

Project Location: Unit 21B (4,871 mi²)

Lower Nowitna River and Yukon River between Melozitna and Tozitna Rivers

Objectives:

Floodplain of the Yukon and Nowitna Rivers:

1. Conduct annual trend area surveys.
2. Maintain an average annual harvest of 40 moose from the desired population of 1000–1600 moose.
3. Monitor harvest with harvest reports and checkstations.

Remainder of the Nowitna drainage:

4. Conduct annual trend area surveys.
5. Maintain an average annual harvest of 20 moose from the desired population of 1100–1300 moose.
6. Monitor harvest with harvest reports and checkstations.

Remainder of Unit 21B:

7. Conduct annual trend area surveys.
8. Maintain a minimum annual harvest of 30 moose from the desired population of 1600–1700 moose.
9. Monitor harvest with harvest reports.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (all objectives).
3. Operate a hunter checkstation on the Nowitna River (objectives 2, 3, 5 and 6).

Activities Accomplished:

1. Monitored harvest through checkstations and general hunt harvest tickets (objectives 2, 3, 5, 6, 8, and 9). (Total harvest did not exceed objectives of the 3 sub-areas in any of the past 3 regulatory years.)
2. Conducted aerial surveys through cooperative efforts with the USFWS in the Mouth of the Nowitna and Nowitna-Sulatna River trend count areas (objectives 1, 4, and 7).
3. Assisted in operation of Nowitna River hunter checkstation (objectives 2, 3, 5, and 6).

Project Location: Unit 21C (3671 mi²)

Dulbi River above Cottonwood Creek and Melozitna River above Grayling Creek

Objectives: Objectives will be formulated during the next reporting period.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.
3. Conduct a hunter checkstation on the Koyukuk River.

Activities Accomplished:

1. Initiated formulation of objectives as part of Koyukuk River management planning.
2. Collected harvest data at the Koyukuk River checkstation.
3. Completed extensive review of population and harvest data in the Koyukuk River drainage for Koyukuk River Planning Group.

Project Location: Unit 21D (12,113 mi²)

Yukon River from Blackburn to Ruby and Koyukuk River drainage below Dulbi Slough

Objective: Objectives will be formulated during the next planning period.

Activities Planned:

1. Review and revise population management objectives.

2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.
3. Operate a hunter checkstation on the Koyukuk River.

Activities Accomplished:

1. Initiated formulation of objectives as part of Koyukuk River management planning.
2. Conducted herd composition aerial surveys of the Three-Day Slough, Squirrel Creek, Pilot Mountain Slough, and the Kaiyuh Slough trend count areas.
3. Collected harvest data at the Koyukuk River checkstation.
4. Completed extensive review of population and harvest data in the Koyukuk River drainage for Koyukuk River Planning Group.
5. Conducted spring calving aerial surveys of the Three-Day Slough trend count area.

Project Location: Unit 24 (26,055 mi²)

Koyukuk River drainage above Dulbi River

Objectives: Objectives will be formulated during the next reporting period.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors.

Activities Accomplished:

1. Initiated formulation of objectives as part of Koyukuk River management planning.
2. Conducted aerial herd composition surveys of the Mathews Slough, Batza Slough, and Treat Island trend count areas.
3. Completed extensive review of population and harvest data in the Koyukuk River drainage for Koyukuk River Planning Group.
4. Collected harvest data at the Koyukuk River checkstation.

Project Location: Units 25A, 25B, and 25D (47,968 mi²)
Upper Yukon River Valley

Objectives:

1. Continue efforts to communicate with and educate local residents about moose management and the importance of not taking cow moose.
2. In cooperation with US Fish and Wildlife Service (FWS), monitor moose population status as funding permits.

Activities Planned:

1. Review and revise population management objectives.
2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (all objectives).

Activities Accomplished:

1. Discussed moose population status and management issues at advisory committee and other meetings and discussed the effects of cow moose hunting in a variety of settings (objective 1).
2. Estimated moose population density and composition in a 2300 mi² area in Unit 25D (West) in March 1999 (objective 2).

Project Location: Units 26B and 26C (25,788 mi²)
North Slope of the Brooks Range and Arctic Coastal Plain east of the
Itkillik River

Objectives:

1. Determine population distribution, composition, density, and trends.
2. Determine movements and habitat use in heavily harvested drainages.
3. Maintain an annual posthunting sex ratio of at least 50 bulls:100 cows.
4. Determine subsistence needs and harvest levels.

Activities Planned:

1. Review and revise population management objectives.

2. Conduct aerial surveys, evaluate harvest reports, contact hunters, and make field observations to determine population status and trend and mortality factors (all objectives).

Activities Accomplished:

1. Conducted surveys in Unit 26B; coordinated surveys with FWS surveys in adjacent areas; gathered and compiled harvest data (objectives 1-2).
2. Made no progress on reviewing and revising population management objectives because of recent declines in numbers of moose and season closures.

Period Segment Costs:

	Personnel	Operating	Total
Planned	151.1	111.9	263.0
Actual	144.3	84.1	228.4
Difference	6.8	27.8	34.6

Explanation

Operating & Personnel: A very low snowfall year prevailed throughout most of the region, particularly during late fall and early winter when most moose surveys are normally accomplished. Several surveys were postponed in hopes of better snow cover but as a result were never completed because the timing conflicted with other projects or the survey was inappropriate for the particular time of year.

Submitted by:

Roy Nowlin

Regional Management Assistant

David James

Management Coordinator

Project Title: Western Alaska Moose Population Management

Project Location: Unit 18 (42,000 mi²)
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 its present size 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), area biologists in Units 19 and 21E, 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: A moose population census was completed in March 1999 in the Andreafsky count area in the middle third of the Yukon River drainage in Unit 18. The population was estimated at 524 moose \pm 29.8% at 95% CI. This is a tenfold increase since the last estimate but is still short of the population objective for this area. Note the wide confidence interval about the midpoint of this estimate.

Two moose checkstations were manned during this period. The Yukon River checkstation at Paimiut checked 39 moose and a total of 221 visitors. A cabin was constructed at the checkstation site in memory of Randy Kaycon, the previous area biologist who was killed in a plane crash while doing moose work in 1996.

The Kuskokwim River checkstation was operated in Aniak this year. We had 39 moose and 19 caribou checked by department staff. Ninety-three hunters visited the checkstation.

An emergency order was issued to shift the fall season to 1 September–21 September for the moose hunt area downriver from Mountain Village on the Yukon River. This was authorized during an emergency meeting of the Board of Game by teleconference where an emergency regulation permitting the action was passed. This meeting was held at the request of the Lower Yukon Advisory Committee.

An emergency order (EO) was also used to open a 10-day moose season from 27 December 1998–5 January 1999. These dates were determined after contacting the various villages and establishing a preference.

The final moose harvest figures are not yet available.

Progress Meeting Project Objectives: Improved harvest reporting and compliance with regulations is being achieved through hunter contacts at the Paimiut checkstation on the Yukon River, the checkstation on the Kuskokwim River, radio and newspaper announcements, law enforcement activities, and community meetings.

A weekly radio message is prepared for broadcast by KYUK in Bethel. Moose issues are a regular topic. A prize drawing was initiated to encourage Unit 18 hunters to return their harvest reports. Local license vendors donated prizes that will be distributed in August 1999.

Surveys reveal that although the moose population is below its potential, it is growing in the Yukon River drainage. There is no indication the moose population on the Kuskokwim River is growing.

Project Location: Unit 22 (25,230 mi²)

Seward Peninsula and eastern Norton Sound.

Project Objectives: The overall population management objective is to maintain a minimum population of 5700–7300 moose in Unit 22. In Unit 22A the objective is to increase population size from the current estimate of 600–800 moose to a minimum of 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 population of 480 animals with a minimum bull: cow ratio of 20:100. In Unit 22E, the objective is to maintain the 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 total reported harvest from Unit 22 was 211 moose (195 males, 13 females and 3 unspecified). The reported harvest for each portion of the unit was Unit 22A – 16, Unit 22B – 58, Unit 22C – 39, Unit 22D – 89, and Unit 22E – 9. Of the 510 individuals who reported hunting in Unit 22, 460 (90%) were residents of Alaska, 388 (76%) were residents of Unit 22, 45 (9)% were nonresidents, and 5 (1%) were of unknown residency. Hunter success rate was 41%. Incisorform teeth from 41 hunter-killed moose were collected to determine age and examine condition of the teeth. Seward Peninsula moose have an unusually high incidence of tooth breakage.

During this reporting period, the department and Kawerak, Inc. initiated a village-based harvest assessment program to collect more accurate big game harvest data from Unit 22 villages. In April 1999 household surveys were conducted in Koyuk and Shaktoolik. Koyuk residents reported harvesting 23 moose. Half the households that reported hunting moose were successful. Of moose taken by Koyuk residents, only 9% (2 moose) was reported through our traditional harvest reporting system. Shaktoolik residents reported 21 moose harvested and 62% of the households that hunted moose were successful. Only 5% (1 moose) of the moose harvested by Shaktoolik residents was reported with a harvest ticket.

Population Monitoring

In March 1999 a survey of a 2404 mi² portion of Unit 22B, west of the Darby Mountains, yielded a population estimate of 797 moose (+/- 19% at the 90% confidence level). Calf recruitment was 8%. The 1999 survey shows a 50% decline in moose numbers since the area was surveyed in 1987. In 1992 a 856 mi² portion of this area was surveyed. The 1999 survey showed a 29% population decline between 1992 and 1999 from 698 moose (+/- 15% at the 90% confidence level) to 496 moose (+/- 15% at the 90% confidence level) in the smaller survey area. Poor productivity and poor recruitment are factors in the continuing decline. Brown bear density in western Unit 22B is increasing and predation on moose calves is a significant factor affecting calf mortality.

In March 1999 recruitment surveys were flown in the Koyuk and Kuzitrin River drainages. Calf recruitment was 9.2% in the Koyuk drainage and 10% in the Kuzitrin drainage. In April 1999 a recruitment survey of the Snake River drainage found 125 moose, 26% of which were short yearlings.

In late April and early May of 1999, much of Unit 22 received heavy snowfall. For a period of about 1 month, browse availability was significantly reduced. Moose appeared to go into this period in good condition, but some appeared gaunt by the time the snow receded. It is not known to what degree lack of browse during later stages of pregnancy affected calf viability. Predation by bears on moose during this period of deep snow was probably considerable.

Wolf numbers have increased in recent years, particularly in Units 22A and eastern 22B. Moose densities may increasingly be affected by wolf predation in those units.

Radiotelemetry Studies

Twenty of 36 cows radiocollared in the Niukluk and Fish River drainages during early April of 1995 and 1996 were alive as of June 1998. However, lack of a qualified staff pilot prevented further work on the moose telemetry study, which was designed to investigate low recruitment rates in the Fish and Niukluk River drainages. Preliminary results of this research study are discussed in the 1998 Moose Management Report.

Public Interactions

Staff attended regional advisory committee meetings, federal advisory council meetings, and public meetings in various Unit 22 villages to discuss wildlife issues and regulations with the public. Staff and contracted surveyors from the villages went door to door in Koyuk and Shaktoolik, conducting big game harvest surveys. The project was well received in both villages and many residents were glad to have a personal opportunity to express their views and concerns about wildlife issues. In light of the decline of moose numbers in Unit 22B, the public seems generally supportive of reduced seasons for residents and nonresidents and closure of antlerless moose hunting in all of Unit 22B. There is also considerable interest in increasing hunting opportunity in Unit 22C where moose productivity and recruitment are high. Considerable time was devoted to answering questions from the public, writing articles, mailing information and regulatory materials, and assisting license vendors.

Progress Meeting Project Objectives: As shown by village harvest surveys in Koyuk and Shaktoolik, the unreported harvest of moose in Unit 22 is considerable. Much of this harvest is probably attributable to hunters who do not purchase licenses or pick up harvest tickets rather than to those who ignore seasons and bag limits. 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 using licenses and/or harvest tickets has increased. However, we need additional contact with local residents if we are to achieve better compliance with current moose regulations. We hope to extend the use of household surveys to better document big game harvest in Unit 22 villages.

In response to the continuing population decline in Unit 22B, the department recommends that the antlerless moose season in all of Unit 22B is eliminated and that the resident and nonresident seasons be shortened. To help reduce calf mortality, we also recommend increased liberalization of bear regulations to encourage increased bear harvest throughout Unit 22.

The department favors establishing a permit hunt for 20 cow moose in Unit 22C where productivity and recruitment are high. By limiting population growth we hope to avoid overbrowsing, which could result in major losses during years with severe winters and reduce carrying capacity in subsequent years.

We are continuing efforts to develop updated management objectives in consultation with the public and other agencies.

Project Location: Unit 23 (43,000 mi²)
Kotzebue Sound and Western Brooks Range

Project Objectives: The population management objectives of Unit 23 are to maintain the moose density at or above 1 moose/mi² and the bull: cow ratio at a minimum of 40:100.

1. Survey moose in established survey areas to monitor population composition and density.
2. Monitor harvest.
3. Collect recruitment information in the Noatak River drainage.
4. Conclude cooperative studies on moose movement patterns, distribution, and mortality in the Noatak and Selawik River drainages.

Work Accomplished During the Project Segment Period:

Population Monitoring

Noatak Survey. During April 1999, we surveyed 461.9 mi² of a 2387 mi² area to estimate recruitment (i.e., calves:100 adults). The survey area was extended from previous years to include additional habitat in the lower Noatak. The calf:adult moose ratio was 6 calves:100 adults +/- 18.6% at the 80% confidence level (6–8 calves: 100 adults). We conducted the survey in early May and observed 639 moose. We searched 73 high-density and 19 low-density units. Stratification was based on the past distribution of moose.

Squirrel River. During November 1998, we estimated the number of moose in a 1440.9 mi² area encompassing the Squirrel River drainage and a small portion of the Kobuk River drainage. We analyzed our data using a new spatial method developed by the department (J. VerHoef, pers commun). The results were comparable to 1992 census results using the Gasaway technique. The total estimate of moose was 1536 +/- 12% at the 80% confidence level (1346–1727 moose). The estimated density of moose was 1.07 moose/mi² and the bull:cow ratio was 50:100 (0.4–0.6, 80% confidence level).

Harvest Monitoring

In Unit 23, 389 hunters harvested 154 moose during the 1998–1999 season. Hunters who reported hunting moose included 201 state residents (including 43 local residents) and 188 nonresidents. We monitored the harvest using the statewide harvest reporting system.

Radiotelemetry Studies

The department and federal agency staff completed the eighth year of a cooperative moose telemetry project in the middle Noatak River drainage. No work was conducted this year by the department staff on a similar study in the Tagagawik River drainage.

Noatak. Total mortality for radiocollared moose in the Noatak study from April 1998 to April 1999 was 25%. We expected a rise in mortality as our sample of collared moose aged. Many moose were collared as adults as early as 1992. In April 1999 we removed 26 collars from moose (14 cows and 12 bulls) that had either been collared prior to 1997, were in upper Noatak drainages or were bulls. Because the original objectives of the Noatak project have been met, we did not collar additional moose. Currently 1 bull and 17 cows are radiocollared.

Progress Meeting Project Objectives: Survey 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^2 based on our last complete survey in these areas. Given low recruitment of calves in the Noatak in relation to adult mortality, this population may be slowly declining. Bull:cow ratios are above 0.40 in all areas based on the latest data. Our next survey priority will be the Noatak River drainage. We have improved moose population data by using statistically rigorous surveys on a rotational basis throughout the unit. We are conducting additional surveys in the spring to monitor recruitment in the Noatak.

Project Location: Unit 26A (53,000 mi^2)
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 unitwide 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 that caused the population to decline.
 - a. Examine and collect samples from captured and dead moose to test for pregnancy status, disease, mineral deficiencies, and contaminants.

- b. Conduct radiotelemetry surveys to examine calf production and survival, distribution, and mortality rates.
- 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 5 and 6 November 1998. During these surveys 159 moose were observed: 51 bulls (64 bulls:100 cows), 80 cows, and 28 calves (18% calves). The estimated antler sizes of the bulls are listed below.

Inches	<30	30-49	40-49	50-59	60+
Percent	14%	22%	14%	31%	19%

All drainages in Unit 26A containing moose habitat were surveyed to conduct a survey 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 represented a 51% decline since the 1991 survey when we counted 1535 moose. Trend counts indicated the population continued to decline 25% through 1996.

We conducted a partial census of Unit 26A during 12-15 April 1999. A total of 326 moose (274 adults and 52 calves) were counted, yielding a short yearling recruitment rate of 16%. We did not complete the census because very few moose were seen in the upper areas of the drainages and it was not cost-effective to survey all areas.

We made an effort to develop a correction factor for moose that were not seen by counters in the area we censused. We logged precise locations for moose we observed during the count and then immediately tracked the radiocollared moose in the area and recorded precise locations for them. We found that we had failed to see between 12% and 21% of the collared moose in the original count. When we applied this correction factor to the 187 moose we saw within the standard trend count area in the Colville, Anaktuvuk, and Chandler River drainages, we calculated an estimate of between 210 and 235 moose with a point estimate of 222 moose. This is a slight increase in total number from 1998 when 216 moose were counted. The short yearling count of 16% was considerably less than the 1998 rate of 26% but was much better than the survival rates in 1994, 1995, and 1996 when we counted 3%, 2%, and <1% short yearlings.

We conducted radiotelemetry surveys during spring calving season, fall, and late winter during 1998-99. From 10-15 June 1998 we located 43 collared cows with 25 calves (58 calves:100 cows), including 5 sets of twins. During our fall survey, flown on 5 and 6 November 1998, we located 39 collared cows and counted 21 calves (54 calves:100 cows). During 13-16 April 1999 we located 41 collared cows with 17 short yearlings (41 calves:100 cows). During calving surveys from 8-10 June 1999, we located 40 collared cows with 37 calves (93 calves:100 cows),

including 13 sets of twins and 11 single calves. The most twins we had counted with the collared cows previous to this survey were 5. Since we attached the collars in 1996 and 1997, we have had 3 known mortalities. There were 4 other collared moose that we did not detect in April or June 1999. We do not know if these collars have malfunctioned or if these moose traveled out of the study area and possibly died.

Dr. Knut Kielland, from the Institute of Arctic Biology at the University of Alaska, analyzed willow samples from the Colville River. He measured the diameter at point of browsing, the current annual growth, the crude protein, and the digestibility of the feltleaf willow twigs. He determined that the digestibility of sapwood is twice as high as it is for feltleaf willow in other areas of the state. He concluded that browse is currently fairly high quality and the nutrient return of browsing on feltleaf willow is relatively high. Considering daily intake rates, Kielland concluded the Colville moose are operating on the margin of dietary sufficiency. This is similar to the nutritional scenario of most moose in the state. There was plenty of unused forage in 1997. Unfortunately, we have little information on the amount of forage available during the time of the population decline.

Because of the declining moose population, restrictive regulations have been established and there were 3 moose reported harvested.

Progress Meeting Project Objectives: Spring population and radiotelemetry surveys in 1998–1999 indicate moderate calf survival and low adult mortality, resulting in a small population increase. This is a continuation of the growth trend seen in 1996–1997 and 1998–1999. This growth period follows a 75% population decline between 1992 and 1996. Calving surveys in June 1999 indicated the highest calf production since the study began. Further surveys will be needed to determine calf survival.

Our fall composition count indicated that oversummer calf survival in 1998 was not as good as in 1996 and 1997 but was much better than during the previous 4 years. We observed a good cross-section of bull antler sizes in 1998, whereas in 1996 nearly all bulls observed were over 3 years of age. It will still be necessary to restrict bull harvest until bulls born during years of high calf survival mature.

We have learned from samples taken from the captured moose that they had a fairly high pregnancy rate. They also had a high incidence of exposure to the diseases brucellosis and leptospirosis. By analyzing samples from moose that were found dead, taken by hunters and captured, we learned most of the moose were marginally deficient in copper. Five moose that had high titers for brucella in 1996 were recaptured in 1997; brucellosis was still active in all of them.

It is unclear how much of a role disease played in the population decline. The moose with positive titers for brucellosis had similar survival rates, calf production, and calf survival as the rest of the population in 1996 and 1997. However, in the 1998 calving survey 7 out of 8 of the cows that had positive titers for Brucella did not have calves. In the 1999 calf survey, 3 of the 8 Brucella+ cows had calves, including 2 pairs of twins (5 calves for 8 cows).

Wolf numbers continue to be low and bear numbers high in the area surrounding the Colville River. The low wolf density probably contributed to the reduced moose mortality in recent years.

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 harvest of bull moose during August when airplanes are not permitted for hunting.

Segment Period Project Costs:

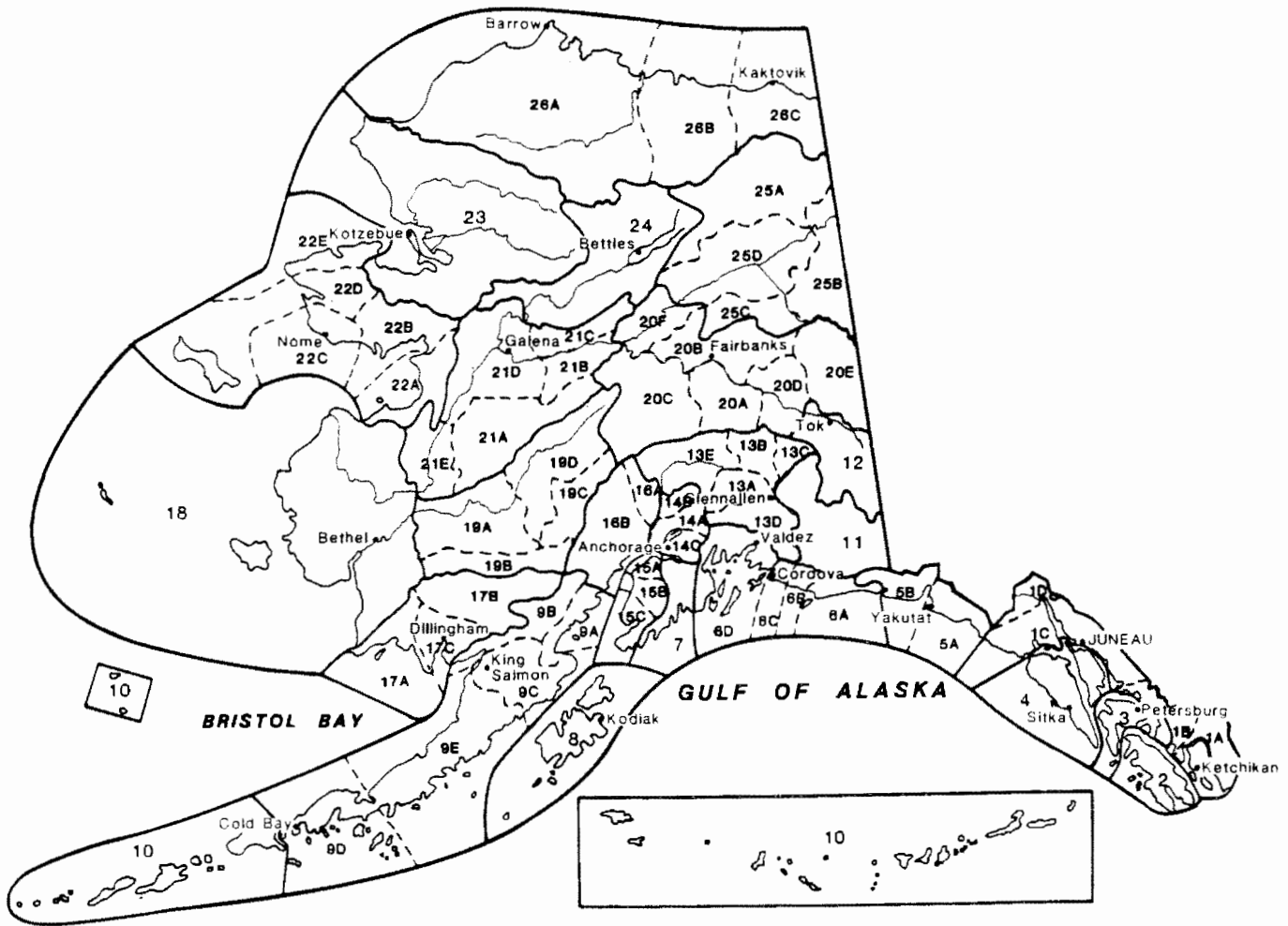
	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	88.7	83.0	171.7
Actual	88.7	70.7	159.4
Difference	0	12.3	12.3

Explanation: Surplus operating costs were caused by decreased aerial survey activities in Unit 22. Poor weather and lack of suitable charter aircraft contributed to lowered operating costs.

Submitted by:

Peter Bente
Survey-Inventory Coordinator

Alaska's Game Management Units



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.



Whitten