

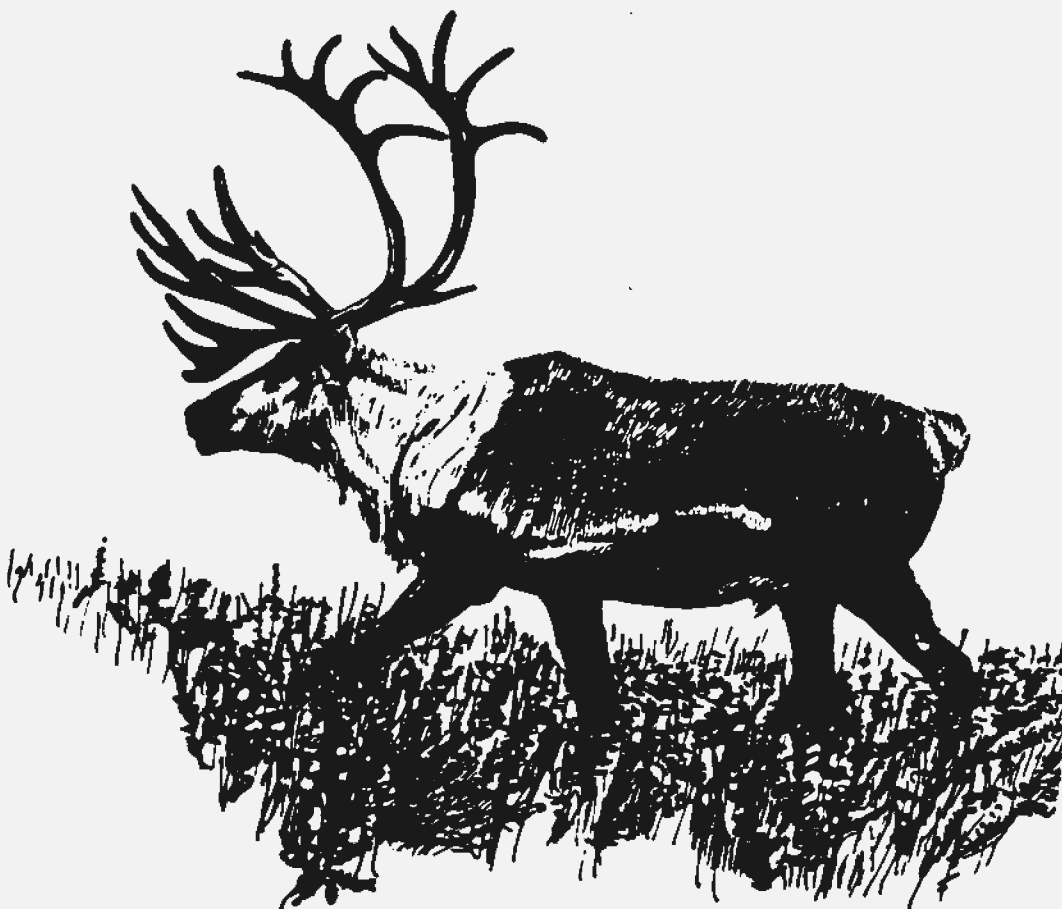
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Alaska Department of Fish and Game  
Division of Wildlife Conservation

Federal Aid in Wildlife Restoration  
Annual Performance Report of  
Survey-Inventory Activities  
1 July 1991 - 30 June 1992

# CARIBOU

Susan M. Abbott, Editor



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**Project Title:** Southcentral Alaska Caribou Management

**Project Location:** Unit 7 (3,520 mi<sup>2</sup>)  
Kenai Mountains Herd

**Project Objectives:** Maintain the pothunting herd at about 400 until a carrying capacity is determined for their winter range.

**Work Accomplished During the Project Segment Period:** We made three unsuccessful attempts to assess herd size and composition during October 1991. Therefore data was unavailable for estimating herd status or trend for this report period. During the last complete survey in October 1990, we observed 303 caribou. We estimated that the herd size remained unchanged in 1991.

ADF&G received 1,306 applications for 100 permits to hunt caribou (either sex) during 1991. Forty-seven permittees did not hunt and 16 hunters who went afield (30%) were successful. The harvest included 9 males (56%) and 7 females (44%).

**Progress Towards Meeting Project Objectives:** The harvest of 16 caribou during 1991 from an estimated herd of 325 should not affect herd growth. We recommend no change in season or bag limit for 1992.

**Project Location:** Subunit 15A (1,300 mi<sup>2</sup>)  
Kenai Lowlands Herd

**Project Objectives:** Increase the herd to a minimum of 150 animals by 1995.

**Work Accomplished During the Project Segment Period:** An aerial survey on 6 June 1992 located 74 caribou including 18 (23%) calves. We estimated the herd contained 74 to 90 caribou. We captured and radio-collared 10 adult female caribou to reduce time spent searching for animals during surveys.

ADF&G received 899 applications for 3 permits for the 1991 permit hunt. The 3 permittees hunted and harvested 2 bulls. A 3 bull harvest will not affect the production of young or significantly reduce herd growth.

**Progress Towards Meeting Project Objectives:** The Kenai Lowlands herd is healthy but not increasing in numbers as rapidly as predicted. The management objective should be extended to 1995. We recommend no changes in season or bag limit for the 1993 season. The Safari Club International donated \$8,000 towards caribou management on the Kenai Peninsula.

**Project Location:** Subunits 15B and 15C (3,563 mi<sup>2</sup>)  
Killey and Fox River Herds

**Project Objectives:** Reestablish viable caribou populations in suitable caribou range in Subunits 15B and 15C.

**Work Accomplished During the Project Segment Period:** We surveyed caribou from a fixed-wing aircraft on 11 November 1991. Staff confined search efforts to the headwaters of Funny River (Killey River herd) and Fox River (Fox River herd). Staff counted 197 caribou in the Killey River herd and 40 in the Fox River herd. We did not obtain sex and age data because of the aircraft used to conduct the survey.

Eighty caribou were transplanted during 1985 and 1986. The minimum fall 1991 population estimate was 237 caribou. This represents a 17% increase in numbers from the 197 caribou observed in November 1990.

During April 1991, staff radio-collared 12 adults (11 cows and 1 bull) to help relocate animals during surveys. Nine of the 12 caribou were with the Killey River herd and 3 were with the Fox River herd. A radio-collared caribou with the Fox River herd died of undetermined cause during this report period.

**Progress Towards Meeting Project Objectives:** The management objective to reestablish a viable caribou population in suitable habitat in Subunit 15B (Killey River herd) has been achieved. A permit hunt should be proposed for fall 1993. The Fox River herd in Subunit 15C is increasing in size but is not yet able to sustain a harvest.

**Project Location:** Subunits 9A, 9B, 9C, 17 and 19B (45,500 mi<sup>2</sup>)  
Mulchatna Herd

**Project Objectives:** Maintain a minimum caribou population of 25,000 adults with a bull:cow ratio of 35 bulls:100 cows.

**Work Accomplished During the Project Segment Period:** Returned harvest reports indicated that 1,464 hunters killed 1,573 caribou (86% males, 13% females, and 1% unknown) during this report period. Hunter success was 85%. Most successful hunters who returned harvest tickets were nonlocal Alaska residents (48%). Most hunters (82%) killed 1 caribou. Twenty-six hunters (2%) reported reaching the bag limit of 4 caribou and 5 reported killing 5 caribou. Hunters used aircraft most frequently for transportation (81%), 9% used boats, and 9% used snowmachines. Harvest chronology was: August, 29%; September, 43%; October-February, 14%; and March, 12%.

During the 1991-92 season, reported harvest by local residents increased (46 in 1989-90, 141 in 1990-91, and 185 in 1991-92). The local harvest remains considerably higher than the reported harvest.

An emergency regulation opened part of Subunit 17C west of the Nushagak River to the Kokwok River from 10 August to 30 September 1991. The Board believed a limited opening would not jeopardize the continued westward expansion of the Mulchatna herd.

Staff conducted a census of the Mulchatna caribou herd on 2 July 1991. We counted 60,220 caribou, but only located 26 of 52 radio-collared animals. Based upon the conditions of the surveys, the number of animals observed, and the number of radios located, it appeared the Mulchatna herd contained in excess of 90,000 caribou. Staff captured and radio-collared 20 adult female caribou near the northwestern shore of Iliamna Lake in April 1992. Most of the herd wintered in that area during this report period. Other wintering areas included the Aniak and Stony River drainages in Unit 19.

During a calving survey conducted on 19-21 May 1992, we located three major calving areas: upper Mulchatna River, Mosquito Creek, and Sleitat Mountain. The latter two areas each contained an estimated 20,000 adult females; there places not previously identified as calving areas. The peak of calving seemed to be during the census period. Four bands of caribou surveyed in the Sleitat Mountain area yielded 591 cows with 296 calves (50 calves:100 cows). This was a minimum estimate as caribou were still calving. We observed large concentrations of bulls along the Nushagak River north of Vukpalik Creek, and in the upper Stony River drainage.

Cominco Exploration-Alaska contracted with ADF&G to investigate caribou use near the proposed Pebble Copper mine, northwest of Iliamna Lake. We analyzed historic radio tracking and harvest data, conducted winter surveys, and report findings to Cominco in May 1992.

Caribou translocated from the Alaska Peninsula to the Nushagak Peninsula in 1987 thrived during this report period. During an aerial census in March 1992, U. S. Fish and Wildlife Service and ADF&G biologists counted 561 caribou. Two caribou were illegally harvested during this report period. Data from monthly radiotracking flights indicated most of the herd stayed on the Nushagak Peninsula. Sixteen new radio-collars were deployed in April 1992.

**Progress Towards Meeting Project Objectives:** The Mulchatna caribou herd continued to expand in population size and range. Movements into new calving and wintering areas may have indicated range overuse or been a function of the increasing number of caribou. No range investigations were conducted in areas used by this herd. Trailing was extensive in areas traversed by the herd, but incidental observations indicated food availability was not a limiting factor.

**Project Location:** Subunit 9D and Unit 10 (4,900 mi<sup>2</sup>)  
Southern Alaska Peninsula Herd

**Project Objectives:** Maintain the population between 5,000-6,000 in midsummer with an October sex ratio of 40 bulls:100 cows.

**Work Accomplished During the Project Segment Period:** We conducted a helicopter composition survey in October 1991, and 883 caribou were classified. Ratios were 28 bulls and 19 calves:100 cows. Calves comprised 13% of the fall sample, compared to 18% in two counts of postcalving aggregations in 1991.

A photo-census on 22-23 July 1992 revealed a minimum of 2,380 caribou. Coverage of the summer range was comparable to previous years and the total herd size was estimated at less than 3,000, with 15% recruitment of calves from a sample of 486 caribou.

Staff captured and radio-collared 11 cow caribou on 14-15 April 1992. We captured the caribou using a helicopter with a skid-mounted netgun. This method was efficient and caused no mortalities. Twenty radiocollars were deployed in the herd.

Hunters reported killing 35 bulls. Hunter success was 88%. Harvest chronology by month was: August, 1; September, 19; October, 1; November, 0; December, 8; January, 4; February, 1; and March, 1. Local residents, other Alaskans, and nonresidents accounted for 46%, 17% and 37% of successful hunters, respectively.

**Progress Towards Meeting Project Objectives:** The southern Alaska Peninsula herd has been below the population objective for several years, but the rate of decline has decreased. Recent research has tentatively identified nutritional stress as the primary factor causing poor body condition and low productivity in the herd. Considering the very low recruitment and high natural mortality of adult females, it appears unlikely that any management strategy will result in meeting the population objective established 10 years ago when the herd was increasing and peaked in 1983 at 10,200 animals. Hunting regulations were restricted several times in the past 5 years to a bag limit of 1 bull. This may have contributed to the low bull:cow ratio observed in 1990, but was not believed to be causing a decline in the herd.

Research on range conditions is underway, and a cooperative management plan with Izembek National Wildlife Refuge is in draft form. A new population objective will close hunting if the winter count drops below 2,500 animals. With our understanding of range conditions, we cannot meet the original management objectives.

**Project Location:** Subunits 9C and 9E (24,000 mi<sup>2</sup>)  
Northern Alaska Peninsula Herd

**Project Objectives:** Maintain the population at 15,000 to 20,000 in midsummer with an October sex ratio of at least 40 bulls:100 cows.

**Work Accomplished During the Project Segment Period:** We conducted a helicopter composition survey in October 1991, and classified 1,639 caribou. Ratios were 41 bulls and 47 calves:100 calves. Calves comprised 25% of the fall sample, compared to 29% of the caribou counted in 1991 postcalving aggregations.

A photocensus on 22-23 June 1992 revealed at least 16,500 caribou. Coverage of the summer range was comparable to previous years and the total herd size was estimated at 17,000 to 18,000 with 31% recruitment of calves from a weighted sample of 6,166 caribou. This population estimate was slightly above the 1991 count, but was within the range of counts made during the last decade and reflects a relatively stable population. We captured and radio-collared 15 caribou on 13-14 April 1992 using a helicopter with a skid-mounted netgun. This method was efficient and caused only 1 mortality in 16 captures. Thirty-two radiocollars were deployed in the herd.

Hunters reported killing 806 caribou (688 bulls, 115 cows, 3 unspecified). Of the 628 successful hunters, 84%, 9%, 2%, and 5% took 1, 2, 3, and 4 caribou, respectively. Hunter success was 80%. Harvest chronology was: August, 111; September, 277; October, 157; November, 17; December, 71; January, 53; February, 61; March, 48; and 11 were unspecified. Local residents, other Alaskans and nonresidents accounted for 9%, 51%, and 40% of hunters, respectively. We estimated unreported sport and subsistence harvest at 400 and 800 respectively, resulting in a total harvest estimate of 2,200.

A special 4-day season from 18-22 April was granted by the Board of Game in southern Subunit 9E. Residents of Port Heiden and Pilot Point harvested approximately 85 caribou. The Board agreed to consider proposals to extend the caribou season in Subunit 9E at their fall meeting. Staff submitted a proposal to extend the season until 30 April with a 2-caribou bag limit.

**Progress Towards Meeting Project Objectives:** Population estimates the past two years ranged from 16,000 to 17,500 caribou, and were lower than estimates for 1988 and 1989 (>20,000). Liberal hunting regulations have contributed to maintaining the herd within the population objective during the past decade while maintaining the desired sex ratio. Changes in the herd's distribution have led to an increased harvest during winter when caribou were accessible along the Naknek/King Salmon road system.

**Project Location:** Unit 10 (300 mi<sup>2</sup>)  
Adak Herd

**Project Objectives:** Maintain the precalving population at 250.

**Work Accomplished During the Project Segment Period:** Staff from the Alaska Maritime National Wildlife Refuge flew a fixed-wing transect survey on 30 April 1992 and observed 239 caribou. Survey conditions were good and it was improbable that a large number of animals went undetected.

Hunting of this herd was administered by permit, and 403 permits were issued in regulatory year 1991-92. Hunters harvested 198 caribou (93 bulls, 105 cows) and hunter success was 48%. Sixty-two hunters took 2 caribou and 74 hunters killed 1 caribou, with successful hunters spending about 6 days afield. Eighty-four percent of the harvest occurred during September-November.

**Progress Towards Meeting Project Objectives:** The management objective of maintaining the precalving population at 250 caribou was met. However, there was continued concern that herd growth cannot be managed by sport harvests in the future. The military community on Adak Island will decline in the future and the sport harvest will probably decline also. Some thought should be given to the possibility that population control or total removal of caribou from Adak Island may be required in the near future.

**Project Location:** Unit 11 (13,300 mi<sup>2</sup>)  
Mentasta Herd

**Project Objectives:** Maintain a minimum overwintering population of 2,500 adults and a minimum posthunting bull:cow ratio of 35:100.

**Work Accomplished During the Project Segment Period:** The October 1991 postrut estimate for the Mentasta caribou herd was 1,937 animals, of which 1,907 were adults and only 30 (0.02%) were calves. Calf recruitment in the herd was nil in 1991. We conducted postcalving aggregate counts in late June 1992 and counted 1,293 caribou. We conducted a sex and age survey by helicopter on 22 June 1992 and observed 15.5 calves:100 cows (12%) and 18.7 bulls:100 cows (14%).

A state hunt was not conducted for Mentasta caribou during 1991. The National Park Service conducted a registration subsistence hunt for local rural residents during fall 1991 with 166 permittees registering. A total of 101 permittees took 30 caribou (29 bulls and 1 unidentified) for a hunter success rate of 30%. Subsistence hunters hunted 5 days to take an animal and ORVs were the most popular method of transportation.

The Mentasta caribou herd summered along the western slopes of Mt. Sanford and Mt. Drum. By early October the herd moved northeast into Unit 12 and some animals moved into the Snag and Beaver creek drainages in the Yukon Territory, Canada by December. The main herd wintered from the Mentasta Mountains, east to the Canadian border. In



Unit 12, bulls from the Mentasta herd were taken by local residents during the subsistence season for Nelchina caribou. It is unclear how the Nelchina subsistence harvest coupled with poaching affected the Mentasta herd. The herd did not return to the usual calving areas between Drop Creek and the Sanford River until late May 1992.

**Progress Towards Meeting Project Objectives:** The 1991 spring calving season was a failure with very few calves surviving until late June. Although a postcalving udder count was not conducted, observations during the composition count suggested most single adult cows had distended udders. Calf production the previous 4 years was low but never a complete failure. Spring weather was wet and cold during 1991 leading to speculation that inclement weather affected plant phenology and contributed to poor calf survival. The 1992 spring composition data suggested an increase in calf production and survival but there was a large decline in the number of adults. The number of cows declined by 29%, from 1,363 cows observed in June of 1991 to 970 females in 1992.

The herd size is well below the minimum management objective of 2,500 adults. The management objective may be unrealistic with existing predation rates and range conditions. A management objective of 1,500 to 2,000 adults may be more realistic as a maximum given historic data. The herd is often located within the Wrangell-St. Elias National Park and Preserve. Management activities designed to increase the size of the herd are hampered by park management objectives.

Permit harvests are not limiting herd growth. The harvest is about 2% of the herd and composed primarily of bulls. An unknown number of Mentasta caribou are poached, taken under a winter permit in Unit 12, or taken by treaty natives in Canada. However, these 3 sources of mortality are an additive harvest and particularly important when cows are killed. The rapid decline in caribou numbers in 1991 and 1992 dictates that caribou harvests be restricted and limited to bulls only with cows protected.

**Project Location:** Unit 13 (25,000 mi<sup>2</sup>)  
Nelchina Herd

**Project Objectives:** Maintain the herd at 30,000 overwintering adults with a minimum bull:cow ratio of 35:100 by harvesting the annual growth increment.

**Work Accomplished During the Project Segment Period:** The October 1991 postrut estimate for the Nelchina herd was 44,903 of which 34,594 were adults (>1 yr). The estimate was extrapolated from a June 1991 postcalving aggregate count of 46,634 animals comprised of 50% cows and the October 1991 sex and age survey which tallied 51 bulls:100 cows and 45 calves:100 cows. The June 1992 postcalving spring count was 46,948 caribou with 53% cows. Number of cows observed did not change between 1991 and 1992 and calf production and survival in spring 1992 was high (63 calves:100 cows).

Three Nelchina caribou hunts were held during 1991. The fall and winter state hunt was a Tier II subsistence permit hunt with 2,802 permits issued. A total of 2,457 hunters went afield and took 1,973 caribou (1,476 bulls, 488 cows, 9 unknown) for a hunter success rate of 80%.

A fall and winter federal registration hunt was conducted in Unit 13 by the Bureau of Land Management on their lands along the Denali and Richardson highways. Each hunter was allowed 2 permits (2 caribou bag limit) and 2,201 permits were issued for the federal hunt. Harvest figures showed 647 caribou were taken for a permit success rate of 46%. The third hunt was also a subsistence hunt for bulls only, during winter in Unit 12 and in which hunters took 30 bulls. At least 2,650 caribou were harvested from the Nelchina herd in all hunts during 1991. The 1991 harvest was 12% below the 3,016 caribou harvested during 1990.

The herd's summer distribution in 1991 was similar to the previous year. Calving and postcalving use traditionally occurs in the eastern Talkeetna Mountains in Subunits 13A, 13E, and 14B. As the herd expanded more animals were summering in Subunit 13B along the Denali Highway. During fall 1991, the herd split with approximately 40% of the animals migrating east into Unit 12 for the winter. During the previous two winters the entire herd wintered in Unit 12. Spring migration to traditional calving grounds occurred later in 1991 because of a very cold spring and lingering deep snow. Some calves were born on the flats on the east side of Lake Louise and were subsequently observed crossing the lake and heading west to the Talkeetna Mountains and traditional calving areas.

Additional activities included repairing plant range stations and evaluating range condition. New radio collars were put on 8 cows during May 1992. This increased the number of radio-collared Nelchina caribou to 37 animals.

**Progress Toward Meeting the Project Objectives:** The Nelchina caribou herd exceeded the management objective of 30,000 adults and productivity remained very high in 1992. Harvest quotas have been increased to a level that should exceed annual production and limit herd growth. The herd is being stabilized following indications of moderate to extensive plant damage in calving areas and summer range.

The bull:cow ratio exceeded the minimum objective for this herd. However, the number of trophy bulls has been declining under heavy harvest pressure. In order to maintain a high bull:cow ratio and a reasonable number of mature bulls, yet reduce the herd size, the number of cows harvested should be increased. Attempts to increase the cow harvest should include requiring only antlered caribou to be taken during winter hunts in Unit 13. Cow harvests are not a management option once the Nelchina herd mixes with the declining Mentasta herd in other game management units.

**Segment Period Project Costs:**

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	102.1	63.0	165.1
Actual	102.1	64.2	166.3
Difference	0.0	-1.2	-1.2

Submitted by:

Ken Pitcher and John Trent  
Management Coordinators

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

**Project Location:** Unit 12 and Subunit 20E  
Chisana Caribou Herd

**Project Objectives and Activities:**

1. Maintain a population of 2,000-2,500 caribou.
  - a. Conduct aerial census of the herd to determine size, trend, and productivity.
  - b. Monitor mortality factors affecting the herd.

**Work Accomplished During the Project Segment Period:** ADF&G staff flew a sex and age composition count survey on 28 September 1991 and classified 855 caribou. The calf:cow ratio was 1.3:100 and the bull:cow ratio was 40:100. We censused the herd on 21 June 1992 and counted 1,223 caribou. The extrapolated estimate of herd size was 1,300-1,400 caribou. During the June count, only 0.8% of the herd were calves. FY92 will be the fourth consecutive year of poor recruitment. The estimated decline of the herd since 1989 is 500 caribou.

ADF&G and the National Park Service staffs jointly monitored mortality of radio-collared caribou. They estimated annual nonhunting adult mortality at 10% and calf mortality 90%. Most mortality of calves  $\geq 5$  months of age was from wolf predation during winter. June counts show the mortality rate of caribou calves during the first month of life is also very high, but the primary cause is unknown.

Hunters reported harvesting 20 bull caribou during FY92. We estimate the unreported harvest at an additional 5-12 caribou. The harvest (about 2% of the herd) is not affecting population growth.

**Progress Toward Meeting Project Objectives:** The Chisana herd is declining because of low calf recruitment. Management options and actions are limited because of land ownership, and no feasible methods to reduce the effects of predation or alter the trend of the population are available. The management objective for the Chisana herd has been modified to maintain an October bull:cow ratio of at least 30:100.

**Project Location:** Units 19 and 21  
Big River, Rainy Pass, Beaver Mountains, Tonzona, and Sunshine  
Mountains Caribou Herds

**Project Objectives and Activities:**

1. Increase caribou herd sizes to:
  - Big River herd: 1,500-2,000
  - Rainy Pass herd: 1,000-1,500
  - Beaver Mountains herd: 1,200-1,500
  - Tonzona herd: 1,800-2,000
  - Sunshine Mountains herd: 1,500-2,000
- a. Monitor mortality factors including hunting and predation.
- b. Estimate status, trend, and productivity of the herds from aerial surveys.

**Work Accomplished During the Project Segment Period:** Preliminary analyses of harvest tickets returned by hunters indicated the following harvests: Big River herd (including Farewell), 48; Rainy Pass herd, 42; Tonzona herd, 25; Beaver Mountains herd, 9; and Sunshine Mountains herd, 0. We did not collect additional information on predation or other mortality factors. Reported hunter success rate on all herds combined was 78%. Except for a higher hunter success rate, these figures do not vary significantly from previous years' data. Based on hunter and guide reports, general herd status has remained unchanged.

**Progress Toward Meeting Project Objectives:** Rough population estimates were available only from the Beaver Mountains and Sunshine Mountains herds. Hunting mortality remains low, but populations remain stable. Because of suspected heavy wolf and bear predation, these herds have remained below the herd objectives listed above. Increases in those herds probably depend on the political ability to reduce predation effects. With further restrictions on same-day-airborne wolf harvest, meeting herd objectives will probably not be possible.

**Project Location:** Subunit 20A  
Delta Caribou Herd

**Project Objectives and Activities:**

1. Provide an annual combined Delta/Yanert caribou herd harvest of at least 500 caribou, with a hunter success rate of at least 30% by at least 1,000 hunters.
  - a. Monitor the annual reported harvest and conduct field interviews to estimate actual harvest.
2. Maintain a bull:cow ratio of at least 30:100 and a large bull:cow ratio of at least 6:100.
  - a. Conduct annual fall composition counts.
3. Estimate optimal herd size and harvest by allowing the Delta/Yanert herd to increase until population responses to increased density become apparent. However, meeting the harvest objectives will have priority over herd growth. In the event that natural mortality becomes sufficient to preclude a harvestable

surplus of 500 caribou, the priority objective will be to maintain a reasonably stable population and avoid a precipitous decline in numbers.

- a. Conduct annual photocensuses of the herd.
4. Gather information on predator:prey ratios and on the significance of predation and weather as natural mortality factors.
  - a. Cooperate with Research Project 3.37 to evaluate the influence of weather, density, food limitation, hunting, and predation on the population dynamics of the Delta caribou herd.

**Work Accomplished During the Project Segment Period:** ADF&G staff conducted field interviews with 161 general season caribou hunters during fall 1990 to estimate reporting rates. Based on these interviews, we estimated that 51% of successful and 34% of unsuccessful caribou hunters reported. Applying these rates to our reported general season harvest (193) and number of hunters (418), the estimated 1990 general season harvest was 387 caribou taken by an estimated 1,040 hunters. Combined with data from permit hunts, we estimated 1,285 hunters harvested 552 animals from the Delta caribou herd during 1990-91.

Preliminary counts of harvest reports from fall 1991 indicate that 411 hunters harvested 202 caribou during the general season. In addition, 147 of 200 permittees participated in Drawing Hunt 570; 98 permittees were successful (77 bulls, 21 cows harvested) and 49 were unsuccessful. Because we did not conduct field interviews of caribou hunters during fall 1991, we applied an average of the reporting rates (57% for successful hunters, 31% for unsuccessful hunters) during 4 years without publicity campaigns to the general season data. Considering these rates, we estimated that 452 caribou were harvested by 1,470 hunters during the general and permit hunts in 1991-92. We estimated the resulting overall success rate to be 31%.

We classified 1,705 caribou, including 29 bulls:100 cows and 5 large bulls:100 cows, during a composition count on 1 October 1991. These ratios are just under our management objectives of 30 bulls:100 cows and 6 large bulls:100 cows. We counted only 8 calves:100 cows, with the total sample consisting of only 6% calves. Failure of the 1991 calf crop was the third consecutive year of poor calf recruitment.

We counted 5,755 caribou during a photocensus of the Delta herd on 23 June 1991 and believe this estimate is reasonably accurate because we located 36 of 37 radio-collared caribou during our search. The resulting population estimate of 6,000 caribou in 1991 compares with an estimated population of 10,700 caribou in 1989, a 44% decline in 2 years. Results of another photocensus of the herd on 29 June 1992 will be available during the next report period.

A final report for Research Study Project 3.33 was printed in January 1991. This report summarizes the "Demography of the Delta caribou herd under varying rates of natural

mortality and human harvest and assessment of field techniques for acquiring demographic data."

**Progress Toward Meeting Project Objectives:** We did not meet our objective to provide for a harvest of at least 500 caribou from the Delta herd, with the 1991-92 estimated harvest at 451 caribou. However, we did meet our objective for at least 30% success rate (31% in 1991) by at least 1,000 hunters (1,470 in 1991). We will not meet any of these objectives in 1992 because all hunting seasons on the Delta herd will be closed during the 1992-93 regulatory year. The season was closed because the herd rapidly declined between 1989 (10,700) and 1991 (5,700), probably because of three years of poor recruitment and high adult mortality. Because of this closure, we will not be monitoring harvest or interviewing hunters in 1992.

Bull:cow ratios were just under our management objectives of 30 bulls:100 cows and 6 large bulls:100 cows. Because there will be no open hunting season in fall 1992, we expect to find ratios exceeding these objectives during October 1992 composition counts. Natural mortality has become sufficient enough to preclude a harvestable surplus of 500 caribou, therefore our priority objective is to maintain a reasonably stable population and avoid a further decline in the population.

Since the completion of Research Project 3.33, a new study has been implemented to investigate regulating and limiting factors in the Delta caribou herd. Revised objectives reflect that cooperation with research.

**Project Location:** Subunit 20D  
Macomb Plateau Caribou Herd

**Project Objectives and Activities:**

1. Determine the size of the caribou herd. Increase the herd to 1,000 animals by 1993, with a sex ratio of 40 bulls:100 cows and 10 large bulls:100 cows after the hunting season.
  - a. Conduct aerial census of the herd to determine size, trend, and productivity.
  - b. Monitor mortality factors affecting the herd.
  - c. Monitor the limited permit hunt.

**Work Accomplished During the Project Segment Period:** We counted 560 caribou during a photocensus on 25 September 1991 and estimated herd size at 560, based on the high quality of the census. Composition data recorded during the census resulted in estimates of 9 calves:100 cows, 39 bulls:100 cows, and 13 large bulls:100 cows. During another census conducted on 22 June 1992 we counted 373 caribou, including 22% calves. We revised the herd size estimate to 500 caribou. Five of 20 radio-collared

caribou died between 11 June 1991 and 25 September 1991. Four of the remaining 15 radio-collared caribou died between 25 September 1991 and June 1992.

We issued registration permits to 318 residents to hunt the Macomb caribou herd during the 1991 hunting season. Two hundred eight people hunted and harvested 51 caribou, for a hunter success rate of 25%.

**Progress Toward Meeting Project Objectives:** No progress was made toward increasing herd size. Based on census data, overwinter mortality of radio-collared adult caribou, and high mortality of calves, the Macomb caribou herd has decreased in size. Predation and weather are thought to be limiting herd growth at this time. No permits will be issued to hunt this herd during the 1992 hunting season.

**Project Location:** Unit 12 and Subunit 20E  
Fortymile Caribou Herd

**Project Objectives and Activities:**

1. When weather-related nutrition is favorable, manage harvest and, secondarily, predation to increase the herd to 50,000 adults or 60,000 caribou by the year 2000.
  - a. Increase the number of radiocollars to assist in population census efforts during FY92.
2. If the mean annual rate of growth is greater than 10%, allow a maximum harvest of 3% of the herd and 1.5% of the females until herd size reaches 50,000 adults or 60,000 caribou. If the mean annual growth rate is 0% to 10%, allow a maximum harvest of 2% of the herd and 0.5% of the females. During years when the herd is declining, hunting will be further restricted and steps to reduce predation will be recommended, assuming poor caribou nutritional status is not a major factor.
  - a. Monitor radio-collared caribou to determine mortality rate.
3. Maintain an October bull:cow ratio of at least 35:100.
  - a. Conduct fall sex and age composition counts.

**Work Accomplished During the Project Segment Period:** During FY92 we deployed 42 radiocollars on Fortymile herd caribou (27 adult females, 15 5-month-old female calves), bringing the number of active radiocollars in the herd to 63. We conducted a population census on 28 June 1992, but the final results were not available for this report. We flew a posthunt composition count on 10 October 1991 and classified 1,445 caribou and observed ratios of 16 calves:100 cows and 39.2 bulls:100 cows. Recruitment of 5-month-old calves was the lowest ever recorded for the Fortymile herd. We conducted



the spring sex and age composition count on 22 June 1992 and classified 3,313 caribou. The calf:cow ratio was 46:100 and the bull:cow ratio was 41:100.

Mortality of radio-collared caribou was high during this report period. We estimated annual adult mortality at 23% and calf mortality at 62%. Most mortalities (>90%) were because of wolf predation.

During the permit registration hunt in the Taylor Highway corridor, 1,947 permittees harvested 320 bull caribou. Six cows were known to have been killed illegally during the registration permit hunt. Fortymile caribou are also hunted in Subunits 20B and 20D and harvest is monitored through the harvest ticket system. With adjustments for nonreporting, the total number of caribou harvested in the herd was 474; the harvest quota for the year was 450. The season was closed by emergency order on 21 September 1991.

**Progress Toward Meeting Project Objectives:** Because the annual growth rate of the herd has declined below 10%, the harvest quota is 2% of the estimated herd size and limited primarily to bulls. Because of the conservative quota and a bulls-only restriction in much of the herd's range, harvest is not limiting population growth. Predation is the main factor retarding herd growth. Steps to reduce predation will be recommended to the Board of Game during fall 1992.

**Project Location:** Units 21 and 24  
Galena Mountain, Wolf Mountain, and Ray Mountains Caribou Herds

**Project Objectives and Activities:** Determine population size, trend, and identity of caribou herds in the Ray Mountains and Kokrine Hills by 1992.

**Work Accomplished During the Project Segment Period:** We radio-collared 20 Galena Mountain caribou on their winter range in April 1992 to provide better data for separating the Wolf Mountain herd caribou from those of the Galena Mountain herd. We conducted a postcalving aggregation survey on 18 June 1992, and results showed very poor recruitment. There were 239 caribou in the Galena Mountain herd with 7% calves and 595 caribou in the Wolf Mountain herd; we made no attempt to count calves. Predation mortality is suspected to be contributing to low calf numbers. Since April, three radio-collared caribou were killed by wolves. One caribou was reported harvested from these herds; 26 hunters were unsuccessful. We estimate the unreported harvest of the Ray Mountains herd at 10 caribou per year.

**Progress Toward Meeting Project Objectives:** The Galena and Wolf mountain herds will probably continue to remain small with little chance of growth unless predation is reduced. Hunting mortality currently has no effect on population growth. Seasons are closed during winter when these herds are accessible by snowmachine. The expansion of

the Western Arctic caribou herd (WACH) into the Galena Mountain herd winter range has increased the complexity of management of both herds. A winter hunting season for WACH is now regulated by emergency order to allow harvest of the WACH in areas where it is not overlapping with the Galena Mountain herd. Radiocollars are used to determine herd segregation.

**Project Location:** Subunit 25C  
White Mountains Caribou Herd

**Project Objectives and Activities:**

1. Establish caribou population and harvest objectives by 1992.
  - a. Conduct aerial surveys of the White Mountains herd to estimate population size, distribution, and population composition.
  - b. Evaluate the feasibility of allowing winter hunting of White Mountains caribou by 1991.
  - c. Monitor anticipated increases in recreational use and mining development and ensure such development does not adversely affect the White Mountains caribou herd.

**Work Accomplished During the Project Segment Period:** To estimate population size, we completed a photocensus on 28 June 1991. We located all 10 radio-collared caribou from a Bellanca Scout aircraft and photographed them with a 35-mm camera. We also visually searched the area within a 20-mile radius of Cache Mountain to locate additional caribou. We counted 761 caribou on the photographs, compared with a visual estimate of 800 caribou during the search.

On 11 October 1991, BLM and ADF&G biologists completed a sex and age composition survey of the herd and attached radiocollars to 9 female calves. The composition sample of 314 caribou included 16 calves:100 cows and 24 bulls:100 cows. Eleven percent (36/314) of the sample were calves and 17% (53/314) were bulls. Of these bulls, 44% were small, 35% medium, and 21% large. The female calves averaged  $131 \pm 13.4$  lbs.

To evaluate the feasibility of allowing winter hunting on the herd, we established a 15 February-15 March season in 1990-91 between the Steese and Elliott highways. This season is open by drawing permit only, with 50 permittees allowed to hunt 15-28 February and 50 permittees allowed to hunt without motorized access 1-15 March. Three of 21 hunters were successful in 1990-91; most permittees did not hunt. Results are not available for the 1991-92 season.

Preliminary counts of caribou harvest reports indicate that 158 people hunted caribou in the White Mountains area. Only 17 (11%) of these hunters were successful. Eighty-one percent (120/148) of the hunters were from the Fairbanks vicinity.

**Progress Toward Meeting Project Objectives:** The 1991 photocensus of the White Mountains herd provided a population estimate of 800 caribou. BLM biologists will continue to monitor distribution, movements, and reproductive rates of radio-collared caribou to further our knowledge about this small, but apparently growing, herd.

Although we have provided a limited opportunity for winter hunting of the herd by drawing permit, few caribou are harvested during this season. If we determine that the herd can withstand additional harvest, we will consider changing this drawing hunt to a registration hunt to allow sincerely interested hunters to participate.

Recreational use and mineral development of the White Mountains National Recreation Area is expected to increase. In fall 1992 the Steese Highway will be one of the few remaining road-accessible areas where a general caribou hunting season is open. We will continue to monitor activities to ensure that these activities do not adversely affect the White Mountains herd.

**Project Location:** Subunits 25A, 26B, and 26C  
Porcupine and Central Arctic Herds

**Project Objectives and Activities:**

1. Maintain minimum population size of 135,000 in the Porcupine caribou herd and 10,000 in the Central Arctic caribou herd.
  - a. Monitor the harvest through field observations, hunter reports, and contact with residents.
  - b. Coordinate data collection with Research Projects 3.34, and 3.35.

**Work Accomplished During the Project Segment Period:** Only those hunters residing south of the Yukon River were required to report harvest. Harvest figures are preliminary, but 202 hunters reported taking about 100 caribou from the Porcupine herd. Harvest by local residents of Arctic Village and Venetie was light; most of the herd wintered in the Yukon and Northwest Territories. Harvest at Kaktovik was average, about 140 caribou per year.

In the Central Arctic herd, preliminary figures indicate that about 450 hunters took 300 caribou, most of which were bulls. Approximately 55% of the hunters used highway vehicles for access and about 40% used aircraft.

During June 1992, we conducted calving ground composition counts and monitored productivity based on observations of radio-collared cows on the Central Arctic herd range. Results of surveys on the Central Arctic herd are unavailable. We monitored radio-collared cows in the Porcupine herd on the calving grounds. Results from the Porcupine herd surveys suggest that despite good early winter nutritional condition and

high pregnancy rates, a severe winter and late spring resulted in low calf survival. Results of composition counts, mortality estimated, and the population census were reported in reports for research projects 3.34, and 3.35.

**Progress Toward Meeting Project Objectives:** The project objectives are being fulfilled for the Porcupine herd, where there are at least 178,000 caribou. Population size of the Central Arctic herd is approximately 19,000 and exceeds the minimum population objective of 10,000.

**Segment Period Project Costs:**

	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	67.1	36.5	103.6
Actual	67.1	38.6	105.7
Difference	0.0	-2.1	-2.1

Submitted by:

Kenton P. Taylor  
Management Coordinator

**Project Title:** Western Alaska Caribou Survey and Inventory

**Project Location:** Unit 18 (42,000 mi<sup>2</sup>)  
Kilbuck Mountain Herd

**Project Objectives:**

1. Allow for continued growth of the caribou population in Unit 18 from the current estimate of 2,500 to 10,000 animals.
  - a. Estimate herd size and demography of caribou in the Kilbuck Mountains in the southern portion of the Unit.
  - b. Determine the extent of movement between the Kilbuck herd in Unit 18 and the Mulchatna herd in Units 17 and 19.
  - c. Estimate the number of caribou in the Andreafsky Mountains.
2. Reduce the magnitude of the illegal harvest of caribou occurring in Unit 18.
3. Finalize development of a management plan for the Kilbuck herd in cooperation with the public and other agencies.

**Work Accomplished During the Project Segment Period:** The demography of the Kilbuck herd was studied in 6,400 mi<sup>2</sup> area in the southern portion of Unit 18. A cooperative study conducted by staff from the Yukon Delta National Wildlife Refuge and ADF&G since 1986 was continued during the report period. We conducted radiotelemetry and survey flights at periodic intervals to monitor distribution, calving success, recruitment, and population size.

We estimated the overall herd size using composition and census data collected during late fall/early winter surveys when the animals became aggregated. During a census and composition survey conducted during November 1991, we estimated a minimum population of 2,582 caribou. Of these 2,582 caribou, 91 groups were located, range in group size was 1 to 83, and average group size was 28 animals. A calving ground survey conducted during May 1992 yielded a count of 457 caribou (13 bulls, 291 cows, 52 yearlings, and 101 calves), calf:cow ratio of 35:100, and a short yearling composition of 14%. This calf count was one of the lowest reported since we began collecting this data in 1986. Normally, the calf:cow ratio has ranged between 54 and 75 calves:100 cows.

We observed caribou movements and distribution periodically during winter, the spring calving period, summer, and during the fall rut. From this movement data, we documented some overlap between the range of the Mulchatna herd to the east and the Kilbuck herd. We also learned that most Kilbuck caribou use a discreet calving area and have high fidelity to their present range. To better document the extent of this range overlap, we radio-collared 15 caribou from the Kilbuck herd on their early winter range during November 1990. This herd is being monitored using conventional VHF telemetry. From this radiotelemetry information, we learned that some radio-collared Kilbuck caribou ranged further east and north, an area associated with the Mulchatna caribou herd.

We made four flights in the Andreafsky Mountains to document calving and total numbers of Andreafsky caribou. Only 4 bulls were observed over a 4-day period which covered a 3,000 mi<sup>2</sup>.

Beginning in summer 1990, ADF&G staff in Bethel made inquiries to residents of 19 villages, USFWS staff, and regional government representatives about their willingness to participate in drafting a Kilbuck Caribou Management Plan. The first Kilbuck caribou management planning meeting was held on December 17, 1991. Six public meetings have since been held to draft a management plan and propose regulations to allow a limited subsistence harvest of Kilbuck caribou.

**Progress Towards Meeting Project Objectives:** The Kilbuck herd has dramatically increased in size from an estimated 75-300 animals when the season was closed during June 1985 to the current minimum estimate of 2,582 animals. This increase has been documented by 113 aerial survey and radio-tracking flights conducted since 1986. The increase in herd size has been attributed to the closed hunting season, natural recruitment, increased ability and experience of agency staff to locate and count caribou, some influx during the late summer and early fall of Mulchatna herd animals, and the occurrence of relatively mild winters during the last seven years.

Illegal harvest has declined in recent years because of increased enforcement efforts by both state and federal enforcement personnel. Although in recent years ADF&G has obtained support from the public and local organizations such as the Association of Village Council Presidents (AVCP) to continue the closure of the legal hunting season, many local residents would like the season re-opened as demonstrated by the court-ordered season for the village of Kwethluk during April 1990. During the Kilbuck caribou management planning meetings, we reached a consensus between the agency and village representatives to open the season during February and March 1992 for a harvest of 72 male caribou. Both the Alaska Board of Game and the Federal Subsistence Board adopted the Kilbuck Caribou Management Plan, and a legal hunting season to harvest 72 antlerless male caribou from 23 February through 7 March 1992. Because both Boards adopted the hunt, the state season was closed by emergency order. It was decided that the State would close the season to allow a federal hunt on federal lands for a select group of 19 villages. Only 21 antlerless male caribou were harvested during the season. Confusion concerning the regulations, cold weather, other more liberal caribou seasons in adjacent units, and overall lack of interest resulted in the low harvest. During its spring 1992 meeting, the Alaska Board of Game established a fall hunting season from 1-15 September by registration permit for a maximum harvest quota of 65 bull caribou.

As mentioned above, a formal management planning process involving extensive public review was implemented for the Kilbuck herd to help resolve some of these problems. We held public scoping and technical review meetings during summer and fall 1990. The seventh Kilbuck caribou herd management planning meeting was held in April 1992, and ADF&G was asked to finalize a draft management plan for the herd. A meeting is

scheduled for October 1992 to finalize the plan, and to present it to the 19 communities and the federal and state boards.

**Project Location:** Subunit 21D, Units 22, 23, 24, and Subunit 26A  
Western Arctic Herd

**Project Objectives:**

1. Maintain a minimum population size of 200,000 caribou or larger.
  - a. Conduct a biennial photocensus to estimate population size.
  - b. Conduct periodic radio-tracking flights to monitor herd distribution.
  - c. Maintain a sample size of at least 100 operational radio collars.
  - d. Conduct aerial surveys during early April to assess short yearling recruitment.
  - e. Conduct aerial surveys during early June to monitor calving success.
  - f. Monitor hunting and other mortality factors through harvest reporting, collection of biological specimens, public contacts, and unreported harvests.
  - g. Improve communication with the public to reduce the magnitude of unreported harvests.
2. Minimize conflicts between caribou and the reindeer herding industry.
  - a. Conduct mid-winter surveys to monitor caribou distribution near reindeer herds.
3. Minimize conflicts with industrial development.
  - a. Monitor the distribution and movements of caribou near major industrial developments to assess impacts.
4. Develop updated population management objectives in cooperation with the public and other agencies.

**Work Accomplished During the Project Segment Period:** During August 1991, we instrumented 16 cow caribou from the Western Arctic herd (WACH) with radio collars near Onion Portage on the Kobuk River. We outfitted 15 caribou with conventional VHF collars and 1 animal was outfitted with a satellite collar (PTT). We were able to maintain at least 100 active radio collars and 2 PTTs on WACH animals during the report period. However, one PTT failed prematurely during April 1992.

From October 1991 through March 1992, ADF&G staff from Nome, Kotzebue, Fairbanks, and Barrow conducted 12 telemetry distribution flights. These were done near eastern Norton Sound in Unit 22, Subunit 21D, Units 23, 24, and northern coastal plain Subunits 26A and 26B. A total of 195 relocations were obtained. Nome staff also conducted 4 aerial survey/radio-tracking flights to assess caribou distribution near reindeer herds.

The field work portion of a photocensus of the WACH was completed during July 1990. We finished counting the photographs during the report period, and estimated a minimum

herd size of 415,692 caribou. Aerial recruitment surveys were conducted in Unit 23 when caribou were migrating north to the calving grounds during late April and May 1992. To better distribute the sampling effort, radio-collared animals were relocated, and composition was determined for up to 200 animals in the immediate vicinity of each collared animal. The surveys required 8 days to complete, and 49 groups containing radio-collared animals were sampled. Staff counted 9,338 caribou (7,660 adults and 1,678 short yearlings) yielding a recruitment ratio of 22 short yearlings:100 adults.

Calving ground surveys were conducted during June 1992 by staff from our Kotzebue, Barrow, and Fairbanks offices in Subunit 26A. A total of 76 collared cows were relocated yielding a calf:cow ratio of 76 calves:100 cows.

Harvest was determined using the WACH reporting system for local residents, and the statewide harvest ticket system for nonlocal residents and nonresidents. During the 1991-92 season, 962 hunters reported a harvest of 1,707 caribou. Of the total, 101 hunters (11%) were nonresidents, 177 (18%) were nonlocal Alaska residents, 682 (71%) were local hunters residing in Subunit 21D, Units 22, 23, and 24, and Subunit 26A. The residency of 2 hunters (1%) was unknown. Because harvest reporting rates among local hunters are often poor, we believe the actual harvest is substantially higher than reported.

**Progress Towards Meeting Project Objectives:** We were able to maintain a minimum sample size of 100 radio-collared caribou in the WACH during the report period. However, we should consider increasing the sample size because the herd has grown considerably in size during the last 5 years, and is estimated in excess of 415,000 caribou. The goal of maintaining a sample size of 100 active radio-collared animals was developed a number of years ago when the herd was substantially smaller in size.

Aerial radiotelemetry and distribution surveys indicated that large numbers of caribou wintered south of the Selawik Hills in and near several reindeer ranges; some losses of reindeer were reported. Additional survey flights in and adjacent to reindeer ranges may be warranted in the future to warn herders of impending movements of caribou that may affect them. Short yearling surveys conducted during May 1992 indicated that the recruitment rate of 22 short yearlings:100 adults was within the range of recruitment observed during recent years. Since 1986, recruitment has ranged from 19-27 short yearlings:100 adults.

Because of staff vacancies in Nome and Kotzebue, we did not conduct as much information/education work as planned. We need to improve the public's understanding of regulations and the need for better harvest reporting. Public contacts made through information/education activities provide needed input about the caribou management program already in place.

If the WACH continues to grow in size, the biennial photocensus may become more difficult to complete. During the 1990 photocensus, the entire post-calving group did not



aggregate at the same time. Aggregations took place over several days, and mixing of animals from different aggregations may be more of a problem in future photocensuses if the herd continues to grow in size. Estimating population size by a sampling procedure rather than by a complete count of post-calving aggregations may be necessary in the future.

**Project Location:** Subunit 26A (53,000 mi<sup>2</sup>)  
Teshekpuk Lake Herd

**Project Objectives:**

1. Maintain the population of the Teshekpuk Lake Herd (TLH) at the current size.
  - a. Conduct a photocensus every two to three years to estimate population size.
  - b. Conduct periodic radio-tracking flights to monitor herd distribution.
  - c. Maintain a sample size of at least 20 operational radio collars.
  - d. Conduct aerial surveys during early April to assess short yearling recruitment.
  - e. Conduct aerial surveys during early July to monitor calving success.
  - f. Monitor hunting and other mortality factors through harvest reporting, collection of biological specimens, public contacts, and unreported harvests.
2. Provide educational opportunities for students and other members of the public.
3. Minimize conflicts with industrial development.
  - a. Monitor the distribution and movements of caribou near areas of industrial development to assess impacts using satellite and VHF radio collars.
  - b. Define critical caribou habitat areas such as calving, insect relief, and wintering areas in Unit 26A by flying surveys and monitoring satellite collars during the appropriate times.
4. Develop updated management objectives in cooperation with the public and other agencies.

**Work Accomplished During the Project Segment Period:** Movements were monitored using 6 satellite radio collars (PTTs) deployed during June 1990. Although all 6 cows instrumented with PTTs travelled considerable distances from the Teshekpuk Lake area (one traveled to the southern Seward Peninsula) during 1990-91, the four caribou with satellite radio collars stayed within 50 miles of Teshekpuk Lake during 1991-92.

Calving ground surveys were conducted on 5 June using a global position system (GPS) to plot locations of the core calving area. Most calving occurred north and east of Teshekpuk Lake. In the core calving area, calf composition was 77 calves:100 adults. South of the Lake, composition was 15 calves:100 adults. Staff conducted a survey to evaluate calving success on 19 July 1992. We observed 3,047 caribou from a Hughes 500 helicopter, and counted 80 calves:100 cows and 93 bulls:100 cows. Staff conducted a

photocensus of the TLH during July 1992, and images of caribou will be counted in fall and winter 1992-93.

Through a cooperative project with the North Slope Borough Department of Wildlife Management, we captured 12 caribou using a Hughes 500 helicopter with a skid-mounted net gun during June 1992. Radio collars were attached to aid in future population, productivity, and movement studies. These caribou were also measured and weighed to assess body condition. We collected samples of blood, feces, and hair to look for the presence of diseases, parasites, trace elements, contaminants, and nutrient deficiencies.

Results of subsistence harvest and radio-tracking studies were examined to estimate how many caribou were harvested. By examining the number of caribou harvested by various villages and assessing the distribution of caribou from the TLH at the time of these harvests, we estimated 900-1,525 TLH caribou were harvested during 1990-91.

**Progress Towards Meeting Project Objectives:** Results are not available for the photocensus which was conducted during July 1992; however, the calf productivity rate (80 calves:100 cows) and the apparent abundance of animals indicated that the population continues to grow. Twenty-three animals are now instrumented with VHF radio collars and 6 with PTTs. These instrumented animals will help us to learn more about population numbers, movements, and recruitment.

Preliminary investigations indicate 900-1,525 caribou were harvested during 1991-92. The population should be able to withstand this magnitude of hunting pressure, and appears to be growing at this level of harvest. Accurate and detailed movement information is being obtained from the satellite radio collars deployed on TLH caribou. We will continue to map caribou movements and use this information to protect critical habitat areas from the impact of industrial exploration and development.

**Project Segment Costs:**

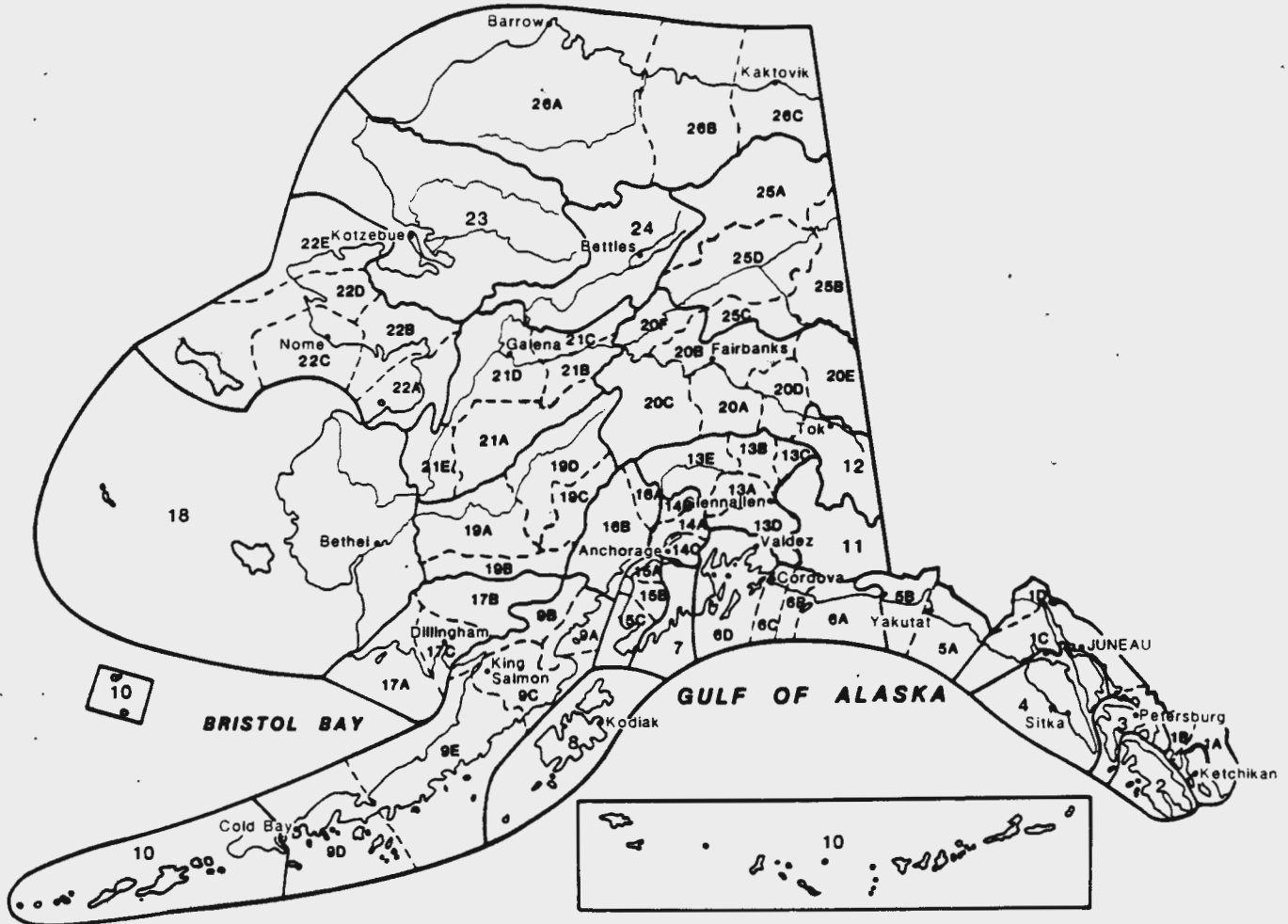
	<u>Personnel</u>	<u>Operating</u>	<u>Total</u>
Planned	117.0	63.2	180.2
Actual	117.0	64.8	181.8
Difference	0	+1.6	+1.6

Explanation: Costs associated with the use of satellite collars were higher than anticipated.

Submitted by:

Steve Machida  
Survey-Inventory Coordinator

# Alaska's Game Management Units



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