Caribou
Management Report
of survey-inventory activities
1 July 2000–30 June 2002

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Division of Wildlife Conservation
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Note that population and harvest data in this report are estimates and may be refined at a later date.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 7 and 15 (8,397 mi^2)

HERDS: Kenai Mountains, Kenai Lowlands, Killey River and Fox River

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

There were 5 small caribou herds on Kenai Peninsula following reintroductions in 1965–66 and 1985–86. The Kenai Mountains caribou herd (KMCH) occupies that portion of Unit 7 drained by Chickaloon River, Big Indian Creek, and Resurrection Creek. The Kenai Lowlands caribou herd (KLCH) summers in Unit 15A north of the Kenai airport to the Swanson River and in the extreme western portion of 15B; the herd winters on the lower Moose River to the outlet of Skilak Lake and the area around Brown's Lake in Unit 15B. The Killey River caribou herd (KRCH) inhabits the upper drainages of Funny and Killey rivers in Unit 15B. The Twin Lakes caribou herd (TLCH) occupies the area drained by Benjamin Creek in Unit 15B. The Fox River caribou herd (FRCH) occupies the area between upper Fox River and Truuli Creek in Unit 15C.

Beginning in 2002, the number of recognized caribou herds on the Kenai Peninsula was reduced to 4. As the Killey River herd grew, their range expanded to include the range of the Twin Lakes herd. Currently, the overlap of these herds makes them indistinguishable and these herds are now recognized as the Killey River caribou herd. The 2001–02 estimated population sizes of the KMCH, KLCH, KRCH, and FRCH were 375, 135, 750, and 70 caribou, respectively.

The KMCH has been hunted annually since 1972. The number of permits issued and animals harvested sharply increased, as hunters became aware of the KMCH. From 1972–1976, the department issued an unlimited number of registration permits and the season was closed by emergency order when necessary. In 1977, a limited permit system was instituted and remains in use. Following the 1985 population peak, the KMCH began to decline for unknown reasons. The department reduced harvest from 1987 through 1990. Biologists surveyed the herd in fall 1992 and tallied 390 caribou; however, calf recruitment was only 14%. A March 1996 survey revealed the herd had grown to at least 425 animals, with a slightly increased calf percentage of 17%. Beginning in 1996 this herd showed a steady decline, 290 caribou were counted on March 5, 2000. Population trends correlated with harvest data collected since the early 1970s suggested

the carrying capacity for this herd's range was 350–400 caribou. During the past 5 years the mean annual success rate was 21%.

The Kenai Lowlands herd has decreased slightly after reaching its largest population size in 2000. Growth has been limited by predation rather than by habitat. Free-ranging domestic dogs and coyotes probably kill calves in summer, and wolves preyed on all age classes during winter. In addition to natural mortality, highway vehicles kill several caribou annually. The KLCH was hunted in 1981, 1989, 1990, 1991 and 1992. The department issued 5 permits the first year and 3, for bulls only, in subsequent years. Biologists believed harvests were not a significant mortality factor.

The Killey River herd has grown steadily since the reintroduction of 80 caribou in 1985 and 1986, while the Fox River reached peak numbers in 1998 and appears to have stabilized. The herds occupied subalpine habitat rarely used by moose; however, the caribou may have competed with Dall sheep for winter range. Caribou have been absent from this area since 1912 (Palmer 1938). Biologists documented instances of wolves killing caribou that may explain the slow growth of the Fox River herd. As the caribou population builds and the moose population declines due to forest maturation, wolf predation on caribou should increase. The Killey River herd has been hunted since 1994 and the Fox River herd has been hunted since 1995.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

The management objective for the Kenai Mountains caribou herd is to maintain the posthunting herd at 350–400 animals until we can determine the carrying capacity of the winter range.

The management objective for the Kenai Lowlands caribou herd is to increase the herd to a minimum of 150. Hunting will be allowed once this objective is reached.

Management objectives for the Killey River, Fox River, and Twin Lakes caribou herds are to: 1) reestablish viable caribou populations throughout suitable and historic, but unoccupied, caribou habitat in Units 15B (Killey River and Twin Lakes) and 15C (Fox River); and 2) provide for additional opportunities to hunt caribou on the Kenai Peninsula.

METHODS

Biologists flew aerial surveys to determine the number, distribution, and composition of caribou herds. A Piper Super Cub (PA-18) was used to locate the herd, followed by a Bell Jet Ranger (206B) helicopter to determine the sex and age composition. Surveyors classified caribou as calves, cows, or bulls and calculated ratios. The department collected harvest data through a mandatory reporting requirement of the drawing permit program.

POPULATION STATUS AND TREND

Population Size

Kenai Mountains Caribou Herd. The KMCH has had 3 population peaks in its 35-year history and is currently declining. The original introduction grew to a preseason population of 339 animals by 1975. Hunters reduced the population to 193 by 1977. The herd reached another preseason peak of 434 in 1985 and declined to an estimated 305 animals in 1988. In 1996 the herd increased to an estimated 500 animals and has shown a general decline since then (Table 1).

Kenai Lowlands Caribou Herd. The KLCH increased steadily from 96 animals in 1995–96 to a peak of 140 caribou counted (population estimate of 150) during spring 1999. The population declined slightly the following year and was not counted during 2001–02 (Table 2). The primary management concern is low recruitment caused by predation.

Killey River Caribou Herd. The KRCH has grown steadily since their introductions in the mid-1980s. The KRCH increased at a mean annual rate of increase of 22% (range = 13–31%) between fall 1991 and 1993. The herd remained stable over the next 2 years at about 300 animals then increased to 400 in 1997. The survey conducted by the Fish and Wildlife Service only revealed 380; however, animals were widely scattered and it is believed the count did not accurately assess the herd's size because 546 animals were counted in June 1999. The recorded increase to a population estimate of 750 animals in 2001–02 is misleading because it included 66 caribou counted from the herd formally recognized as the Twin Lakes herd (Table 3).

Fox River Caribou Herd. The FRCH mean annual rate of increase was 29% (range = 14–49%) between fall 1991 and 1994 and only increased 9% by spring 1996. The herd declined by 9% the following spring then increased 16% by spring 1998. Predation by wolves and brown bears was the suspected cause of a reduction in herd size to 67 by the fall of 1998, when a survey revealed there were no calves in the herd. A survey was not completed in 1999–00, but the herd is considered to be stable or slightly decreasing (Table 4).

Twin Lakes Caribou Herd. The TLCH herd mean annual increase was 25% between fall 1992 and 1994 and remained stable in 1995. In spring 1997 the herd increased again, followed by a 9% decline by January 1998 (Table 5). These growth rates appeared normal for recently introduced herds on excellent range; however, the TLCH has been difficult to survey and may have been larger during fall surveys. The TLCH is now considered to be part of the Killey River caribou herd.

Population Composition

Kenai Mountains Caribou Herd. There were 29 calves:100 cows and 41 bulls:100 cows in March 1996. Calves composed 17% of the herd. We have not collected herd composition data since then because of budget limits, however, annual surveys were completed to determine population size (Table 1). The ratio of bulls to cows remained stable from 1990 to 1995 with a mean of 41:100 (range = 39–43:100). Observations during subsequent surveys indicated the calf-to-cow ratio was still low.

Kenai Lowlands Caribou Herd. Biologists only surveyed the KLCH during spring because of poor fall survey conditions. The area where this herd aggregated during the fall rutting period was heavily timbered, making it difficult to locate and classify caribou. Data collected from 1996 to 2000 indicated the mean June calf percentage was 21%, (range = 17 to 29%). Surveyors counted a low of 17 calves in 1997 compared to a high of 29 young in 1999 and 2000, the counts increased from 96 to 140 caribou during the same period (Table 2). Bull-to-cow ratios were not available because fall surveys were not conducted. Incidental observations suggested the ratio was probably stable and at a minimum of 35 bulls per 100 cows.

Killey River Caribou Herd. In 1996, calves comprised 23% of the 376 caribou counted, and the bull-to-cow ratio remained stable. The January 1998 survey revealed a decline of 36 caribou when compared to the June 1997 count. Although this count may reflect predation and mortality due to hunting, it is believed the 1997 count of 376 and the 1998 counts were low. A composition survey of 509 of 546 caribou observed on June 23, 1999 revealed the following ratios: 25 calves:100 cows, 36 bulls:100 cows and calves comprised 16 percent of the total classified. Although a survey was not completed in 1999–00, the herd is believed to have increased again, and was estimated at 600 animals. This herd has continued to grow and was estimated at 750 animals (including those from the former TLCH) in 2001–02 (Table 3). Composition data has remained relatively constant during this reporting period, however, an avalanche killed a minimum of 143 caribou during the winter 2001–02. Most of the mortalities were cows and calves and the effect on herd composition has not been determined.

Fox River Caribou Herd. Biologists completed composition surveys for the FRCH in fall of 1993. They counted 57 caribou in 1993 with the following ratios: 23 calves:100 cows and 61 bulls:100 cows; calves composed 22% of the caribou observed. Composition surveys were not conducted in 1994 and 1995. In 1996, 81 caribou were counted, and 19% were calves. Only aerial surveys to assess the herd's population size were completed in 1997. These data indicate the herd increased from 57 caribou in 1993 to 96 in 1997. A survey in November 1998 revealed a decline to 67 caribou and no calves. The November 2000 survey was the last survey completed during this reporting period and resulted in a count of 70 caribou, of which 10 were calves (Table 4).

Twin Lakes Caribou Herd. A fall composition count was completed on the Twin Lakes caribou herd in the fall of 1993. The following ratios were observed: 26 calves and 30 bulls:100 cows. Calves composed 17% of the 36 animals classified. In 1994 and 1995 we conducted only aerial surveys revealing 45 and 48 animals, respectively. Seventy-three caribou were counted in 1996, composed of 19% calves. An aerial survey completed in 1997 indicated that the herd declined by 10% to 66 animals then declined 18% in 1998 to 54. In June 1999 the herd was composed of 11(20%) calves, 37 (69%) cows and 6 (11%) bulls. The last survey for this herd was flown in November 2000 and produced a count of 65 caribou, of which 7 were calves (Table 5). Bulls were not identified during this survey.

MORTALITY

Harvest

Season and Bag Limits.

Kenai Mountains Caribou Herd — Open season for resident and nonresident hunters in Unit 7 north of the Sterling Highway and west of the Seward Highway was Aug. 10–Sept. 30 between 1993 and 1996. In 1997 and 1998, the season was Aug. 10–Sept. 30 and Nov. 10–Dec. 10. In 1999, the season was extended to Aug. 10–Dec. 31 and has remained there. The bag limit was 1 caribou by drawing permit only (DC001) and up to 250 permits could be issued.

Kenai Lowlands Caribou Herd — Open season for resident and nonresident hunters in the portion of the Kenai National Wildlife Refuge of Unit 15A was 1–20 Sept. The bag limit was 1 bull caribou by drawing permit only, and up to 3 permits could be issued. The season was closed beginning fall 1993.

Killey River Caribou Herd — Open season for resident and nonresident hunters in Units 15B south and west of Killey River in the Kenai National Wildlife Refuge was Aug. 10–Sept. 20. The bag limit was 1 caribou by drawing permit only; up to 150 permits could be issued. In 1999, two drawing permit cow hunts were opened from Aug. 10–Sept. 10 (hunt 610) and Sept. 15–Oct. 10 (hunt 612). Twenty permits, each for two caribou, were issued for each hunt for a total of 40 permits. Seasons and bag limits remained the same until 2001–02 when DC610 and DC612 were combined and changed to registration hunt RC610, with a bag limit of 3 cows and season dates of August 10–September 20. Also at this time the bag limit for DC608 was changed from 1 caribou to 3 caribou, of which only 1 can be a bull. Season dates for DC608 remained August 10–September 20.

Fox River Caribou Herd — Open season for resident and nonresident hunters in Units 15C, that portion north of Fox River and east of Windy Lake, was Aug. 10–Sept. 20. The bag limit was 1 caribou by drawing permit only, and no more than 30 permits could be issued.

Twin Lakes Caribou Herd — The Board of Game has not authorized hunting on this herd and this herd is now considered to be part of the Killey River herd.

Board of Game Actions and Emergency Orders.

The Board of Game changed the season dates, hunt type, and bag limits on the Killey River caribou herd during the March 2001 meeting. Drawing hunts DC610 and DC612 were combined and changed to a registration hunt RC610, with season dates of August 10–September 20 and a bag limit of 3 cows. Also, the bag limit for drawing hunt DC608 was changed from 1 caribou to 3 caribou, of which only 1 can be a bull. Season dates for DC608 remained August 10–September 20.

Permit Hunts.

Kenai Mountains Caribou Herd — Hunting of this small introduced population was regulated by registration or drawing permit. Number of permits issued was unlimited between 1972 and 1976. Since 1977 permits have been limited in number and issued through a drawing. The department received 1768 applications for 250 permits in 2000 and 1786 applications for 250 permits in 2001. The mean annual harvest for the past 5 years was 23 caribou (range = 19–27), and bulls averaged 58% (range = 46–68%) of the harvest (Tables 6 and 10). Permittees harvested 15 bulls and 7 cows in 2000 and 13 bulls and 6 cows during 2001.

Kenai Lowlands Caribou Herd — The season was closed during this reporting period.

Killey River Caribou Herd — The department received 326 applications for hunt DC608 (25 permits issued), 109 applications for hunt DC610 (20 permits issued) and 128 applications for hunt DC612 (20 permits issued) in 2000. Reported harvests included 13 bulls for DC608, 1 bull and 8 cows for DC610 and DC612 combined. For the 2001 season the department received 604 applications for DC608 (76 permits issued) and issued 158 permits for RC610. Reported harvests included 10 bulls and 4 cows for DC608 and 40 cows for RC 610 (Tables 8, 12 and 13).

Fox River Caribou Herd — The department received 143 applications in 2000 and 150 in 2001 for the 10 permits issued to hunt the FRCH. Permittees harvested 3 bulls in 2000 and 1 bull in 2001 (Tables 9 and 14).

Twin Lakes Caribou Herd — The TLCH was not open to hunting during this reporting period.

Hunter Residency and Success**.**

Kenai Mountains Caribou Herd — Fifty-four percent of permittees reported they did not hunt in 2000, while 64% did not go afield in 2001 (Table 10). Twenty-two (19%) of the 114 hunters in 2000 and 19 (21%) of the 89 hunters in 2001 were successful (Tables 10 and 15). Local residents harvested 0 caribou, nonlocal residents harvested 21 caribou and nonresidents harvested 1 caribou in 2000 (Table 15). Local residents harvested 1 caribou, nonlocal residents harvested 14 caribou and nonresidents harvested 4 caribou in 2001. Unsuccessful hunters included 4 local resident and 88 nonlocal residents in 2000. In 2001, 1 local resident and 69 nonlocal residents hunted unsuccessfully.

Kenai Lowlands Caribou Herd — This herd was not hunted during this reporting period.

Killey River Caribou Herd — The department issued 25 permits in 2000 and 76 in 2001 for hunt DC608. Twenty percent of the permittees in 2000 and 53 % in 2001 did not hunt (Table 12). The harvest was 13 caribou in 2000 and 14 in 2001. Hunter success rate was 65% in 2000 and 39% in 2001. Twelve local residents and 1 nonlocal resident were successful in 2000, compared to 8 local, 5 nonlocal residents, and 1 nonresident in 2001 (Table 16).

Forty permits were issued in 2000 for hunts 610 and 612, combined, resulting in the harvest of 3 cows. During 2001, DC610 and DC612 were combined to initiate hunt RC610. During the first year (2001) of this hunt 158 permits were issued and 40 cows were harvested (Table 13).

Fox River Caribou Herd — The department issued 10 permits in 2000 and 2001. Five (50%) permittees hunted in 2000 and harvested 3 bulls for a hunter success rate of 60%. In 2001, 4 permittees hunted and harvested 1 bull for a hunter success rate of 25% (Table 14). In 2000, all successful hunters were local residents and the 2 unsuccessful hunters were nonresidents. During 2001, the 1 successful hunter was a local resident, while the 3 unsuccessful hunters were nonlocal residents (Table 17).

Harvest Chronology.

Kenai Mountains Caribou Herd — Since 1995, essentially all of the harvest for hunt DC001 occurred during August and September (Table 18). In the past 5 years (combined), hunters harvested 56% of the take during August, 44% in September and less than 1 percent after September.

Kenai Lowlands Caribou Herd — The Kenai Lowland Caribou herd was not hunted during this reporting period.

Killey River Caribou Herd — During the 2000 hunting season 69% (9 of 13) of the harvest occurred between September 1–15, while the harvest was more evenly distributed throughout the 2001 season for hunt DC608 (Table 19).

Fox River Caribou Herd — For the 2000 and 2001 seasons combined, 75% (3 of 4) of the harvest occurred during the first week of the season (Table 20).

Transport Methods.

Kenai Mountains Caribou Herd — In 2000 and 2001 most successful hunters used highway vehicles for access and then hiked into the areas they hunted (Table 21). In 2000, 16 (73%) successful hunters walked in, while 5 (23%) used horses, and 1 (5%) used aircraft. The following year 8 (42%) successful hunters walked in, 4 (21) relied on aircraft, 2 (11%) used horses, and 4 (21%) did not report the type of transportation they used. Unsuccessful hunters followed a similar pattern of reliance on foot travel.

Kenai Lowlands Caribou Herd — The Kenai Lowland Caribou herd was not hunted during this reporting period.

Killey River Caribou Herd — In 2000 and 2001 hunters used 2 primary methods to access their hunting areas: boat across Tustumena Lake and walk to the hunting area or boat across the lake and use horses to pack into the hunt area. Thirty-one percent of the hunters in 2000 used horses, compared to 57% the next year. In 2000 69% of hunters used boats, compared to 36% in 2001. One successful hunter did not report a mode of transportation (Table 22).

Fox River Caribou Herd —All successful hunters (n=4) used boats for access during the 2000 and 2001 seasons (Table 23)**.**

HABITAT

Assessment

Biologists have not thoroughly investigated the habitat components of the Kenai Mountains herd. There are approximately 1407 km^2 (563 mi^{-2}) within the known range of the KMCH. Winter range was approximately 532 km^2 of the total identified range. The department initially discussed habitat concerns during the mid 1980s when the herd started to decline. Between 1980 and 1984 the KMCH had high calf:cow ratios and the herd was growing. Subsequent declines in the calf:cow ratios and herd size between 1985 and 1990 raised concerns over habitat adequacy. Hunting mortalities probably became additive around 1985; while hunting may have accelerated the decline, it provided some habitat protection. The herd declined to 300 animals by 1988 and remained at that size until 1990. The calf:cow ratio improved with 34:100 in fall 1990. As the herd increased, the percentage of calves observed declined from 20% in 1990 to 14% in fall 1992. A March 14, 1996 composition survey revealed the herd size had continued to increase since 1992. We observed 425 caribou and classified 403. Classification indicated the bull:cow ratio has remained relatively unchanged at about 41:100 since 1990 and the calf:cow ratio has increased slightly from 14:100 in 1992 to 17:100 in 1996. Composition surveys were not completed from 1997–2002, however, surveys to determine population size were. The observation of 452 caribou on 14 March 1997 indicated the herd had reached its highest number and began a downward trend. During the October 2001 survey 353 were counted. This has been the typical pattern of the Kenai Mountains Caribou herd over the past 3 decades. The KMCH appeared more productive when stabilized around 350–400 caribou.

The Kenai Lowlands herd appears to have stabilized at an estimated 135 caribou during this reporting period. The opportunity for viewing by locals and tourists is also increasing. The primary predators are wolves during winter and free-ranging domestic dogs and coyotes during summer.

Although some caribou in the KLCH have been observed south and east of Kalifornsky Beach Road in Unit 15B in winter, most of the herd migrates east to winter on the Kenai National Wildlife Refuge along Moose River to the outlet of Skilak Lake and south to Brown's Lake. Unlike ranges for other herds on the Kenai Peninsula, summer and winter ranges were separate for the KLCH. The summer range was 254 km^2 (101 $mi.^2$), compared to 925 km^2 (370 $mi.^2$) for the winter. This herd occupies a large range, and habitat is not limiting the growth of the KLCH at this time.

In 1996, 1998 and 2000, female calves were captured in the Killey River and Kenai Mountains Caribou herds in March and April to compare weights as an indicator of range quality. In 1996 the Kenai Mountain mean calf weights were 127 pounds compared to a mean weight of 145 in the Killey River herd. In 1998 Kenai Mountains calves averaged 122 pounds compared to 141 recorded for the Killey River calves. In 2000, Kenai Mountains calves averaged 120 pounds compared to 130 recorded for the Killey River calves. We also recorded morphometric measurements.

A comparison of the mean weights for calves indicates Killey River calves were larger than calves from Kenai Mountains herd in all years. The estimated 325 caribou currently in the Kenai Mountains herd occupy a 1407 km^2 area, a density of 0.2 animals/km^2. The 600 Killey River caribou currently occupy about 516 km^2, a density of 1.2 animals/km^2. It is interesting to note that the Killey River herd density is over five times the density of Kenai Mountains but their calves are larger.

The fact that mean calf weight of Killey River calves appears to be the highest in the known herds of the state is interesting; however, several influencing factors need to be reported to make these findings applicable to future capture efforts. Calves captured in 1996 were born following one of the most severe winters on record for the Kenai Peninsula. The severe winter of 1994–95 was also followed by one of the best growing seasons due to warm days with a record amount of rain. The winter of 1995–96 was, in contrast, one of the mildest on record. As a result, although these weights seem appropriate for the range conditions, they are probably the highest mean weights one could expect from these herds and may not represent an average calf weight following a normal summer growing season and winter. The winter of 1997–98 was normal for the Kenai. Similar environmental conditions should be noted for the Kenai Mountains herd.

Department and Kenai National Wildlife Refuge biologists conducted preliminary habitat assessments for the Killey and Fox River herds before reintroduction in the mid 1980s. These results, published in the Kenai Peninsula Caribou Management Plan and revised in 2001, indicated the KRCH's range (516 km^2) should sustain a herd of 400–500 caribou, the FRCH (85 km^2) could sustain approximately 80, and the TLCH range of 216 km^2 could support 200 animals. Calf recruitment for these herds has been moderately low and insufficient habitat may now be limiting the growth of the Killey River, Fox River and Kenai Mountains Herds.

CONCLUSIONS AND RECOMMENDATIONS

Recent survey and harvest data indicate we have reached the KMCH post-season population objective of 350–400 caribou. Consequently, changes to the current regulations are not recommended at this time. The allowable annual harvest will be set to maintain the population between 350 and 400 (post-season) until we identify factors influencing calf recruitment.

The KLCH has slowly decreased since 1999 and may now be stabilizing. Low calf recruitment is still the primary management concern for this herd. Department and FWS biologists suspect predation coupled with insufficient annual recruitment to offset the aging trend rather than available range is limiting herd growth. If the herd continues to increase, I recommend not allowing harvest until the herd increases to approximately 150 animals.

The Killey River herd has increased since 1998. Reduced annual recruitment and declining mean weight of female calves indicates this herd may be habitat limited. A secondary management objective is to allow hunting as this herd increases. I recommend ADF&G continue harvesting caribou in this herd to decrease the herd's growth rate. A decreased rate of growth in this herd will allow biologists time to determine the optimum density. Because of limited access, few hunters are expected to take advantage of these permits, however, several years of assessing hunter success may be necessary to properly manage annual harvests.

During the winter of 2001–02 an avalanche killed a minimum of 143 Killey River caribou. The effects of the avalanche on population parameters are not known because surveys have not been conducted since this event occurred.

The Fox River caribou herd has declined in recent years probably due to increased predation by wolves and bears or emigration into the Killey River herd. Observations by staff and hunters indicate that a pack of at least 6 wolves, several brown bears and numerous black bears commonly use this small area. Although harvesting 4 bulls over the past two years is not suspected to cause the current low numbers, if the herd declines below 60 animals, we should consider not issuing permits for DC618.

The Twin Lakes caribou herd is now considered to be part of the Killey River caribou herd and will be managed as such.

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Table 1. Kenai Mountains caribou fall composition counts and estimated population size, regulatory years 1995–2001

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1995–96[b]	41	29	17	59	--	--	--	403	450
1996–97[c]	--	--	--	--	--	--	--	452	500
1997–98[d]	--	--	--	--	--	--	--	419	475
1998–99[e]	--	--	--	--	--	--	--	380	425
1999–00[f]	--	--	--	--	--	--	--	290	325
2000–01[g]	--	--	--	--	--	--	--	378	400
2001–02[h]	--	--	--	--	--	--	--	353	375

[a] Estimated herd size postseason. [b] Surveyed Mar. 14, 1996. [c] Surveyed Mar. 14, 1997. [d] Surveyed Feb. 27, 1998. [e] Surveyed Jan. 7, 1999. [f] Surveyed Mar. 5, 2000. [g] Surveyed Mar. 31,2001. [h]Surveyed Oct. 23, 2001

Table 2. Kenai Lowlands caribou composition counts and estimated population size, regulatory years 1995–2001

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1995–96[b]	--	--	28(29)	--	--	--	--	96	100
1996–97[c]	--	--	17(17)	--	--	--	--	98	105
1997–98[d]	--	--	24(19)	--	--	--	--	124	135
1998–99[e]	--	--	29(21)	--	--	--	--	140	150
1999–00[f]	--	--	25(19)	--	--	--	--	131	140
2000–01[g]	--	--	29(23)	--	--	18(18)	--	128	135
2001–02	--	--	--	--	--	--	--	--	135

[a] Estimated herd size in June. [b] Surveyed June 6, 1996. [c] Surveyed June 8, 1997. [d] Surveyed June 20, 1998. [e] Surveyed June 22, 1999. [f] Surveyed June 20, 2000. [g] Surveyed June 19, 2001.

Table 3. Killey River caribou composition counts and estimated population size, regulatory years 1995–2001

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1995–96[b]	--	--	--		--	--	--	--	261	300
1996–97[c]	--	--	--		--	--	--	--	376	400
1997–98[d]	--	--	--		--	--	--	--	340	380
1998–99[e]	36	25	77(16)	318(63)	--	--	--	114(22)	509	546
1999–00	--	--	--		--	--	--	--	--	600
2000–01[f]	42	24	87(14)		--	--	--	154(25)	607	650
2001–02[g]	--	--	--		--	--	--	--	710	750

[a] Estimated fall herd size. [b] Surveyed Nov. 28, 1995. [c] Surveyed June 11, 1997. [d] Surveyed Jan. 13, 1998. [e] Surveyed June 23, 1999. [f] Surveyed Nov. 14, 2000. [g] Surveyed Oct. 19, 2001 and includes 66 caribou from the herd previously identified as Twin Lakes herd.

Table 4. Fox River caribou fall composition counts and estimated population size, regulatory years 1995–2001

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1995–96[bc]	--	--	--		--	--	--	--	89	90
1996–97[d]	--	--	15 (19)		--	--	--	--	81	85
1997–98[ce]	--	--	--		--	--	--	--	96	100
1998–99[f]	--	--	0 (0)		--	--	--	--	67	70
1999–00	--	--	--		--	--	--	--	--	70
2000–01[g]	--	--	10 (14)		--	--	--	--	70	70
2001–02	--	--	--		--	--	--	--	--	--

[a] Estimated herd size. [b] Surveyed Apr. 9, 1996. [c] Aerial survey using fixed-wing aircraft - total count only. [d] Surveyed June 3, 1997. [e] Surveyed Mar. 11, 1998. [f] Surveyed Nov. 28, 1998. [g] Surveyed Nov. 1, 2000.

Table 5. Twin Lakes caribou fall composition counts and estimated population size, regulatory years 1995–2001

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1995–96	--	--	--	--	--	--	--	--	48	50
1996–97[b]	--	--	14(19)	--	--	--	--	--	73	75
1997–98	--	--	--	--	--	--	--	--	66	70
1998–99[c]	16	30	11(21)	37(69)	--	--	--	6	54	65
1999–00	--	--	--	--	--	--	--	--	--	65
2000–01[d]	--	--	7(11)	--	--	--	--	--	65	65
2001–02[e]	--	--	--	--	--	--	--	--	--	--

[a] Estimated fall herd size. [b] Surveyed June 11, 1997. [c] Surveyed June 23, 1999. [d] Surveyed Nov. 1, 2000. [e] These caribou are now considered part of the Killey River caribou herd.

Table 6. Kenai Mountains caribou harvest (DC001) and accidental death, regulatory years 1995–2001

Regulatory year	Hunter Harvest								
	Reported				Estimated				
	M (%)	F (%)	Unk.	Total	Unreported	Illegal	Total	Accidental death	Total
1995–96	10(56)	8(44)	0	18	--	--	--	--	18
1996–97	10(44)	13(56)	0	23	--	--	--	--	23
1997–98	12(46)	14(54)	1	27	--	--	--	--	27
1998–99	17(68)	8(32)	0	25	--	--	--	--	25
1999–00	11(46)	13(54)	0	24	--	--	--	--	24
2000–01	15(68)	7(32)	0	22	--	--	--	--	22
2001–02	13(68)	6(19)	0	19	--	--	--	--	19

Table 7. Kenai Lowlands caribou harvest and accidental death, regulatory years 1995–2001

Regulatory year	Hunter Harvest: Reported M	(%)	F	(%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death[a]	Grand Total
1995–96	No open season						--	--	--	1	1
1996–97	No open season						--	--	--	1	1
1997–98	No open season						--	--	--	1	1
1998–99	No open season						--	--	--	--	0
1999–00	No open season						--	--	--	3	3
2000–01	No open season						--	--	--	--	--
2001–02	No open season						--	--	--	--	--

[a]Caribou/highway vehicle accidents–all were adults.

Table 8. Killey River caribou harvest (DC608) and accidental death, regulatory years 1995–2001

Regulatory year	Hunter Harvest: Reported M (%)	F (%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death	Grand Total
1995–96	8(100)	0	0	8	--	--	--	--	8
1996–97	12(100)	0	0	12	--	--	--	--	12
1997–98	23(100)	0	0	23	--	--	--	--	23
1998–99	26(100)	0	0	26	--	--	--	--	26
1999–00	13(93)	1(7)	0	14	--	--	--	--	14
2000–01	13(100)	0	0	13	--	--	--	--	13
2001–02[a]	10(71)	4(29)	0	14	--	--	--	143	157

[a] A minimum of 143 caribou died in an avalanche during the winter of 2001–02.

Table 9. Fox River caribou harvest (DC618) and accidental death, regulatory years 1995–2001

Regulatory year	Hunter Harvest								Grand Total
	Reported				Estimated				
	M (%)	F (%)	Unk.	Total	Unreported	Illegal	Total	Accidental death	
1995–96	5(100)	0	0	5	--	--	--	--	5
1996–97	2(100)	0	0	2	--	--	--	--	2
1997–98	2(100)	0	0	2	--	--	--	--	2
1998–99	3(75)	1(25)	0	4	--	--	--	--	4
1999–00	1(50)	1(50)	0	2	--	--	--	--	2
2000–01	3(100)	0	0	3	--	--	--	--	3
2001–02	1(100)	0	0	1	--	--	--	--	1

Table 10. Kenai Mountains caribou harvest (DC001), regulatory years 1993–2001

Hunt No. /Area	Regulatory year	Percent Permits issued	Percent did not hunt	Percent successful hunters	unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
001/07	1993–94	200	47	27	73	66	34	--	29
	1994–95	200	42	24	76	61	39	--	28
	1995–96	200	47	19	81	56	44	--	18
	1996–97	250	49	18	82	44	56	--	23
	1997–98	250	52	23	78	46	54	--	27
	1998–99	250	60	25	75	68	32	--	25
	1999–00	250	50	19	81	46	54	--	24
	2000–01	250	54	19	81	68	32	--	22
	2001–02	250	64	21	79	68	32	--	19

Table 11. Kenai Lowlands caribou harvest (DC506), regulatory years 1995–2001

Hunt No. /Area	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
506/15A									
	1995–2002		NO OPEN SEASON						0

Table 12. Killey River caribou harvest (DC608), regulatory years 1994–2001

Hunt No. /Area	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
608/15B									
	1994–95[a]	25	40	73	27	10(91)	1(9)	0	11
	1995–96	25	52	67	33	8(100)	0	0	8
	1996–97	25	36	75	25	12(100)	0	0	12
	1997–97	50	46	85	13	23(100)	0	0	23
	1998–99	50	40	87	13	26(100)	0	0	26
	1999–00	25	24	74	26	13(93)	1(7)	0	14
	2000–01	25	20	65	35	13(100)	0	0	13
	2001–02	76	53	39	61	10(71)	4(29)	0	14

[a] This permit hunt was established in fall 1994.

Table 13. Killey River cow caribou harvest (DC610, DC612, and RC610) by permit hunt, regulatory years 1999–2001

Hunt No. /Area	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
DC610& DC612[a]									
	1999–00	40	40	25	75	1	5	0	6
	2000–01	40	52	16	84	0	3	0	3
RC610[b]									
	2001–02	158	53	54	46	0	40	0	40

[a] Drawing permit cow hunt started in fall 1999.

[b] Registration permit cow hunt started in fall 2001.

Table 14. Fox River caribou harvest (DC618), regulatory years 1995–2001

Hunt No. /Area	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
618/15C[a]									
	1995–96	15	47	63	37	5(100)	0	0	5
	1996–97	10	70	67	33	2(100)	0	0	2
	1997–98	10	60	50	50	2(100)	0	0	2
	1998–99	10	40	67	33	3(75)	1(25)	0	4
	1999–00	10	60	50	50	1(50)	1(50)	0	2
	2000–01	10	50	60	40	3(100)	0	0	3
	2001–02	10	60	20	80	1(100)	0	0	1

[a]This permit hunt was established in fall 1995.

Table 15. Kenai Mountains caribou (DC001) annual hunter residency and success, regulatory years 1995–2001

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total[b] (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1995–96	2	16	0	18(17)	6	79	3	88(84)	105
1996–97	2	20	1	23(18)	16	86	3	105(82)	128
1997–98	3	22	0	27(23)	7	82	4	93(78)	120
1998–99	3	20	2	25(25)	1	74	1	76(75)	101
1999–00	2	22	0	24(19)	7	90	3	100(81)	124
2000–01	0	21	1	22(19)	4	88	0	92(81)	114
2001–02	1	14	4	19(21)	1	69	0	70(79)	89

[a] Local resident resides in Unit 7.

Table 16. Killey River caribou (DC608) annual hunter residency and success, regulatory years 1995–2001

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1995–96	7	1	0	8(67)	3	1	0	4(33)	12
1996–97	7	3	2	12(75)	3	1	0	4(25)	16
1997–98	17	5	1	23(85)	3	1	0	4(15)	27
1998–99	19	6	1	26(87)	3	1	0	4(13)	30
1999–00	10	4	0	14(74)	4	1	0	5(26)	19
2000–01	12	1	0	13(65)	2	3	2	7(35)	20
2001–02	8	5	1	14(39)	14	5	3	22(61)	36

[a] Local resident resides in Unit 7 or 15.

Table 17. Fox River caribou (DC618) annual hunter residency and success, regulatory years 1995–2001

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1995–96	3	1	1	5(63)	3	0	0	3(38)	8
1996–97	1	0	1	2(67)	1	0	0	1(33)	3
1997–98	2	0	0	2(50)	2	0	0	2(50)	4
1998–99	4	0	0	4(67)	2	0	0	2(33)	6
1999–00	2	0	0	2(50)	2	0	0	2(50)	4
2000–01	3	0	0	3(60)	0	0	2	2(40)	5
2001–02	1	0	0	1(25)	0	3	0	3(75)	4

[a] Local resident resides in Unit 7 or 15.

Table 18. Kenai Mountains caribou (DC001) harvest chronology, regulatory years 1995–2001

Regulatory year	Harvest periods 8–10 to 8–31	9–01 to 9–30	10–01 to 10–31	11–01 to 12–31	n
1995–96	9	9	0	0	18
1996–97	18	5	0	0	23
1997–98	15	12	0	0	27
1998–99	15	10	0	0	25
1999–00	15	8	1	0	24
2000–01	11	11	0	0	22
2001–02	9	10	0	0	19

Table 19. Killey River caribou (DC608) harvest chronology, regulatory years 1995–2001

Regulatory year	Harvest periods					
	8–10 to 8–15	8–16 to 8–31	9–1 to 9–15	9–16 to 9–30	Unk.	n
1995–96	0	2	4	2	0	8
1996–97	3	0	5	3	1	12
1997–98	3	10	9	1	0	23
1998–99	6	9	10	1	0	26
1999–00	5	1	8	1	1	15
2000–01	1	3	9	0	0	13
2001–02	3	2	4	4	1	14

Table 20. Fox River caribou (DC618) harvest chronology, regulatory years 1995–2001

Regulatory year	Harvest periods				
	8–10 to 8–15	8–16 to 8–31	9–1 to 9–15	9–16 to 9–30	n
1995–96	0	2	1	2	5
1996–97	0	0	2	0	2
1997–98	0	0	1	1	2
1998–99	0	1	3	0	4
1999–00	0	1	1	0	2
2000–01	2	0	1	0	3
2001–02	1	0	0	0	1

Table 21. Kenai Mountains caribou % harvest (DC001) by transport method, regulatory years 1995–2001

Regulatory year	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV[a]	Highway vehicle	Unknown	n
1995–96	6	22	0	6	0	0	67	0	18
1996–97	0	22	0	4	0	0	70	4	23
1997–98	7	22	0	0	0	0	70	0	27
1998–99	8	24	0	0	0	16	52	0	25
1999–00	21	4	0	0	0	0	75	0	24
2000–01	5	23	0	0	0	0	73	0	22
2001–02	21	11	0	0	0	5	42	21	19

[a] ORV includes mountain bike.

Table 22. Killey River caribou % harvest (DC608) by transport method, regulatory years 1995–2001

Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1995–96	13	75	13	0	0	0	0	0	8
1996–97	0	67	25	0	0	0	0	8	12
1997–98	9	70	22	0	0	0	0	0	23
1998–99	4	65	31	0	0	0	0	0	26
1999–00	0	43	57	0	0	0	0	0	14
2000–01	0	31	69	0	0	0	0	0	13
2001–02	0	57	36	0	0	0	0	7	14

Table 23. Fox River caribou % harvest (DC618) by transport method, regulatory years 1995–2001

Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1995–96	0	40	60	0	0	0	0	0	5
1996–97	0	0	100	0	0	0	0	0	2
1997–98	0	0	100	0	0	0	0	0	2
1998–99	0	25	75	0	0	0	0	0	4
1999–00	0	0	100	0	0	0	0	0	2
2000–01	0	0	100	0	0	0	0	0	3
2001–02	0	0	100	0	0	0	0	0	1

Alaska Department of Fish and Game
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CARIBOU MANAGEMENT REPORT

From: July 1, 2000
To: June 30, 2002

LOCATION

GAME MANAGEMENT UNITS: 9B, 17, 18 south, 19A and 19B (60,000 mi^2)

HERD: Mulchatna

GEOGRAPHIC DESCRIPTION: Drainages into northern Bristol Bay and Kuskokwim River

BACKGROUND

There is little objective information available on the Mulchatna caribou herd (MCH) from before 1973. The first historical accounts of caribou in the area are contained in the journals of agents of the Russian-American Fur Company (Van Stone 1988). In 1818, while traveling through areas now included in Game Management Units 17A and 17C, Petr Korsakovskiy noted that caribou were "plentiful" along Nushagak Bay and there were "considerable" numbers of caribou in the Togiak Valley. Another agent, Ivan Vasilev, wrote that his hunters brought "plenty of caribou" throughout his journey up the Nushagak River and into the Tikchik Basin in 1829. Skoog (1968) hypothesized that the caribou population at that time extended from Bristol Bay to Norton Sound, including the lower Yukon and Kuskokwim River drainages as far inland as Innoko River and Taylor Mountains. This herd apparently reached peak numbers in the 1860s and began declining in the 1870s. By the 1880s, the large migrations of caribou across the Lower Kuskokwim and Yukon Rivers had ceased.

Caribou numbers in the Mulchatna River area began to increase again in the early 1930s (Alaska Game Commission Reports, 1925–39), remaining relatively stable throughout that decade. There were indications that the herd began declining in the late 1930s (Skoog 1968); however, no substantive information was collected between 1940 and 1950 to support this theory.

Reindeer were brought into the northern Bristol Bay area during the early part of the 20th century to supplement the local economy and food resources. Documentation of the numbers and fate of these animals are scarce, but local residents remember a thriving, widespread reindeer industry before the 1940s. Herds ranged from the Togiak to the Mulchatna River drainages, with individual herders following small groups throughout the year. Suspected reasons for the demise of the reindeer herds include wolf predation and the expansion of the commercial fishing industry. Local residents also suggest that many reindeer interbred with Mulchatna caribou and eventually joined the herd.

Aerial surveys of the MCH range were first conducted in 1949, when the population was estimated at 1000 caribou (ADF&G files 1974). The population increased to approximately 5000

by 1965 (Skoog 1968). In 1966 and 1972 relatively small migrations across the Kvichak River were recorded; however, no major movements of this herd were observed until the mid 1990s. An estimated 6030 caribou were observed during a survey in June 1973. In June 1974 a major effort was made to accurately census this herd. That census yielded 13,079 caribou, providing a basis for an October estimate in 1974 of 14,231 caribou.

We used photocensusing to monitor the herd as it declined in size through the 1970s. Seasons and bag limits were reduced continuously during that decade. Locating caribou during surveys was a problem and biologists often underestimated the herd size. Twenty radio transmitters were attached to MCH caribou in 1981, providing assistance in finding postcalving aggregations. During a photocensus on 30 June 1981, 18,599 caribou were counted, providing an extrapolated estimate of 20,618 caribou. Photocensus estimates of the MCH since then have been used to document population size. The aerial photocensus in 2002 provided a minimum estimate of 147,000 caribou in the MCH.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

To maintain a population of 100,000–150,000 with a minimum bull:cow ratio of 35:100.

Additional objectives include:

- Manage the MCH for maximum opportunity to hunt caribou
- Manage the MCH in a manner that encourages range expansion west and north of the Nushagak River

METHODS

We conducted a photocensus of the MCH during the postcalving aggregation period in late June or early July in most years from 1980–1992. In recent years, the censuses have been scheduled on alternate years, occurring in even years. The photocensus planned for 1998 did not occur because of poor weather and a photocensus was conducted July 1999. The last photocensus conducted during this reporting period occurred June 30, 2002. ADF&G coordinates censuses out of the Dillingham area office in cooperation with staff from the Bethel, McGrath, Palmer and Fairbanks offices and personnel from Togiak National Wildlife Refuge (TNWR), Yukon Delta National Wildlife Refuge (YDNWR) and Lake Clark National Park (LACL). Biologists, using fixed-wing aircraft, radiotrack and survey the herd's range, estimate the number of caribou observed and photograph discrete groups. Since 1994 we have photographed large aggregations with an aerial mapping camera mounted in a DeHavilland Beaver (DH-2) aircraft flown by ADF&G staff from Fairbanks. We estimate herd size by adding: 1) the number of caribou counted in photographs; 2) an estimate of caribou observed but not photographed; and, 3) the estimated number of caribou represented by radiocollared caribou not located during the census.

We conducted aerial surveys to estimate the sex and age composition of the herd with a Cessna 185 and Robinson R-44 helicopter in October. We captured and radiocollared MCH caribou in most years from 1980 to 1992. Beginning in 1992, collaring programs were scheduled for

alternating years, occurring in even years. Beginning in 1997, capture and radiocollaring efforts occurred only when funding was made available. Female calf caribou are captured using a helicopter and drug-filled darts. These are usually cooperative efforts between ADF&G and TNWR. In April 2001, thirteen 10-month old female calves were darted and radiocollared west of Iliamna Lake. In April 2002, twenty four 10-month old female calves were darted and radiocollared in the lower Mulchatna River area.

Beginning in May 2000, intensive radiotracking surveys during calving were flown to determine the proportion of adult females calving. A fixed-winged aircraft was used to find calving concentrations and locate individual radiocollared adult females. Daily flights to relocate these individuals occurred until we could determine whether they had calved or until so late in the calving period that absence of a calf could possibly be attributed to predation or other loss.

We conducted periodic radiotracking flights throughout this reporting period to continue the demographics study that began in 1981. Supplemental funding from the Bureau of Land Management (BLM) and U.S. Fish and Wildlife Service allowed us to schedule bi-monthly flights. Staff from BLM and USFWS enter radiotracking data from these flights into a statewide interagency GIS database.

We monitored the harvest and assisted Fish and Wildlife Protection in enforcement during late August and throughout September, when hunting pressure was most intense. Harvest data are collected from statewide harvest reports. Hunter "overlay" information prior to the 1998–99 season have not been entered into the statewide harvest information system. Beginning with the 1998–99 regulatory year, reminder letters have been sent to hunters who failed to report their caribou hunting activity.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Between 1981 and 1996, the MCH increased at an annual rate of 17%. From 1992–1994, the annual rate of increase appeared to be 28%, but this was probably an artifact of more precise survey techniques. The dramatic growth of the herd is attributed to a succession of mild winters, movements on to previously unused range, relatively low predation rates and an estimated annual harvest rate of less than 5% of the population since the late 1970s. From 1996 though 1999 no herd size information was available. The summer 1999 photocensus indicated the herd had declined from the peak, which probably occurred in 1996. The most recent photocensus indicates the herd has continued to decline.

Population Size

We conducted a photocensus of the MCH on June 30, 2002. Based on results of that survey, the population estimate for the MCH was 147,000 (Table 1). The MCH has declined as indicated by the 2002 estimate, but at the same time caribou distribution during the summers has become more widespread. Some caribou were observed through the summers in Units 17A and 18, however surveys indicated these were mostly bulls. This population estimate includes an estimate of the number of caribou not found with the main postcalving aggregations.

Population Composition

We conducted sex and age composition surveys in the Kilbuck and Kuskokwim Mountains (Unit 18) on October 2, 2000 and in the middle Nushagak River drainage (Unit 17C) on October 9, 2000. In 2001, composition surveys were conducted between Whitefish Lake and the Fog River (in Units 18 and 19A) on October 11, near the Muklung Hills (Unit 17C) on October 14 and in the upper Tikchik River (Unit 17B) on October 15.

During the fall 2000 surveys, 44.3 bulls:100 cows were counted in the sample of 2,426 caribou in Unit 18. Only 27.7 bulls:100 cows were observed in the sample of 1,468 caribou in Unit 17. The caribou located in Unit 17 were generally subject to heavier hunting pressure in the fall than the caribou in Unit 18, which likely contributes to the disparity in the bull:cow ratio between the survey areas. Because of the great deal of mixing of the herd throughout the rest of the year, composition data for the 2000 survey was pooled for an overall bull:cow ratio of 37.6 bulls:100 cows. (Table 2).

During the fall 2001 surveys, 35.9 bulls:100 cows were counted in the sample of 2,051 caribou in Unit 18 and 19A. Only 17.8 bulls:100 cows were observed in the sample of 2,369 caribou in the Muklung Hills (Unit 17C) and 23.9 bulls:100 cows observed in the sample of 1,308 caribou in the Tikchik River area (Unit 17B). Composition data for the 2001 surveys were pooled for an overall bull:cow ratio of 25.2 bulls:100 cows. (Table 2).

The fall calf:cow ratio remained consistently greater than 30:100 until 1999 (Table 2). Unlike the 2000 and 2001 survey results for bull:cow ratios, the proportions of calves in the Unit 17 and 18 samples were typically similar. The calf:cow ratio observed on October 2, 2002 in Unit 18 was 24.3 calves:100 cows and that in Unit 17 on October 9 was 24.2 calves:100 cows. Pooled counts for both areas gave a calf:cow ratio of 24.3 calves:100 cows for the Mulchatna herd in fall 2000. (Table 2). The calf:cow ratio observed on October 11, 2001 in Unit 18 and 19A was 22.0 calves:100 cows, on October 14 in Unit 17C it was 20.6 calves:100 cows and on October 15 in Unit 17B it was 15.8 calves:100 cows. Pooled counts from all three areas gave a calf:cow ratio of 19.9 calves:100 cows for the Mulchatna herd in fall 2001. (Table 2).

Productivity Surveys

Productivity surveys were flown in May 2001 and 2002. A total of 15 radiocollared cow caribou that were of calf-bearing age, six 2-year old females (radioed as calves in spring 2000) and nine 1-year old females (radioed as calves in April 2001) were located in May 2001. Of the 15 adult cows, 7 were accompanied by calves, 4 had hard antlers but no calves, 4 had no antlers and no calf and 2 cows were not visually observed. High winds during late May 2002 precluded completing calving surveys in Unit 17 and only 13 radiocollared cow caribou of calf-bearing age were located. Of the 13 adult cows, 2 were accompanied by calves, 4 had hard antlers but no calves and 7 had no antlers and no calves. Presence of hard antlers during calving is generally considered evidence that the adult cow is pregnant. It appears that 11 of 13 radiocollared adult cow caribou in the MCH produced calves in May 2001 and a minimum of 6 of 13 radiocollared adult cows produced calves in May 2002.

Distribution and Movements

The MCH has continued to increase its range even after its apparent peak in population size in 1996. To follow the movements of the herd, we had 47 caribou with radio collars that were active in June 2002. These included collars deployed in the Kilbuck caribou herd range when large numbers of Mulchatna caribou were in that area.

Wintering Areas. The most significant wintering area for the MCH during the 1980s and early 1990s was along the west side of Iliamna Lake, north of the Kvichak River. While there, MCH animals appeared to intermingle with caribou from the Northern Alaska Peninsula Caribou Herd (NAPCH). Analysis of radiotelemetry data indicated that the MCH had been moving its winter range to the south and west during most of the late 1980s and early 1990s (Van Daele and Boudreau 1992). Starting in the mid 1990s, caribou from the MCH began wintering in Unit 18 south of the Kuskokwim River and southwestern Unit 19B in increasing numbers.

The MCH did not move into the above described traditional wintering areas en masse during this reporting period but scattered throughout their range and beyond into previously little used land. During fall 2000 and again in fall 2001, large numbers of Mulchatna caribou traveled through western Unit 17 and southwestern Unit 19B, into the Kuskokwim Mountains, and eventually into Unit 18 south of the Kuskokwim River. The greatest part of the herd wintered in Unit 18, south of the Kuskokwim River. Movement into these wintering areas has probably decreased pressure on the forage supply in the more typically utilized wintering areas. Another 10–20,000 caribou spent most of these winters in southern Unit 9B and southeastern Unit 17B. In March 2002, many of the caribou wintering in Units 9B and 17B moved south to the King Salmon and Naknek area. These caribou remained only a short time in central Unit 9C before traveling north back to the lower Mulchatna River area.

Calving Areas. The MCH has changed its calving areas in recent years. Taylor (1988) noted the main calving area for the MCH included the upper reaches of the Mulchatna River and the Bonanza Hills. Small groups were also observed in the Jack Rabbit and Koktuli Hills, Mosquito River and the Kilbuck Mountains. In 1992 only 10,000–15,000 adult female caribou were along the upper Mulchatna River and fewer than 1000 were in the Bonanza Hills area. During that year, the Mosquito River drainages contained about 20,000 calving females and an estimated 20,000 adult females were located near Harris Creek, northeast of the village of Koliganek. In 1994 most of the MCH females started using the area between the upper Nushagak River and upper Tikchik lakes for calving. In May 1996, 1997 and 1998, most of the cows from the MCH calved in the drainages of the King Salmon River and Klutuspak Creek of the upper Nushagak River. In May 1999, the drainages of the King Salmon River and Klutuspak Creek were still covered with snow and the caribou continued to move south to the edge of the snow, between Klutuspak Creek and the Nuyakuk River where many of them calved. Calving during spring 2000 occurred in two distinct areas; the lower Nushagak River the headwaters of the South Fork of the Hoholitna River. In May 2001, calving also occurred in two distinct areas, with at least 40,000 caribou between Kemuk Mountain and the Nushagak River and at least 60,000 caribou in the northeastern Nushagak Hills and the South Fork of the Hoholitna River. Calving in May 2002 was spread out through a vast area from southeast of Kemuk Mountain, north and northeast to the area north of the Hoholitna River and as far west as the lower ends of Klutuspak Creek and

the King Salmon River. In recent years, individual or very small groups of cows with calves have been occasionally observed scattered throughout the range of this herd.

Seasonal Movements.

The MCH does not generally move en masse as a distinct herd, nor do the individuals move to predictable places at predictable times. However during recent years, a trend has been noticed that most of the herd moves to the western side of its range during the fall, back to the middle part of its range for calving, into the upper Mulchatna River drainage for the postcalving aggregations, then becomes widely dispersed throughout its range by late summer and then forms large groups and moves west again during the fall.

In May 2000 most of the MCH had once again returned from being scattered throughout the western part of their range to calve in the middle Nushagak River area and South Fork of the Hoholitna River. By late June, most of the herd had moved into the eastern Nushagak Hills and also scattered through the upper Mulchatna River area. Throughout July, many caribou moved southeast from the Mulchatna drainage and into the lower Nushagak River area. By late July, the caribou were moving northward from the lower Nushagak River area and scattering throughout Unit 17B. Large numbers of caribou had also moved westward, into Unit 18 by mid September. During fall 2000 and winter of 2000–01, the bulk of the Mulchatna Herd was scattered throughout Unit 18 south of the Kuskokwim River, though 10–20,000 remained throughout the winter in the area west of Iliamna Lake. By late April 2001, Mulchatna caribou started moving toward the calving area for that year, in the middle Nushagak River area and northeastern Nushagak Hills. They again moved through the Nushagak Hills and into the upper Mulchatna drainage for the postcalving aggregations in late June and early July. After moving into the lower Nushagak River area by late July and early August, most of the herd became widely scattered throughout much of its range until aggregations formed for the rut in late September and early October 2001. By late fall most of the caribou were in the general areas where they would winter. In late April 2002, large numbers of Mulchatna caribou traveled eastward from Unit 18 to the areas used for calving that year. Again, the greatest part of the herd moved up through the Mulchatna drainage and by late June were forming into postcalving aggregations in the area between the Mulchatna River and Lake Clark.

In the past, several large peripheral groups appeared to be independent from the main MCH. A group of about 1300 caribou resided between Portage Creek and Etolin Point. Caribou in the Kilbuck Mountains (Seavoy 2001) and the upper Stuyahok and Koktuli River drainages (Van Daele and Boudreau 1992, Van Daele 1994) seemed distinct from the MCH. These subherds periodically intermingled with the main herd, but remained within their traditional ranges. As the MCH grew in size and seasonally moved through the areas used by these groups, they eventually ceased to exist as discrete groups of caribou.

MORTALITY

Harvest

Season and Bag Limit

	Resident Open Season	Nonresident Open Season
Unit 9A and that portion of Unit 9C within the Alagnak River drainage.		
Resident Hunters: 1 caribou	Aug 1–Mar 31	
Nonresident Hunters: 1 bull		Aug 1–Mar 31
Unit 9B.		
Resident Hunters: 5 caribou, however no more than 2 bulls may be taken during Oct 1–Nov 30	July 1–Apr 15	
Nonresident Hunters: 2 caribou		Aug 1–Apr 15
Unit 17A, all drainages east of Right Hand Point.		
Resident Hunters: up to 5 caribou	Season may be announced	
Nonresident Hunters:		No open season
Remainder of Unit 17A		
Resident Hunters: 5 caribou, however no more than 2 bulls may be taken during Oct 1–Nov 30	Aug 1–Mar 31	
Nonresident Hunters:		No open season
Unit 17B and a portion of 17C east of the Wood River and Wood River Lakes.		
Resident Hunters: 5 caribou, however no more than 2 bulls may be taken during Oct 1–Nov 30	July 1–Apr 15	
Nonresident Hunters: 2 caribou		Aug 1–Apr 15
Remainder of Unit 17C and Unit 18 south of the Yukon River.		
Resident Hunters: up to 5 caribou	Season may be announced	

Nonresident Hunters:		No open season
Unit 19A, within the Lime Village Management Area.		
Residents: 4 caribou total		
Bulls	July 1–Jun 30	
OR any caribou	Aug 10–Mar 31	
Nonresidents: 1 caribou		Aug 10–Mar 31
Remainder of Unit 19A and Unit 19B.		
Resident Hunters: 5 caribou, however no more than 2 bulls may be taken during Oct 1–Nov 30	Aug 1–Apr 15	
Nonresident Hunters: 2 caribou		Aug 1–Apr 15

Board of Game Actions and Emergency Orders. During their spring 2001 meeting, the Alaska Board of Game established a population objective of 100,000–150,000 and a harvest objective of 10,000–15,000 for intensive management purposes. The Board also established a caribou hunting season in Unit 17A that opens and closes on regular dates rather than by Emergency Order. During their fall 2001 meeting, the Board established a caribou hunting season in Unit 18, south of the Yukon River that opens and closes on regular dates rather than by Emergency Order, to become effective with the fall 2002 hunting season. Three Emergency Orders for hunting Mulchatna caribou were issued during this reporting period. An Emergency Order effective September 9, 2000 through March 31, 2001 opened caribou hunting in Unit 18 south of the Yukon River and in Unit 17A west of the Togiak River and north of Pungokepuk Creek. An Emergency Order effective February 10 through March 31, 2001 opened caribou hunting in Unit 17A east of the Togiak River and south of Pungokepuk Creek. An Emergency Order effective August 25, 2001 through March 31, 2002 opened caribou hunting in Unit 18 south of the Yukon River.

Hunter Harvest. The reported harvest from the MCH was 4,004 caribou during the 2000–01 hunting season and 3,826 during 2001–02 (Table 3). These totals and the number of hunters reporting hunting Mulchatna caribou are similar to the previous several years. As in previous years, males composed most of the harvest each year (81% and 72%).

The unreported harvest for each year during this reporting period was estimated at an additional 5,000. This number should be viewed with some caution though. While reminder letters were sent to caribou hunters these years, caribou distribution likely resulted in increased hunting effort by village residents of Unit 18, who might be less likely to use harvest cards. Most of the unreported harvest was attributed to local and other Alaska residents. Subsistence Division household surveys conducted in local villages from 1983 to 1989 indicated an estimated annual harvest of 1318 caribou (P. Coiley, ADF&G-Subsistence, Dillingham). The number of caribou harvested by local residents has undoubtedly increased since the subsistence surveys because of increases in the size and range of the herd and number of people living in the surrounding villages. Unreported harvest by other Alaska residents is even more difficult to quantify.

From the early 1980s through 1995, there was a steady increase in the number of caribou hunters in the range of the MCH during the fall season, yet reported harvest levels remained less than 5% of the total population. Harvests did not appear to be limiting herd growth or range expansion. In the mid 1990s, unpredictable caribou distribution caused decreased hunting effort in the areas traditionally considered used by the MCH. Since then however, commercial operators providing transportation to hunters have expanded into areas previously not hunted as well as basing their hunts from additional communities located within the range of this herd.

Hunter Residency and Success. Nonresidents made up 60% of the reporting hunters during the 2000–01 season and 51% of the reporting hunters during 2001–02. Nonlocal Alaska residents accounted for 31% and local residents 8% of the hunters who returned harvest reports for 2000–01. In 2001–02 nonlocal Alaska residents accounted for 35% and local residents 13% of hunters who returned harvest reports. Of the reporting hunters, 68% successfully harvested at least 1 caribou in 2000–01 and in 2001–02 74% were successful (Table 4).

Harvest Chronology. Most (82%) of the reported harvest in 2000–01 occurred during August and September, as did 72% in 2000–01. March was also an important month for harvesting caribou, accounting for 4% in 2000–01 and 9% in 2001–02 of the reported harvest and a large portion of the local unreported harvest. These data are comparable to the harvest chronology reported for previous years (Table 5).

Transport Methods. Aircraft were the most common means of hunter transport during the 2000–01 (87%) and 2001–02 (79%) hunting seasons (Table 6). Boats and snowmachines were other important means of transportation and were the main transportation methods for local hunters. These transport methods were probably underreported in our harvest data.

Other Mortality

There were several observations and reports of wolf and brown bear predation on caribou during this reporting period. Predation rates on MCH were traditionally low, but probably increased as the herd grew and provided a more stable food source for wolves. Many local residents report increasing wolf numbers. A growing number of hunters throughout the area used by the MCH report having encounters with brown bears, including bears on fresh kills, on hunter-killed carcasses and on raids in hunting camps. It is likely that individual bears learned to capitalize on this newly abundant food supply.

The reason for the marked decline in the fall 1999 calf:cow ratio is unknown. A subjective estimate during June 1999 indicated calf numbers and proportions similar to previous years. The survey conducted in October 1999 resulted in the lowest calf:cow ratio observed in this herd to date. Though the fall 2000 calf:cow ratio showed a marked improvement, it was still substantially less than that observed during the period of rapid growth. To investigate the possibility that lung worm infestation may be contributing to summer calf mortality, necropsies were performed on 10 female calves in October 2000. Of the 10, lungs of 6 showed large areas of hepatinization consistent with infestation of the lungworm, *Dictyocaulus viviparus*. However upon dissection of bronchioles, adult lungworms were not found (L. Johnson, pers. comm). Histological examination of the lung tissue revealed congestion consistent with bacterial pneumonia (R. Zarnke, ADF&G-DWC, Fairbanks). Of six fecal samples, a small number of lungworm larvae (*Parelaphostongylus spp*.) were found in only one (W. Foreyt, Washington

State Univ, Pullman). The role disease may be playing in the decline of the MCH is still unknown.

HABITAT

Assessment

We have not objectively assessed the condition of the MCH winter range. Taylor (1989) reported the carrying capacity of traditional wintering areas had been surpassed by 1986–87 and it was necessary for the MCH to utilize other winter range to continue its growth. The herd has been using different areas at an increasing rate since that time.

Portions of the range are showing overt signs of heavy use. Extensive trailing is evident along migration routes. Some of the summer/fall range near the Tikchik Lakes is trampled and heavily grazed. Traditional winter range on the north and west sides of Iliamna Lake is also showing signs of heavy use. Many of the areas that the MCH started using in the mid 1990s had not been used by appreciable numbers of caribou for over 100 years, or reindeer for over 50 years. These areas appear to have vast quantities of essentially virgin lichen communities.

CONCLUSIONS AND RECOMMENDATIONS

The minimum postcalving population estimates increased from 18,599 in 1981 to 200,000 in 1996 and declined to 147,000 by summer 2002. In 1994 the herd surpassed the Porcupine caribou herd in size, making the MCH the second largest caribou herd in the state. Distribution of this herd continued to expand throughout this period. Fall composition counts in recent years have varied, but proportions of calves and bulls were generally less than during the period of rapid herd growth.

The total reported harvest and the number of hunters afield steadily increased until the late 1990s, then both appeared to remain relatively constant. Increased reported hunting effort during this reporting period indicates that harvests remained at less than 7% of the herd. However, a better assessment of unreported harvest will be important if the herd continues to decline substantially. The MCH is an important source of meat and recreation for hunters throughout southcentral and southwest Alaska. Establishment of the 5 caribou bag limit, coupled with the reputation for large antler and body sizes, make this herd increasingly popular with hunters. However, the mobility of the herd and the difficult access into much of its range makes hunting logistics challenging.

During the past 15 years, the MCH has made dramatic changes in its range. In the early 1980s, the herd spent most of the year east of the Mulchatna River between the Bonanza Hills and Iliamna Lake. Their range now encompasses more than 60,000 mi^2 and large portions of the herd have recently pioneered winter and summer ranges in good to excellent caribou habitat. There is some evidence of localized overuse of habitat in some portions of the range, but most of the areas used by the MCH seem to be in good condition.

The tremendous growth rate of this herd continued to at least 1996, then the population declined. Possible signs of stress in this herd include the outbreak of foot rot in 1998 and/or the low calf:cow ratios in fall 1999 (Woolington 2001). Caribou in the adjacent NAPCH had a high

incidence of lungworms in 1995 and 1996. We should continue to monitor the herd closely to watch for indications of continued population decline.

Increased harvest pressure on the MCH also affects other big game populations in the area. As caribou become more available near villages, less pressure may be put on local moose populations. Illegal moose harvests may decrease as local hunters increase their use of caribou meat. However, the increased number of caribou has also attracted more nonlocal hunters interested in "combination hunts." Consequently, the overall moose harvest in Unit 17 has doubled in the past 10 years. The Board of Game addressed this issue by imposing stricter bag limits on moose hunters in Unit 17 in an effort to divert hunting pressure away from the moose and onto caribou.

The MCH presents new management challenges as its size and range change. Since the main portion of the herd is migratory and uses areas from the western slopes of the Alaska Range to the Kuskokwim River, it seasonally occupies ranges used by smaller resident caribou herds. These subherds and new ones that establish themselves, may be the key to a quicker recovery from any future crash of the MCH. The MCH also overlaps with larger, more established herds as they move into the southern fringes of the Western Arctic caribou herd range and the northern portion of the NAPCH range. We should strive to recognize the impacts on these potentially unique demographic components when setting management objectives and proposing regulatory formulas.

Recommended management actions for the next few years include:

1 Conduct a biannual photocensus of the MCH during postcalving aggregations;

2 Conduct composition surveys annually during October. Sample sizes should be at least 5% of the estimated herd size and at least 2 distinct areas should be sampled;

3 Collect a sample of at least 10 yearling female caribou from the winter range of the MCH each October or April to investigate body condition;

4 Conduct calving surveys in May of each year;

5 Monitor the movements of the MCH by locating radiocollared caribou at least 6 times each year;

6 Attempt to maintain at least 1 active radio collar per 2000 caribou in the MCH;

7 Develop an improved method of collecting harvest data, including unreported harvest;

8 Continue to work with other land and resource management agencies and landowners on MCH management activities and directions; and,

9 Work with local advisory committees and the state and federal boards to coordinate MCH hunting regulations with those for adjacent herds and develop contingency plans for managing the herd when the population begins to decline to low levels.

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Table 1 Mulchatna caribou herd estimated population size, regulatory years 1991 to 2001

Regulatory Year	Date	Preliminary estimate[a]	Minimum Estimate[b]	Extrapolated estimate[c]
1991–92	July 2, 1991	60,851	--	90,000
1992–93	July 7–8, 1992	90,550	110,073	115,000
1993–94	--	--	--	150,000
1994–95	June 28–29, 1994	150,000	168,351	180,000
1995–96	--	--	--	190,000
1996–97	June 28 - July 3, 1996	200,000	192,818	200,000
1997–98	--	--	--	--
1998–99	--	--	--	--
1999–00	July 8, 1999	160-180,000	147,012	175,000
2000–01	--	--	--	--
2001–02	June 30, 2002	--	121,680	147,000

[a] Based on estimated herd sizes observed during the aerial census.

[b] Data derived from photo-counts and observations during the aerial census.

[c] Estimate based on observations during census and subjective estimates of the number of caribou in areas not surveyed and interpolation between year's photocensus was not conducted.

Table 2 Mulchatna caribou fall composition counts and estimated population size, regulatory years 1991 to 2001

Regulatory Year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small Bulls (% of Bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size[a]
1991–92	---	---	---	---	---	---	---	---	---	90,000
1992–93	---	---	---	---	---	---	---	---	---	115,000
1993–94	42.1	44.1	23.7%	53.7%	---	---	---	22.6%	5,907	150,000
1994–95	---	---	---	---	---	---	---	---	---	180,000
1995–96	---	---	---	---	---	---	---	---	---	190,000
1996–97	42.4	34.4	19.5	56.6	49.8	28.5	21.7	24.0	1,727	200,000
1997–98	---	---	---	---	---	---	---	---	---	--
1998–99	40.6	33.6	19.3	57.4	27.8	43.7	28.5	23.3	3,086	--
1999–00	30.3	14.1	9.8	69.3	59.8	26.3	13.8	21.0	4,731	175,000
2000–01	37.6	24.3	15.0	61.8	46.6	32.9	20.4	23.2	3,894	--
2001–02	25.2	19.9	13.7	68.9	31.7	50.1	18.3	17.7	5,728	147,000

[a] Estimate derived from photo-counts, corrected estimates, subjective estimate of the number of caribou in areas not surveyed and interpolation between years when census not conducted.

Table 3 Mulchatna caribou harvest and accidental death, regulatory years 1991 to 2001

Regulatory Year	Hunter Harvest: Reported M (%)	Reported F(%)	Reported Unk.	Reported Total[a]	Estimated Unreported	Estimated Illegal	Estimated Total	Accidental death	Total caribou
1991–92	86%	13%	1.1%	1,573	1,700	--	1,700	--	3,273
1992–93	74%	9%	17%	1,602	1,800	--	1,800	--	3,402
1993–94	80%	20%	0.4%	2,804	2,000	--	2,000	--	4,804
1994–95	78%	21%	0.7%	3,301	2,700	--	2,700	--	6,001
1995–96	75%	24%	0.6%	4,449	2,800	--	2,800	--	7,249
1996–97	78%	21%	1.0%	2,366	2,200	--	2,200	--	4,566
1997–98	84%	15%	0.6%	2,704	2,400	--	2,400	--	5,104
1998–99[b]	82%	17%	1.0%	4,770	5,000[c]	--	5,000	--	9,770
1999–00	76%	23%	1.0%	4,467	5,000[c]	--	5,000	--	9,467
2000–01	81%	19%	0.8%	4,004	5,000[c]	--	5,000	--	9,004
2001–02	72%	27%	0.4%	3,826	5,000[c]	--	5,000	--	8,826

[a] Includes only reported harvest from harvest cards

[b] First year that reminder letters were sent to caribou hunters

[c] Includes minimum suspected unreported harvest from Unit 18

Table 4 Mulchatna caribou annual hunter residency and success, regulatory years 1991 to 2001

Regulatory Year	Successful				Unsuccessful				Total hunters[b]
	Local resident[a]	Nonlocal resident	Nonresident	Total (%)	Local resident[a]	Nonlocal Resident	Nonresident	Total (%)	
1991–92	89	562	599	85%	9	136	69	15%	1,464
1992–93	82	542	651	91%	12	82	26	9%	1,391
1993–94	47	718	725	86%	5	171	77	14%	2,394
1994–95	61	812	896	85%	11	227	124	15%	2,954
1995–96	52	1,035	928	87%	15	188	86	13%	3,127
1996–97	56	647	824	85%	25	139	101	15%	1,822
1997–98	85	564	1,277	84%	33	178	152	16%	2,301
1998–99	178	1,130	1,877	78%	142	320	414	22%	4,131
1999–00	174	1,024	1,697	72%	120	453	553	28%	4,140
2000–01	188	817	1,713	68%	148	427	692	32%	3,999
2001–02	270	843	1,377	74%	159	351	368	26%	3,406

[a] Includes residents of communities within the range of the Mulchatna Caribou Herd.

[b] Includes hunters of unknown residency and hunters who reported harvesting more than one caribou.

Table 5 Mulchatna caribou annual harvest chronology percent by month, regulatory years 1991 to 2001

Regulatory Year	Harvest Periods										
	July	August	September	October	November	December	January	February	March	April	Total[b]
1991–92		29%	43%	6%	0.4%	2%	1%	4%	12%	0%	1,573
1992–93		30%	54%	5%	1%	0.3%	0.2%	1%	8%	0%	1,602
1993–94		36%	50%	5%	0.4%	1%	1%	1%	5%	2%	2,804
1994–95		35%	50%	5%	0.4%	1%	1%	1%	5%	2%	3,301
1995–96		33%	50%	6%	1%	2%	1%	1%	5%	2%	4,449
1996–97		25%	52%	5%	1%	1%	1%	2%	11%	2%	2,366
1997–98		33%	53%	4%	0.3%	0.4%	1%	3%	4%	0.3%	2,704
1998–99		25%	55%	6%	0.6%	0.6%	2%	2%	7%	1%	4,770
1999–00	0.1%	24%	52%	5%	0.5%	1%	3%	5%	8%	2%	4,467
2000–01	0.2%	27%	55%	6%	0.3%	0.3%	2%	3%	4%	1%	4,004
2001–02	0.2%	23%	49%	3%	1%	2%	2%	4%	9%	5%	3,826

[a] July opening date for Unit 9B established starting July 1, 1999.

[b] Includes unknown harvest date

Table 6 Mulchatna caribou harvest percent by transport method, regulatory years 1991 to 2001

Regulatory Year	Percent of reported harvest								Total caribou[a]
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1991–92	81%	0.2%	9%	1%	9%	0.1%	0.2%	2%	1,573
1992–93	88%	0.2%	8%	3%	3%	0.1%	0.1%	0%	1,602
1993–94	86%	1%	10%	1%	2%	0.3%	1%	0%	2,804
1994–95	85%	0.2%	12%	1%	2%	--	0.2%	0.2%	3,301
1995–96	88%	0.2%	9%	1%	2%	0.1%	0.1%	--	4,449
1996–97	82%	0.4%	10%	2%	3%	0.3%	0.7%	1%	2,366
1997–98	86%	0.4%	8%	1%	2%	0.1%	0.2%	2%	2,704
1998–99	82%	0.1%	10%	2%	3%	0.1%	1%	1%	4,770
1999–00	85%	0.3%	6%	2%	5%	0.2%	0.7%	1%	4,467
2000–01	87%	0.2%	6%	1%	5%	0.1%	0.1%	0.6%	4,004
2001–02	79%	0.1%	7%	2%	11%	0.2%	0.2%	0.8%	3,826

[a] Includes harvest by unknown transport method

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 9C and 9E (19,560 mi^2)

HERD: Northern Alaska Peninsula

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

The Northern Alaska Peninsula caribou herd (NAPCH) ranges throughout Subunits 9C and 9E. Historically, the size of this population has fluctuated widely, reaching peaks at the turn of this century and again in the early 1940s (i.e., 20,000 caribou). The last population low was during the late 1940s (i.e., 2000 caribou); by 1963 the herd had increased to over 10,000 animals (Skoog 1968). The first radiotelemetry-aided census in 1981 estimated 16,000 caribou; by 1984 the herd had increased to 20,000.

During the next several years, indicators such as the noticeable depletion of lichens and caribou movements across the Naknek River were evidence that the traditional wintering area was overgrazed. In 1986 significant numbers of NAPCH animals began wintering between the Naknek River and Lake Iliamna, and there was reason to believe that excellent forage conditions in this region would sustain the NAPCH within the population objective of 15,000–20,000. However, up to 50,000 Mulchatna caribou also began using this area at about the same time. As both herds intermingled near Naknek and King Salmon, winter hunting pressure along the road system grew rapidly, and it became impossible to apportion the reported harvest between the 2 herds. Given this change in winter distribution of both herds and the increasing competition for winter forage, by the late 1980s it was decided that the NAPCH should be maintained at the lower end of the management objective (i.e., 15,000). During 1992–93 and 1993–94, harvests along the King Salmon road and trail system peaked, and many local residents complained about problems (wounded animals, gut piles, etc.) associated with a multiple bag limit hunt on the road system. Despite these problems, we viewed the large harvests as beneficial to reduce the NAPCH herd to 15,000 and to utilize the Mulchatna animals in the area. During 1993–94, the record harvest of 1345 caribou and natural mortality estimated at >30% combined to reduce the NAPCH to 12,500 by June 1994. The herd continued to decline through 2001.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Based on the history of this herd and the long-term objective of trying to maintain the NAPCH at a relatively stable level, we recommend reducing the midsummer population objective of 15,000–20,000 caribou to 12,000–15,000 with an October sex ratio of at least 25 bulls: 100 cows.

METHODS

POPULATION SIZE

In late June 2000 and 2001 we used an R-22 helicopter and fixed-winged aircraft to conduct radiotelemetry-aided aerial photocensuses on postcalving concentrations. We took oblique 35mm photos of large groups to allow accurate enumeration. In addition, the Fish and Wildlife Service (FWS) surveyed peripheral areas along the Aleutian Mountains and Pacific coast. We determined the percent calves by direct enumeration or close-up photos of larger herds. We weighted the results by herd size to estimate total productivity.

POPULATION COMPOSITION

We conducted sex and age composition surveys with a helicopter in October and classified caribou throughout their entire distribution between the Naknek River and Port Moller. Caribou were classified as calves, cows, small bulls, medium bulls, and large bulls.

Parturition Surveys

During late May–early June, we used a helicopter to classify caribou on the calving grounds as parturient cow (with calf, hard antlers or distended utter), nonparturient cow, yearling, or bull (Whitten 1995). We also observed radiocollared females to document their age-specific pregnancy rate.

RADIOTELEMETRY DATA

We scheduled capture operations in cooperation with the FWS to maintain 25–30 functioning radio collars in the NAPCH. In April 1997 we used an R-22 helicopter to dart 14 female calves and 4 female yearlings. In October 1999 we captured 11 female calves (10 were fitted with standard radio collars) and 1 adult female (fitted with a satellite collar). In April 2001 we put standard collars on 22 female calves and 1 female yearling. In July 2001 we fitted 6 adult females with satellite collars and 1 yearling female with a standard VHF collar. In October 2002 we put satellite collars on 6 adult females captured between the Naknek and King Salmon Rivers to monitor potential intermingling with the Mulchatna herd. We recorded standardized measurements, took blood samples, and radiocollared the calves. We periodically conducted radiotelemetry flights to monitor herd movement and survival rates of collared caribou.

MORTALITY

The harvest was monitored by state Tier II and federal subsistence permits beginning in 1999. Survival rates of radiocollared females were estimated with the Kaplan-Meier method (Pollock et al. 1989)

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Minimum counts from photocensuses during 1981–1993 ranged between 15,000 and 19,000 caribou. Annual variations in counts were caused by actual changes in herd size and/or sampling error (restricted coverage due to poor weather or errors in visual estimates). Because of concerns regarding winter range quality, in the late 1980s we decided to keep the herd at the lower end of the management objective. The actual postcalving count dropped from a minimum of 16,500 in 1992 to 15,000 in 1993. The 1994 postcalving count, which involved extended coverage of fringe areas, only tallied 12,000 caribou. The herd began a decline in 1992, although at first the decline was not viewed with alarm because the herd was at the desired level. We anticipated that harvest pressure would decline due to liberalized regulations for the growing Mulchatna herd and closure of the King Salmon Air Force Base. Despite a series of hunting restrictions implemented starting in 1994, which significantly reduce harvests, the herd has continued a gradual decline through 2001 (Table 1). Similar counts in 2001 and 2002 suggest the heard may have “bottomed out.”

Population Size

Over the past 14 years, the size of the NAPCH has been reported in 2 ways: the actual number of caribou counted during the postcalving photocensus, rounded to the nearest 100, and an estimated total herd size which included 1000 to 1500 "uncounted" caribou believed to be in fringe areas. Since 1995, staff members of the Alaska Peninsula/Becharof Refuge have covered portions of the Aleutian Mountains and Pacific drainages. This area had not been counted since the early 1980s, so counts after 1995 represent a more complete "minimum count" than obtained from photocensuses in previous years. The same cooperative counts were conducted during 1999–2002, with total estimates of 8,600, 7,200, 6,300, and 6,660, respectively (Table 1).

Population Composition

During 1970–80, when the NAPCH was growing, the average fall ratio was 50 calves:100 cows (range = 45–56). During 1981–94, the fall ratio varied from 27 to 52 calves:100 cows and averaged 39. During 1995–98 the ratio averaged 30 (range = 24–38) calves:100 cows. During 1999 and 2000 we only counted 21 and 18 calves:100 cows, but slight improvement was noted in 2001 and 2002 (Table 1). Higher productivity in 2001 may have resulted from the extremely mild weather and lack of persistent snow during the previous winter.

From 1990 to 1997, the bull:cow ratio averaged 42:100 (range 34–38); but the ratio dropped to an average of 36 bulls:100 cows during 1998–2000 (Table 1). Reductions in harvest under the Tier II permit hunt may have resulted in higher bull:cow ratios observed during 2001 and 2002.

Distribution and Movements

The NAPCH's primary calving grounds are in the Bering Sea flats between the Cinder and Bear Rivers. Traditionally, this herd wintered between the Ugashik and Naknek Rivers. Beginning in 1986 many caribou wintered between the Naknek River and the Alagnak River. They even went as far north as Big Mountain and upper Kaskanak Creek on both sides of Lake Iliamna, where they have intermingled with a portion of the Mulchatna herd. During the 1999–2000 winter, a substantial number of the NAPCH wintered north of the Naknek River, but few Mulchatna animals moved into the Naknek drainage. No radiocollared NAPCH animals wintered north of the Naknek River during the winters of 2000–01, 2001–02, or 2002–03.

MORTALITY

Harvest

Season and Bag Limits. Since the Tier II permit hunt was instituted in 1999 the bag limit has been 1 bull. The season has been 10 August to 20 September and 15 November to 28 February in 9C, excluding the Alagnak River drainage. In Unit 9 the season ran from 10 August to 30 September and 1 November to 15 April.

Board of Game Actions and Emergency Orders. During the 2001–02 winter, virtually all the NAPCH animals remained south of the Naknek River while up to 6,000 Mulchatna caribou moved into the Naknek drainage. Given the availability of these Mulchatna caribou with very little risk to the NAPCH, the Board of Game responded favorably to a petition from several local villages and opened an emergency season for all Alaskan residents for up to 3 caribou north of the Naknek River from 19–31 March. Approximately 70 Mulchatna caribou were taken during this special hunt.

Hunter Harvest. The Board of Game authorized up to 1,500 Tier II permits, and the Federal Subsistence Board authorized an additional 10%. The state issued 600, 400, 400, and 361 permits during 1999, 2000, 2001 and 2002, respectively. Four hundred permits were available for the 2002 season, but a change in the application and scoring system may have caused some local residents to not apply, resulting in an under subscription of permits. Harvests from state hunts during 1997–2001 regulatory years are presented in Table 2. Data from federal subsistence hunt RC009 is available only from 1999 and 2000, and appears to be incomplete. Ten bulls were reported for each of these years.

Hunter Residency and Success. Under the Tier II hunts during 1999–2001, an average of 66% of those that reported hunting were successful, and local hunters took over 95% of the reported harvest (Table 3).

Harvest Chronology. September has historically been the most important month, especially for nonresidents, because of the combination of reasonably good weather, the best chance to harvest a trophy bull, and comparatively easy access by boat and aircraft. The subsistence harvest has been primarily opportunistic, and chronology of harvests varies between villages depending upon caribou availability.

Under the Tier II permit hunt, harvests are more spread-out, with early fall and late winter accounting for most of the harvest. (Table 4).

Transportation Methods. Prior to 1999 airplanes were the most important method of transportation reported from harvest tickets, but under the Tier II most hunters used 4-wheelers or snowmachines (Table 5). The level of snowmachine use varies annually depending on snow conditions.

Other Mortality

The radio collars placed on the NAPCH cows were designed to facilitate annual postcalving photocensuses, so mortality censors were not used in some transmitters. Telemetry flights were sporadic. These 2 factors preclude precise dating of natural mortalities or determining the cause of death. There appears to be a higher rate of natural mortality of adult females in recent years. From October 1980 through March 1984, the average annual mortality rate was approximately 7%. During the next 4 years the annual mortality rate averaged 18%. Annual mortality rates, using modified Kaplan–Meier procedures, from 1992 to 1998 were 29%, 35%, 20%, 19%, 20%, and 24%, respectively. In October 1998, 19 calves and 2 yearlings were collared throughout the range of the NAPCH, and by June 1999 71% were dead. Because radio collars were not retrieved until June 1999, evidence of the cause of death was scant, but most deaths from the NAPCH were on winter range, ruling out bear predation in most cases. Evidence of wolf activity was present at several carcasses, but we could not confirm whether predation or merely scavenging occurred. Seven of 8 (87%) calves collared in October 1999 died during the following year. Only 2 of 9 (22%) collared caribou older than calves died during the same period.

We reported the results of a calf mortality study conducted during June 1998 in Sellers et al. 1998*a*. During the first month of life, 35% of radiocollared calves (n = 37) died. Predators, primarily brown bears (*Ursus arctos*), bald eagles (*Haliaeetus leucocephalus*), and wolves (*Canis lupus*) caused most of the mortality of calves <2 weeks old, but disease apparently was an important mortality factor in calves >3 weeks old.

Habitat and Animal Condition

Little quantitative data are available to assess range conditions. Visual assessment of winter range condition based on the abundance of lichens in the early 1980s clearly noted a difference between the traditional range south of the Naknek River and areas between the Naknek River and Lake Iliamna. This difference was confirmed in a reconnaissance survey comparing lichen abundance in several areas on the traditional range with areas close to the King Salmon-Naknek road that still receives minimal use by caribou (R. Squibb, FWS, King Salmon pers commun).

Based on our preliminary analysis of data (i.e., weights and body size) from the caribou translocated in 1988 and from animals captured in April 1990, 1992, 1994, NAPCH adult females are intermediate in body size and condition between the Southern Alaska Peninsula herd (SAPCH) and Mulchatna herd animals (Pitcher et al. 1990). Progeny of the translocated caribou on the Nushagak Peninsula are larger than animals from the parent NAPCH (ADF&G unpublished data and Hinks and VanDeale 1994).

Weights of neonate calves captured in 1998 and 1999 averaged 8.4 for males and 7.2 kg for females. These weights are intermediate compared to other herds in the state.

During 1995–98 we captured female calves and collected female calves every October to further assess body condition, looking for differences over time and to make comparisons with other herds. Weights and percent bone marrow fat of female calves collected in October are also intermediate, but a high percentage of these caribou showed lesions from lungworms. In October 1999, 11 captured female calves weighted an average of 114.2 pounds. Female calves captured in 2001 averaged 120.3 pounds, and were significantly heavier than those captured in 1997 ($\bar{x}$ = 106.4, $P < 0.001$) or 1995 ($\bar{x}$ = 108.4, $P < 0.001$). The extremely mild and snow-free winter of 2000–01 may have influenced spring calf weights more than improved forage conditions.

Age-specific productivity has also been monitored since 1997. This work has been reported by Valkenburg et al. (1996) and Sellers et al. (1998*a*, 1998*b*, 1999 and 2000). Overall, this work demonstrates that the NAPCH is under moderate nutritional stress. No 2-year-old females have produced calves (n = 32) and only 33% of 3-year-olds (n = 18) have been pregnant. Overall pregnancy rates are relatively low at less than 80%.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

A panel of caribou biologists chose this herd for experimental management because the NAPCH has been relatively stable for the past 30 years at a moderately high density and because of its importance to a variety of hunters. The panel proposed maintaining the population at 15,000–20,000 indefinitely and closely monitoring the herd, including population composition, distribution, and animal condition.

Recent advances in monitoring the condition of caribou herds (P. Valkenburg, memo dated 4 January 1995) include collecting or radiocollaring only female calves. The rationale for handling female calves is that they better reflect range quality and weather stress because their body condition is more sensitive and is not influenced by maternal status as are adult cows. Additionally, collared female calves will provide data on age at first parturition, which has proven to be a good indicator of nutritional status. In conjunction with determining the age of first reproduction for radiocollared calves, parturition surveys conducted just before peak calving provide a measure of natality rate (K. R. Whitten, memo dated 3 January 1995). These procedures were implemented for the NAPCH in 1995 and will be followed in the future.

During routine postcalving counts in 1995 and 1996, several recently dead calves were located and necropsied. Pneumonia, as evidenced by purulent abscesses in the lungs, was the apparent cause of death and was confirmed as bacterial bronchopneumonia by a diagnostic lab (R. Zarnke, pers commun). When we collected calves in October 1995–98, most calves exhibited numerous small pinhead hemorrhagic spots on the lungs. A veterinary pathology lab identified these as consistent with lungworm-induced pneumonia.

Given the potential for marginal nutrition and possible linkage to disease, it will be important to monitor the condition of NAPCH animals. Any indication of declining productivity should be detected immediately.

A few encouraging signs of improved nutrition were noted in 2001 and 2002, including improved survival rates, higher body weights of calves captured in April 2001, higher calf:cow ratios, and renewed fidelity to traditional winter range. Additionally, post-calving counts in 2002 showed a slight increase over the previous year for the first time in 10 years.

CONCLUSIONS AND RECOMMENDATIONS

The decline of the NAPCH may have reached bottom in 2001, and monitoring efforts should continue to verify whether body condition, productivity and survival are improving. The NAPCH has been designated a population important for high levels of human consumption, and under the state's Intensive Management law, a review of intensive management options was triggered in March 1999 when the Board of Game significantly reduced harvest under a Tier II permit hunt. This review occurred in October of 1999. A new long-term population objective of 12,000 to 15,000 animals has been recommended to the Board of Game. The number of Tier II permits was reduced from 600 in 1999 to 400 in 2000–2002, although only 361 people applied in 2002. If the 2003 post calving count verifies that the herd is no longer declining, the number of permits should be increased to at least 600 for 2003.

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Table 1 NAP caribou fall composition counts and estimated population size, 1970–2002

Year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% of bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size
1970	48	46	23							
1975	33	45	25							10,340
1978	48	55	25							
1980	53	56	27							
1981	34	39	23							
1982	43	52	26					22	1,392	18,000
1983	39	27	16		51	25	24	24	1,410	19,000
1984	39	39	22		67	16	17	22	1,087	20,000
1986	51	34	18	54				27	2,540	17,000
1987	54	51	25	49	51	32	17	26	1,536	17,000
1988	49	48	26	51	46	34	20	25	1,156	20,000
1990	41	29	17	59				24	1,484	17,000
1991	42	47	25	53	54	34	12	22	1,639	17,000
1992	40	44	24	54	44	38	19	22	2,766	17,500
1993	44	39	21	55	52	29	19	24	3,021	16,000
1994	34	34	20	59	58	28	14	20	1,857	12,500
1995	41	24	15	60	49	29	22	25	2,907	12,000
1996	48	38	19	54	71	19	10	26	2,572	12,000
1997	47	27	16	57	54	31	14	27	1,064	10,000
1998	31	30	19	62	57	28	15	19	1,342	9,200
1999	40	21	13	62	58	30	12	25	2,567	8,600
2000	38	18	12	64	59	24	17	24	1,083	7,200
2001	49	28	16	57	61	24	15	28	2,392	6,300
2002	46	24	14	59	57	19	24	27	1,007	6,600

Table 2 NAPCH harvest, regulatory years 1997–2001

Regulatory YEAR	Hunter harvest: Reported M (%) TOTAL[A]	F (%)	UNK.	TOTAL	Estimated UNREPORTED	Estimated
1997–98	446 (92%)	36 (8%)	0	482	900–1,000	1,300-1,400
1998–99	453 (94%)	31 (6%)	6	490	500	1,000
1999–00	147 (95%)	8 (5%)	0	155	45	200
2000–01	76 (93%)	6 (7%)	0	82	30	112
2001–02	87 (93%)	7 (7%)	0	94	30	124

[a] Estimated total is rounded off.

Table 3 NAP caribou annual hunter residency and success, regulatory years 1997–2001

Regulatory year	Successful: Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Unsuccessful: Local resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
1997–98	49	112	277	438 (78%)	14	57	56	127 (22%)	565
1998–99	145	136	140	421 (68%)	53	75	66	194 (32%)	624
1999–00	151	5	0	156 (68%)	72	3	0	75 (32%)	231
2000–01	80	2	0	82 (60%)	48	6	0	54 (40%)	136
2001–02	86	8	0	92 (69%)	41	1	0	42 (31%)	134

[a] Local residents are residents of Subunits 9A, 9B, 9C and 9E.

Table 4 NAP caribou annual harvest chronology percent by month, regulatory years 1997–2001

Regulatory year	Harvest periods									
	August	September	October	November	December	January	February	March	April	*n*
1997–98	11	50	23	1	5	4	4	2	0	454
1998–99	16	31	12	6	8	8	8	6	1	490
1999–00	14	23	0	8	13	19	16	6	0	124
2000–01	14	22	1	5	4	9	18	8	18	77
2001–02	14	12	0	8	7	6	19	11	24	85

Table 5 NAP caribou harvest percent by transport method, 1997–2001

Regulatory year	Percent of harvest						
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle
1997–98	53	0	21	15	4	2	5
1998–99	33	0	21	25	10	1	9
1999–00	3	0	15	52	19	2	10
2000–01	5	0	27	44	19	1	4
2001–02	1	0	18	42	25	6	8

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 9D (3,325 mi^2)

HERD: Southern Alaska Peninsula

GEOGRAPHIC DESCRIPTION: Southern Alaska Peninsula

BACKGROUND

The range of the Southern Alaska Peninsula caribou herd (SAPCH) extends from Port Moller to False Pass. Even though there have been numerous reports of caribou moving between Unimak Island and the mainland, including what may have been a substantial emigration in 1976, caribou on Unimak Island have been determined to be genetically isolated enough with fidelity to calving areas on the Island to be designated a separate herd. Historically, the size of the SAPCH has varied widely, ranging from 500 to over 10,000. Skoog (1968) speculated that the Alaska Peninsula was marginal habitat for sustaining large caribou populations because severe icing conditions and ash from frequent volcanic activity affect food supply and availability. Recent herd history includes growth from 1975 to 1983 and decline from 1983 to 1996.

Harvest of the SAPCH was fairly high from 1980–1985, probably exceeding 1000 in several years. Starting in 1986 restrictive regulations reduced harvests as the herd continued to decline. By 1993 the herd was below 2500 and all hunting was closed. Poor nutrition appears to have played a major role in the decline of the SAPCH. Predation by wolves and brown bears and human harvest may also have contributed to the decline (Pitcher et al. 1990). A survey by Izembek National Wildlife Refuge (INWR) staff early in 1997 showed a substantial increase in numbers, and a federal subsistence season was opened that fall. The herd continued to grow slowly, and in 1999 a general state hunt was opened.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

A cooperative, interagency (the Department and the U.S. Fish and Wildlife Service [FWS]) management plan was adopted in April 1994. This plan sets the following population and management objectives:

1 Sustain a total population of 4000–5000 animals

2 Maintain a fall bull:cow ratio of 20–40:100

3 Discontinue harvest when the herd is below 2500 animals

4 Provide limited harvest of bulls when the herd exceeds 2500 animals as long as there are at least 20 bulls:100 cows

5 Phase in cow harvests when the population reaches 3500. If the population reaches 4000, harvests will be increased to prevent further growth.

METHODS

In most years since 1984, we conducted a postcalving aerial radiotelemetry survey in late June or early July. We conduct fall sex and age composition surveys with a helicopter in October. Occasional radiotracking flights are used to monitor herd distribution. Staff of INWR periodically conduct winter aerial counts along systematic transects. A study of causes of low calf recruitment in the SAPCH was completed during 1989–1990 (Pitcher et al. 1990), and range conditions were studied in 1991 and 1992 (Post and Klein 1999). We began parturition surveys in June 1997. In April 1997 and October 1998, in cooperative projects with the FWS, we captured and radiocollared females calves. In October 1998 we also captured 8 adult females in northeastern 9D and fitted them with satellite radio collars. During 1999, with substantial funding from the FWS, we conducted a study of caribou productivity and calf survival (Sellers et al. 1999).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of over 10,000 caribou in 1983, the SAPCH began a precipitous decline. By 1993 the herd was below the 2500 threshold for which a cooperative ADF&G/FWS management plan specified all hunting was to be closed. The population appeared to stabilize during the mid 1990s, and then began to grow slowly.

Population Size

In February 1998 the FWS counted 3127 caribou within the core area in Unit 9D. No postcalving count was attempted in summer 1998. During 26–29 June 1999 I completed an expanded postcalving photo count of the SAPCH and counted 3612 caribou in Unit 9D. During 27–28 June 2000, I only counted 2,857 caribou despite locating all the functioning radio collars. A partial survey by FWS in February 2002 only counted 1700 caribou, but a more complete FWS survey in November 2003 counted over 3900.

Population Composition

Calves comprised 26% and 24% of all caribou seen during the 1999 and 2000 postcalving counts, respectively. In June 2000, calves comprised 28% of caribou seen on the Caribou River Flats (n = 1077) and 22% of 1780 caribou found elsewhere.

Fall composition surveys in 2000, 2001 and 2002 showed a decline in calf:cow ratios and except for 2001, a decline in bull:cow ratios (Table 1).

Distribution and Movements

Data from radiotracking surveys conducted by staff from both INWR and the department indicate that the SAPCH calves were in 2 main subgroups in separate areas (Pitcher et al. 1990). Approximately 25% of the herd calves on the CRF. Many of these animals are relatively sedentary and remain in the area throughout winter. However, some have been located during the winter near Cold Bay. The remainder of the herd calves in the BHTM area and winters around Cold Bay. Further radiotelemetry studies will be needed to clarify the discreteness of the 2 major calving components of this population. Additionally, a few caribou calve in the mountains east of the CRF.

Since the early 1980s, caribou in Unit 9D have been presumed to be part of the SAPCH, and all caribou in Unit 9E have been counted as part of the Northern Alaska Peninsula caribou herd (NAPCH). During recent deliberations over whether a special federal subsistence hunt should be granted, local residents were skeptical about the fate of the SAPCH. Two general opinions, not withstanding the obvious contradiction, were voiced about why both our postcalving counts and the INWR winter surveys show a steady decline. Some members of the public contended that the herd had not declined at all and that the caribou were now using numerous valleys on the Pacific side of the Peninsula. The distribution of radiocollared cows does not support that claim. Conversely, other local residents claimed that the "missing" caribou simply migrated north into the range of the NAPCH. This theory does not explain how the NAPCH could have absorbed a significant number of SAPCH animals during a period when the NAPCH was declining. No radiocollared SAPCH animals have been located north of Unit 9D, but empirical evidence of this distinction has been scant because of the difficulty in collaring and following caribou in this remote part of the Alaska Peninsula.

In October 1998, 6 caribou in the extreme southeastern corner of Unit 9E and 8 caribou in the northeastern portion of Unit 9D were fitted with satellite collars to further investigate whether interchange between herds occurred in this area. As of June 2002, none of these caribou has moved from the unit where captured. Genetic testing for interbreeding among caribou in 9E, 9D, and Unimak Island also confirms relatively little genetic interchange between these herds. Exchange of caribou between Unimak Island and the mainland has not been documented in recent years.

MORTALITY

Harvest

Season and Bag Limits. There was no state hunt in Unit 9D or Unimak Island during 1993–98. In 1999 a state hunt was resumed in 9D with a resident season from 1–20 September and 15 November–31 March, with a 1 caribou limit. A registration permit hunt was set for nonresident during 10–25 September, with a quota of 50 bulls. The 2000 fall season was expanded until 25 September for residents, and a general season was established for nonresidents from 10–30 September. In 2001, fall seasons were again lengthened for residents (10 August–30 September) and nonresidents (1–30 September). The bag limit since 1999 has been 1 caribou for residents and 1 bull for nonresidents.

Board of Game Actions and Emergency Orders. See preceding section.

Federal Subsistence Board Actions.

Following the Board of Game's action in March 1999 to establish a general resident state season, the Federal Subsistence Board dropped the federal subsistence hunt in 9D and later opened federal lands to nonlocal hunters. However, in 2000, another federal registration hunt was opened with a longer fall season (1August–25 September).

Hunter Harvest.

The reported harvests for state hunts is presented in Table 1.

A federal subsistence registration permit hunt (RC091) was established in 1997 with a bag limit of 1 bull. This season has continued since then, except in 1999 when it was suspended because of the open state hunt. Harvests under this federal hunt were 25 in 1997, 20 in 1998, and 14 for 2000, although the reporting rate averaged only 56%.

Hunter Residency and Success. Nonresident hunters have averaged 89% success but have only accounted for 25% of the reported harvest (Table 3). The harvest by local residents is undoubtedly under reported in Table 3 both because of non-compliance with state harvest tickets and use of federal permits.

Harvest Chronology. Timing of the harvest (Table 4) is influenced primarily by season dates and availability of caribou on the Cold Bay road system.

Transportation Methods. The vast majority of nonresident hunters used aircraft, while local hunters used a combination of boats, 4-wheelers or highway vehicles (Table 5).

Other Mortality

During June–August 1999, 66% of 49 radiocollared calves died of natural causes (Sellers et al. 1999). Wolves (*Canis lupus*) and brown bears (*Ursus arctos*) killed most of the calves for which the cause of death was determined. Annual survival rates beginning in June for 1999 were 0.83 and 2000 were 0.76. Too few radiocollared caribou remained on the air during 2001 to calculate a meaningful survival rate.

HABITAT

Assessment

The pregnancy rate in 2000 for cows ≥2 years old was 74% (n = 341), and none of the radiocollared 2-year-old cows (n = 5) were pregnant. Combining parturition surveys in 2000 and 2001, only 55% of 3-year-old collared cows (n = 11) were pregnant.

CONCLUSIONS AND RECOMMENDATIONS

The rapid decline of the SAPCH was neither unusual in terms of the history of this herd nor was it inexplicable. The range of the SAPCH has probably never been exceptionally good, and the period of record high numbers of caribou during the late 1970s and early 1980s undoubtedly depleted the preferred forage species. Nutritional stress was manifested in poor body condition of caribou, resulting in low reproduction and survival. Given adult female mortality rates averaging 25% per year and fall ratios averaging about 20 calves:100 cows, the herd could not possibly have sustained itself.

Based on evidence of improved body condition, higher productivity, and better survival rates of radiocollared females, the SAPCH began a period of recovery during the late 1990s. However, high mortality of neonatal calves documented in 1999 and reduced calf:cow ratios during 2000–2002 indicate herd growth may be somewhat sporadic. Past experience of overpopulation indicates that management actions should ensure that this herd does not exceed 5000 animals; and now that the herd is approaching the lower end of the management objective (4000), harvests should be increased modestly. It appears the federal subsistence bag limit will be increased to 2 caribou for 2003. The effects of this liberalization and herd performance should be monitored carefully.

Close cooperation between the department and the INWR staff is essential for effective management and research. Expanded survey and research efforts made possible from recent cooperative projects have provided essential information on the current condition of this herd. Genetic testing should be used to evaluate the distinctness of the NAPCH, SAPCH, and Unimak Island herds. Following the protocol for caribou management, we recommend that future collaring efforts be directed at female calves, and that a collaring effort be planned for April 2004. Given the high incidence of lungworm detected in 1995–98 in the NAPCH, it might be worth collecting 10 calves during fall composition surveys in 2003.

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Table 1 Southern Alaska Peninsula caribou composition and survey results, 1983–2001

Regulatory year	% Calves		Fall composition							Postcalving survey results	INWR[a] counts
	Summer	Fall	Bulls: 100 cows	Calves: 100 cows	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	sample size		
1983		15[a]									10,203
1984	17[a]	15[a]									7,500
1985	6[a]	9[a]									4,044
1986	17	13	32	20	66	59	28	13	2,307		4,543
1987	12	16	36	26	62	54	25	21	1,769	4,067	6,401
1988	16	12	41	19	59	61	37	4	886	3,407	
1989	17	5							1,718[b]	3,386	3,957
1990	14	9	19	12	76				1,051	3,375	
1991	18	13	28	19	68	53	33	14	883	2,287	2,830
1992	15	15	22	22	70	46	32	21	746	2,380	
1993	16	16	30	24	65	59	24	17	745	1,495	1,929
1994	21	18	29	28	64	46	27	27	531	2,137	1,806
1995	11									1,434	
1996	10										1,403
1997	15	12	42	19	62	36	36	27	546	1,844	3,243
1998		21	32	35	60	42	23	36	987		3,127
1999	26	15	51	25	57	48	30	22	1,049	3,612	
2000	24	21	42	37	56	50	24	26	982		
2001		19	57	38	51	57	26	17	1,313		
2002		10	38	16	65	44	34	23	932		

[a] Counts by Izembek National Wildlife Refuge staff [b] Count from Super Cub

Table 2 SAP CARIBOU harvest, regulatory years 1999–2001

Regulatory Year	Hunter harvest: Reported M (%)	Reported F (%)	Reported Unk.	Reported Total	Estimated Unreported	Estimated Total[a]
1999–00	46 (85%)	7 (13%)	1	54	30	84
2000–01	49 (93%)	2 (4%)	2	53	30	83
2001–02	45 (92%)	4 (8%)	0	49	30	79

[a] Estimated total is rounded off.

Table 3 SAP CARIBOU annual hunter residency and success, regulatory years 1999–2001

Regulatory year	Successful: Local[a] resident	Successful: Nonlocal resident	Successful: Nonresident	Successful: Total (%)	Unsuccessful: Local resident	Unsuccessful: Nonlocal resident	Unsuccessful: Nonresident	Unsuccessful: Total (%)	Total hunters
1999–00	27	19	7	54 (77%)	8	6	2	16 (23%)	70
2000–01	20	10	21	53 (79%)	5	8	1	14 (21%)	67
2001–02	22	13	12	49 (71%)	10	2	2	20 (29%)	69

[a] Local residents are residents of Subunit 9D.

Table 4 SAP caribou annual harvest chronology percent by month, regulatory years 1999–2001

Regulatory year	Harvest periods								*n*
	August	September	October	November	December	January	February	March	
1999–00	0	46	2	17	19	7	2	7	54
2000–01	2	60	0	16	4	16	2	0	50
2001–02	4	43	2	11	13	23	4	0	47

Table 5 SAP caribou harvest percent by transport method, regulatory years 1999–2001

Regulatory year	Percent of harvest						
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle
1999–00	20	0	17	22	0	2	37
2000–01	36	0	17	13	0	9	25
2001–02	27	0	18	29	0	4	22

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 10 (Unimak Island) (6,435 mi^2)

HERD: Unimak Island

GEOGRAPHIC DESCRIPTION: Unimak Island

BACKGROUND

There have been numerous reports of caribou moving between Unimak Island and the mainland, including what may have been a substantial emigration in 1976. Based on this interchange, caribou on Unimak Island were considered a segment of the Southern Alaska Peninsula caribou herd. But fidelity to calving grounds on the island and recent evidence from genetic sampling show that there is enough distinction between caribou on the island and mainland to classify these as 2 different herds. Numbers of caribou on Unimak Island have varied substantially, ranging from 5000 in 1975 to 300 during the 1980s. Emergency Orders closed both state and federal hunts on Unimak Island in 1993. The federal subsistence season reopened in 2000 and the state general season reopened in 2001.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

No formal management objectives are in place for caribou on Unimak Island, and practically speaking there is little opportunity to actively manage this herd given the formidable logistics involved in reaching the island that will keep hunting effort extremely low. Given this problem and the relatively limited habitat, the herd ideally should be kept at 1000 to 1500 animals.

METHODS

We periodically conduct fall sex and age composition surveys with a helicopter in October. Occasional radiotracking flights are used to monitor herd distribution. Staff of the Izembek National Wildlife Refuge (INWR) periodically conduct winter aerial counts along systematic transects.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of over 5000 caribou in 1975, the Unimak herd began a precipitous decline, apparently initiated by a sizable emigration. By the early 1980s the herd numbered in the just several hundred animals. By 1997 the herd had grown to at least 600, and has continued to grow through 2002.

Population Size

On January 17, 1997 the FWS counted 603 caribou on Unimak Island. This has been the only comprehensive survey of Unimak Island in over 2 decades. On May 22, 2000 Rod Schuh, a registered guide who has hunter on Unimak for several years, counted 983 caribou on the north and west sides of Unimak Island. That count and the number classified during the October 2000 fall composition surveys suggest that there are over 1000 caribou on Unimak.

Population Composition

Fall composition surveys in 1999 showed a ratio of 46 claves:100 cows on Unimak, but only 126 caribou were classified. In 2000, 406 caribou were classified and ratios were 40 bulls and 21 claves per 100 cows. Large bulls made up 33% of all bulls. In 2002, 392 caribou were classified with ratios of 54 bulls and 31 calves per 100 cows. Large bulls made up 29% of all bulls.

Distribution and Movements

No significant interchange between Unimak Island and the mainland has been documented in recent years.

MORTALITY

Harvest

Season and Bag Limits. There was no state or federal hunt on Unimak Island during 1993–99. In 2000 a federal subsistence hunt was resumed. In 2001 a general state hunt was established with a 1 caribou bag limit and dates of 1 September–30 September for nonresidents and 10 August–30 September and 15 November–31 March for residents.

Board of Game Actions and Emergency Orders. The Board of Game restored the general hunt for 2001.

Federal Subsistence Board Actions. The fall season was extended from 25 September to 30 September for 2002.

Hunter Harvest. The reported harvests from the 2001 general season was 19 bulls and no cows. Of seven nonlocal Alaskans, 5 were successful. All 14 nonresidents were successful. All 19 caribou were killed in September and all hunters used aircraft to access the island.

Other Mortality

Too few caribou were radiocollared to allow calculation of survival rates.

HABITAT

Assessment

No data are available.

CONCLUSIONS AND RECOMMENDATIONS

Caribou on Unimak Island should be considered a separate herd, even though it is recognized that we will be unable to manage this herd to dampen population fluctuations. Hunting regulations should be manipulated to provide for local subsistence uses and to provide quality hunting experiences for other Alaskans and nonresidents.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 12 (3300 mi^2) and adjacent Yukon, Canada (500–1000 mi^2)

HERD: Chisana

GEOGRAPHIC DESCRIPTION: Upper Chisana and White River drainages in the Wrangell–St. Elias National Park and Preserve in southeastern Unit 12 and adjacent Yukon, Canada

BACKGROUND

The Chisana caribou herd (CCH) is a small, nonmigratory herd inhabiting east central Alaska and southwest Yukon, Canada. Skoog (1968) assumed the CCH derived from remnant groups of Fortymile caribou that used the Chisana's range during the late 1920s and early 1930s. Genetic analysis conducted by Zittlau et al. (2000) found that the genetic distance between the CCH and 5 other nearby caribou herds is large, suggesting the herd has been unique for thousands of years and was not formed through emigration from another herd. Their analysis also indicates that the CCH is a woodland caribou herd, the only one in Alaska.

Little is known about population trends before the 1960s. Scott et al. (1950) estimated herd size at 50 animals in 1949 but Skoog (1968) thought his estimate was low due to sampling problems. Skoog (1968) estimated the CCH at 3000 animals in 1964. By the mid-to-late 1970s, the herd declined to an estimated 1000 caribou. Similar declining trends were reported in other Interior caribou herds. During the 1980s, environmental conditions were favorable, and the herd increased to about 1900 caribou by 1988.

Since 1988 the herd has steadily declined. Weather and predation have been the primary causes for the decline. Harvest has had a minor effect on population fluctuations. Between 1979 and 1994 the bag limit was 1 bull caribou, and harvest was limited to 1–2% of the population. By 1991 declining bull numbers became a concern, and harvest was reduced through voluntary compliance by guides and local hunters. In 1994 the bull population declined to a level below the management objective and all hunting of Chisana caribou was stopped. Hunting will remain closed until the bull:cow ratio exceeds 30 bulls:100 cows for 2 years and productivity is high enough to compensate for hunter harvest. By fall 2001 the herd numbered 325–350 caribou and adult and calf mortality continued to be high. Modeling

current herd mortality and productivity indicated if these patterns continued the herd would decline to 100–150 caribou (Farnell and Gardner 2002).

During the early 1900s the CCH was used as a food source by residents of the Athabascan villages at Cross Creek and Cooper Creek and by gold seekers. Subsistence use of the herd declined after 1929, once the Gold Rush ended, and declined again after the Cooper Creek village burned in the mid 1950s (Record 1983). People from Northway and Scotty Creek villages hunted the herd through the 1940s but rarely thereafter (unpublished data recorded at the 2001 Northway/White River First Nation Traditional Knowledge Workshop). For at least 60 years, few people in Alaska or Yukon have depended on Chisana caribou for food.

In the Chisana area, guided hunting became common after 1929 and was the primary use of the CCH from the mid-1950s through 1994. Primarily, 5 guide/outfitters hunted the herd; 4 operated in Alaska, and 1 in the Yukon. Use of the area and herd by tourists is minimal.

Before the mid 1980s, the CCH was not a high management priority because of its small size, remoteness, and the light and selective (primarily mature males) hunting pressure it received. In 1980 the Wrangell–St Elias National Park and Preserve was created, and the preserve boundaries encompassed most of the Chisana Herd's range. The Alaska National Interest Lands Conservation Act that created the preserve mandated the National Park Service (NPS) to preserve healthy populations and also to allow for consumptive uses of the herd. Chisana caribou management became more complex because the Alaska Department of Fish and Game (ADF&G) and the NPS have different mandates and approaches to meeting management objectives.

To meet the increasing management needs, we initiated a cooperative study with the NPS and the Yukon Department of Environment (YDE) in October 1987. Initially, 15 adult female caribou were radiocollared to monitor movements and to facilitate spring and fall censuses and composition surveys. Subsequently, from 1990 through 2002, 57 adult females and 33 4-month-old female calves were radiocollared. Radiocollaring and herd monitoring costs are shared between ADF&G, NPS, and YDE.

A cooperative draft CCH Management Plan was developed in 2001 and a Yukon CCH Recovery Plan in 2002. Both plans were designed to aid herd recovery.

MANAGEMENT DIRECTION

During 2000–2002, CCH management and research was cooperatively developed to aid herd recovery. Activities that met the different mandates and philosophies of ADF&G, NPS, and YDE were assigned.

The current Chisana caribou management goal and objective are:

MANAGEMENT GOAL

- Manage the Chisana Herd for the greatest benefit of the herd and its users under the legal mandates of the managing agency and landowners.

MANAGEMENT OBJECTIVE

- Develop a management plan that recommends management and harvest strategies designed to meet the management goal by January 2003.

METHODS

Herd size was estimated in late June 1992, 1993, 1995, 1997, 1999, and 2002. During these surveys we located caribou by visually searching the herd's summer range and by locating radiocollared caribou. We used 1–2 search aircraft (Piper Super Cub and a Bellanca Scout) with a pilot and 1 observer in each. All caribou found were counted by the observation team, and all groups larger than 25 caribou were also photographed using a 35-mm camera. Prints were then enlarged and the caribou were counted with the aid of a magnifying glass. We also estimated population size and trend by using a population model designed by P Valkenburg and D Reed (ADF&G). Sex and age composition, recruitment, and mortality data are the primary components of the model.

Since 1986 we have collected annual fall sex and age composition data between late September and early October. A Bellanca Scout was used to locate most of the herd by radiotracking collared animals. Since 1993 we have used a Robinson-22 helicopter to classify each caribou as either a cow, calf, or bull. Bulls were further classified based on antler size as either small, medium, or large (Eagan 1993). We attempt to classify >90% of the herd each year.

We captured and radiocollared Chisana caribou since 1991 to 1) improve the efficiency of the census and composition surveys; 2) monitor seasonal distribution and movement patterns; 3) determine pregnancy and natality rates and median calving date; 4) evaluate herd condition; 5) estimate annual mortality rates; and 6) obtain blood samples to determine pregnancy rates, herd genetics, and incidence of disease. The number of active collars operating from 2000–2002 was 16–32.

We used several indices to evaluate herd condition and range quality. Since 1993 we have estimated annual herd pregnancy rate by monitoring radiocollared cows during late May and by determining the presence of hard antlers, distended udders, or the presence of a calf (Whitten 1995). In 1994, 1995, 2000, and 2002 we captured 30, 20, 28, and 24 adult cows, respectively, and collected blood to determine pregnancy using a serum progesterone assay testing technique (Russell et al. 1998). We assessed body condition using a subjective measure of body fatness and estimated age by tooth wear. In fall 1998, 1999, and 2000, we captured and radiocollared 3–9 female calves to monitor calf weight, size, and condition, and determine age of first reproduction and movement patterns. In 1993 and 1994 we determined median calving date, which is the date by which 50% of the pregnant radiocollared cows had given birth. We assessed range condition by evaluating the percent lichen versus moss in the herd's winter diet in 1994, 1995, 2000, and 2001.

To assess whether wolf numbers had increased during the Chisana Herd decline we estimated wolf numbers within the CCH range in 2001 using aerial snow-tracking methods (Stephenson 1978). Two experienced teams using 2 Super Cubs searched the area. Wolf trails were

followed until the wolves were observed. If we could not see the wolves, we estimated numbers based on tracks.

Hunting for CCH has not been allowed since 1994. Technically, there is a hunting season, however no permits were issued during 1995–2002. Harvest data since 1989 were included in this report to help explain herd population and composition trends. Hunting seasons are based on a regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY01 = 1 Jul 2001 through 30 Jun 2002).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The CCH increased through the 1980s and reached its peak in 1988 at about 1900 caribou. During 1988 through 2000, herd size declined by an average of 11.8% annually. The rate of decline was 8.6% between 2000 through 2002, and by fall 2002 it was estimated at 315 caribou (Table 1). The initial cause of the herd's decline was severe winter and summer weather that affected productivity and calf and adult survival. Since 1993 low survival of calves to 5-months of age (0–14 calves/100 cows) was probably due to predation based on the timing of calf mortality. Many of the small mountain herds in Interior and Southcentral Alaska and western Yukon experienced low calf survival during the early 1990s. However, none was as low as the CCH.

Population Composition

By May 2000, after 11 years of poor recruitment, the herd was composed of an estimated 71% old-age (teeth worn to gum line) animals (Farnell and Gardner 2002). In contrast, most stable woodland caribou herds in Yukon contain about 50% middle-aged animals (R Farnell, Yukon Department of Environment, unpublished data). Between 1 October 2000 and 1 October 2001, 33% of the radiocollared cows (11/33) died, of which 6 (55%) were ≥10 years old. In 2002 the estimated percentage of old-age cows and middle-aged cows was 29% and 38%, respectively. The higher proportion of younger cows reflects the die-off of the older aged cohorts. Based on the age structure, if recruitment remains poor (≤5/100), herd size will decline to 200–225 caribou during the next 3 years.

The genetic separation between the CCH and other Yukon and Alaska caribou herds indicates that the CCH was distinct from all herds tested including the adjacent Kluane and Mentasta Herds and the Fortymile Herd (Zittlau et al. 2000). Skoog (1968) hypothesized that the CCH was created by emigration from the Fortymile Herd. Zittlau (University of Alberta, unpublished data) also compared the genetic diversity between calves and adults to determine whether or not reduced bull numbers in the herd caused a decline in heterozygosity due to increased inbreeding. The bull:cow ratio in the CCH during 1998–2000 was the lowest of all Alaskan and Yukon herds. This study found that the genetic variation for calves and adult cows was 80.1% and 81.6–82.2%, respectively, indicating that genetic diversity has not been lost.

Since 1990 the calf:cow ratio in the CCH has been 0–14 ($\bar{x}$ = 3.6:100, s = 4.48). We classified calves during 1999–2002 and found that females predominated, ranging between 56–82%. The bull:cow ratio declined during 1990–2000 (Table 1). Modeling demonstrated that the herd's declining bull:cow ratio was primarily a function of low calf recruitment. Bull numbers continued to decline during 2000–2002 but the bull:cow ratio increased because of the large die off of old cows. Most likely, now that the herd's age structure is more balanced, if calf recruitment remains low the bull:cow ratio will cease to grow and eventually decline.

Pregnancy and Natality Rates

Pregnancy rates and number of calves on 31 May (estimated by calf:cow ratio) have been inconsistent since 1993. Annual pregnancy rate had little effect on the number of calves by 31 May. Also, the number of calves alive on 31 May had little effect on the number of calves that were alive by 21 June (Table 2).

Estimated numbers of calves on 31 May were low (<40:100) in 1993, 1996, 1998, 1999, 2000, and 2002. In 1993 a low number of calves was expected because only 50% of the cows were pregnant in March. On 31 May 1993 the calf:cow ratio was 38:100, but declined to 19:100 by 13 June 1993. In 1994 the pregnancy rate increased to about 86%, and on 30 May the estimated calf:cow ratio was 73:100. However, by 17 June 1994, the calf:cow ratio had declined to about 11:100. In 1995 and 1996 pregnancy rates increased to >93%, and calf:cow ratios on 30 May were 52:100 in 1995 but only 38:100 in 1996. By 20 June calf:cow ratios were 7:100 in both years. In 1997 the estimated minimum herd pregnancy rate was 82%. The 30 May calf:cow ratio of 64:100 declined to 14:100 by 1 October. Herd pregnancy rate was not estimated in 1998, but the late May calf:cow ratio was 14:100. We do not know if the low number of calves was due to a reduced pregnancy rate or to high early calf mortality. In 1999 and 2000, pregnancy rates were >92%. Calf:cow ratios in 1999 were 25:100 on 29 May, 9:100 on 26 June, and 7:100 on 1 October. In 2000 the 31 May calf:cow ratio was 29:100 but declined to 6:100 by 1 October. In 2002 the pregnancy rate for cows ≥3-years old was 95–100%, the 31 May calf:cow ratio was 25–29:100, and the percent calves in the herd was 19.8. On 23 June and 30 September, the percent calves in the herd was 10.8% and 9.7%.

During 1990–2002 fall composition data demonstrated that pregnancy and birth rates had no influence on fall calf:cow ratios, indicating late May and June calf mortality is the factor that most influences recruitment (Table 1).

Since 1995 the CCH pregnancy rate for cows ≥3-years old exceeded 90% except during 1997. Based on female calf weights, Chisana caribou were in excellent condition, at least going into the rut. However, no 2-year-olds have been documented pregnant ($\bar{x}$ = 11).

Distribution and Movements

Based on radiotelemetry data collected since 1981, the Chisana Herd's range is relatively small (5100 mi^2) and encompasses the Nutzotin and northern Wrangell Mountains between the Nabesna and Generc Rivers. Seasonal movements are normally short (<50 mi). Between 1991 and 1996, most of the herd wintered in the eastern end of its range in Canada within the spruce forests in the Beaver Creek drainage. In 1992 snowfall was very early (11 Sep) and deep. The herd moved further north and wintered in the forested habitats near Wellesley

Lake. In years of average snow before 1991, most of the herd remained on sedge-grass range primarily in Alaska and used the eastern portion of its range only during deep snow winters. During 1997 most of the herd wintered in Alaska along Beaver Creek and in the Ptarmigan Lake area. In 2000 snowfall was deeper than average (US Department of Agriculture 2000) and the herd wintered in the spruce forest along the White River. In 2001 and 2002, most of the herd wintered between the White and Generc Rivers. Since 1993 over 92–97% of the calving has occurred in Alaska. Since 1995 the herd formed its postcalving aggregations from Ophir Creek west to the Chisana Glacier, however most of the cows that still had a calf at heel in June did not join the postcalving groups but remained sequestered throughout the herd's Alaskan range.

The CCH does not have a core calving area. Instead, Chisana cows sequester themselves throughout the calving period. Calving was limited to higher elevations (4800 and 6600 ft) in 1993 but occurred in spruce to alpine habitats (3400–6600 ft) during 1994–2002. During 1995 and 1996, more cows calved below treeline (30–38%) than in previous years (0–10%); however, they still calved apart. In 1997 and 1998–2002, 25% and <10% of the calving took place below tree line. The largest calving groups observed in 1993 and 1994, after a minimum of 10 days of monitoring, consisted of 3 and 4 cows with calves. Between 1996 and 2002, radiotracking surveys conducted 3–5 days after peak calving found ≤5% of the calving cows in a group of >4 caribou.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 12, that portion east of the Nabesna River and south of the winter trail from the Nabesna River to Pickerel Lake to the Canadian border:		
1 bull; by registration permit only; the season will be closed when 20 bulls have been taken.	1 Sep–20 Sep (General hunt only)	1 Sep–20 Sep

Alaska Board of Game Actions and Emergency Orders. In spring 1993 the Alaska Board of Game created a registration permit hunt for Chisana caribou. To ensure against overharvest, the board stipulated a 5-day report period and a harvest quota of up to 20 bull caribou. The board gave ADF&G the authority to determine the annual quota and to temporarily close areas. Since RY94 the harvest quota has been zero and no permits have been issued. To

reduce confusion to hunters, the season and bag limit description has been listed as no open season in the Alaska Hunting Regulations.

The Yukon Fish and Wildlife Management Board adopted regulations in 1994 that stopped all licensed hunting for Chisana caribou in Yukon, Canada. Hunting by the First Nations was not affected by this action and some harvest occurred (L LaRocque and D Drummond, Haines Junction YDE, personal communication). In 2002 the CCH was designated as a species at risk in Yukon under Specially Protected Wildlife regulation of the Yukon Wildlife Act. This action stopped all legal harvest of Chisana caribou.

Human-induced Mortality. There has been no legal harvest of Chisana caribou in Alaska or by licensed hunters in Yukon since RY94 (Table 3). Reports from local residents and incidences of radiocollared caribou that were shot indicate an illegal harvest in Alaska of 0–3 caribou annually. In Yukon, between 1996 and 1999, First Nation members killed 3–20 Chisana caribou annually along the Alaska Highway. In 2001, Yukon First Nation members voluntarily did not harvest Chisana caribou. Because the herd is inaccessible most of the year in Alaska, illegal or incidental harvest is not a concern. During years the herd winters along the Alaska Highway in the Yukon, illegal harvest could affect herd population trend. The regional biologist and protection officer in Haines Junction, Yukon have almost eliminated illegal harvest through patrols and public education.

Other Mortality

During 1996–2002 the annual mortality rate for radiocollared adult females was 8–33%. Since 1994, causes of death have been determined for 19 radiocollared females; predators killed 17, 1 died in an avalanche, and 1 was illegally shot.

Based on the percent cows in the herd and on herd pregnancy rate, 200–225 calves were born in May 2002. By 30 September, 30–35 calves remained (83–87% reduction). During 1994–2001, 83–95% of the calves died each year by 1 October. Most calf mortality occurred between the end of May and 26 June. Predation was probably the primary cause of death, based on timing of the mortality and on results from caribou calf mortality studies of adjacent herds (Boertje and Gardner 1999, 2000; Valkenburg et al. 1999).

Since 1998, overwinter mortality of calf and yearling females has been 15–25%, which is high compared to the Delta Herd (Valkenburg et al. 2002) but comparable to the mortality rates of older Chisana cows. The second year of the herd's decline, between October 1990 and June 1991, 64% of radiocollared female calves died. Of the 9 collared caribou that died, all were apparently killed by either bears or wolves, based on the evidence of a violent death (blood on collar) and sign at the death site. At least 3 of these deaths can be attributed to wolves based on the timing of death (midwinter).

Wolf predation was the primary cause of calf mortality in the nearby Aishihik Herd, which is a small mountain caribou herd in Canada with behavior similar to the CCH (Hayes et al., in press). Spence (1998) estimated that each wolf killed about 8 calves/summer and that wolves were the primary limiting factor to Aishihik Herd growth. In 2001 there were 10 wolf packs (30–36 wolves, late winter count) that overlapped the CCH's summer range in Alaska. Five of

these packs resided in the area where most of the calving occurs. There are 7 additional packs (37–40 wolves) in Yukon that overlapped the herd's winter range. Wolf numbers were comparable in 2001 to 1987 (Sumanik 1987).

Grizzly bears could also be important predators on calves as the timing of Chisana calf loss coincides with the time period that grizzly predation was high in other calf mortality studies (Adams et al. 1995; Boertje and Gardner 2000). We have observed golden eagles killing Chisana calves but have no measure of frequency. Based on calf mortality studies in Denali National Park (Adams et al. 1995), Unit 20A (Valkenburg et al. 1999), and in eastern Interior Alaska (Boertje and Gardner 1999), golden eagles were effective only during the first few days of the calves' lives and kill fewer calves than wolves or grizzly bears. Based on incidental sightings, coyotes may be important predators when their numbers are high. During 1990–1992 and 1998–2000, coyotes were abundant within the Chisana's range. During those years, there were several reports of coyotes killing caribou calves and Dall sheep lambs (Urban Rahoi, personal communication). However, calf survival has been poor in years when coyote numbers were low indicating that coyotes are not a primary predator.

During the early 1990s the Chisana Herd formed large postcalving aggregations during June and most of the herd would be accounted for in 2–4 groups. After 1992, during the time of rapid herd decline, it was apparent that predators killed many calves as the herd formed these postcalving aggregates. Sightings of wolves and grizzly bears were common during this period in the area the herd traditionally used for postcalving. Since 2000 it appears that most of the cows that still had a calf at heel in late June did not join large groups but remained sequestered away from the main herd.

Using calf mortality data from other small herds in a predictive model, Spence (1998) hypothesized that reducing wolf pack size on the calving grounds would significantly increase calf survival. It may be possible that selective wolf trapping by private citizens could benefit the Chisana Herd if they could reduce the 5 primary packs in the herd's summer range to 2 wolves/pack. Trapping is legal throughout the herd's range under state, federal subsistence, or territorial regulations. During winter 2002–2003, wolf trappers in Yukon have increased their efforts and preliminary reports indicate several packs have been reduced. Little trapper effort has occurred on the calving grounds in Alaska where wolf reduction is most needed.

Summers were warm and slightly dry during 1989–1995, and winters 1991, 1992, 1999, and 2000 were severe in terms of snow depth and late spring snows. Lenart (1997) found that short-term variations in climate would affect nutrient quality in aboveground biomass of caribou forage and possibly adversely affect caribou by increasing insect harassment and decreasing nitrogen content in their forage. A record low number of snow-free days and drought conditions in summer 1992 caused reduced pregnancy rate in 1993 (50%). Similar conditions possibly prevailed in 1991, 1992, and 1998 as pregnancy rates during these years appeared low but were not measured. However, even in years with >90% pregnancy, no additional calves survived until fall. Favorable weather conditions (normal rainfall, low snowfall) persisted during 1995, 1996, 1997, 2001, and 2002. Pregnancy rates were high but calf survival continued to be very low (4–13:100 cows), indicating that predation was the

primary limiting factor. The CCH increased during the 1980s when climate conditions were favorable and predation numbers were comparable to current levels.

The CCH initially declined due to adverse weather and then, predation. Currently, predators are the primary factor causing the herd to decline. Considering the herd's age structure and the high rates of mortality, it is conceivable the CCH could decline to a low enough level that a environmental event could cause extirpation. However, its situation is not unique. Other small herds are in danger of disappearing. The common themes between these areas are the presence of alternate prey and the lack of wolf control or regulation of wolf numbers. It is possible that the primary reason these small herds existed or increased was that wolf control was widely practiced from the 1920s through most of the 1980s. Historically, the Chisana Herd has shown the ability to increase after reaching low numbers, but it will require substantial reductions in predation mortality. Modeling indicates 1–2 good calf cohorts (>25:100 cows) could stabilize the decline and if continued, allow the herd to recover.

Between June 1999 and December 2002, agency representatives from ADF&G, YDE, and NPS and the public met 3 times to discuss CCH management options. In Alaska, one of the most difficult problems is landownership. Most of Chisana Herd's calving range is within Wrangell–St Elias National Park and Preserve. NPS is mandated to manage for healthy animal populations including predators. NPS has interpreted this to mean that predator management is out of the question. However, there are other federal policies that recommend that cooperative management with states and other nations should occur to prevent species from declining to levels that would be considered threatened or endangered under the Endangered Species Act. To ensure Chisana Herd recovery, some management actions to increase calf survival in Alaska must be implemented. Unfortunately, this decision is primarily up to NPS.

Even though most CCH calving occurs in Alaska, because the Chisana Herd is currently listed as a species at risk, YDE will attempt a captive rearing program in spring and summer 2003 to improve calf survival. The plan is to temporarily hold pregnant cow caribou within a 50-acre enclosure on their natural range during April through July or August to protect their calves from predators. Twenty cow caribou will be captured, radiocollared, and placed in the enclosure. Behavior and calving success will be monitored. Calf survival will be compared between captive-reared and free-ranging calves. The first year will test the efficacy of the technique. The project will be expanded to 60–65 cow caribou/year and continue for 3–5 years if it proves to be safe and increases calf survival.

If Yukon's captive rearing program is successful, NPS should consider allowing similar temporary enclosures in Alaska. This would comply with federal policies recommending cooperative management to prevent species from declining to threatened or endangered status.

HABITAT

Assessment

Before the 1990s the most frequently used range in both winter and summer was predominantly grass–sedge habitat with few lichens. During 1991, 1993–1996, and 2000–2002 the herd wintered in timbered habitats along the White River and Beaver Creek drainages in the eastern portion of the herd's range. Fecal samples collected in 1994, 1995, 2000, and 2001 showed a sharp contrast in lichen distribution among the herd's winter ranges. During 1994, in the vicinity of Wellesley Lake, lichen availability was low (21% lichen and 75% moss and evergreen shrub fragments in fecal samples). In the remaining portion of the winter range, lichen availability was moderate to high (50–80% of discerned plant fragments in fecal samples). During 2000 and 2001 most of the herd wintered along the White River. Lichen availability was low (28–32% lichen, 51–55% moss, and 6–11% evergreen in fecal samples). Boertje (1984) found that fecal samples containing high proportions of mosses and evergreen shrubs indicate the range was overgrazed or suboptimal. Nutritionally stressed caribou are presumably more vulnerable to predators, which may explain the higher winter mortality the CCH experiences.

Data collected since 1991 indicate that nutrition of Chisana caribou has been variable. Summer range quality determines body size and body condition in the fall, as well as pregnancy and natality rates. If cow caribou do not reach optimum condition, pregnancy rates decline. Pregnancy rates were very low in 1993 and possibly in 1991, 1992, and 1998. Adverse weather conditions also prevailed during those years. In most years pregnancy rates were high, indicating summer range was adequate except during periods of unfavorable weather. Another indicator of summer range quality is autumn weights of female calves (Valkenburg et al. 2000). During 1998–2000, 19 five-month-old female calves were captured and weighed. Average weights only varied by 7% annually and the overall average weight was 141 pounds indicating excellent nutritional status.

Enhancement

The entire range of the CCH is located in the Wrangell–St Elias National Park and Preserve or within Yukon, Canada. It is currently against NPS policy to conduct wildlife habitat improvement projects. Therefore, no habitat improvement projects are being considered. Habitat enhancement will depend on natural occurrence of wildland fires under terms of the Alaska Interagency Fire Management Plan (US Bureau of Land Management 1984) or on any wildfires that may occur within its range in the Yukon.

CONCLUSIONS AND RECOMMENDATIONS

Since 1988 the CCH declined by 83% from poor calf recruitment and since 1992 from high adult mortality. Since 1990, recruitment averaged <6 calves:100 cows. Causes of low calf numbers are not completely known, but primary factors were low natality rates in 1993 and 1998 and possibly in 1991 and 1992, caused by adverse weather conditions. Predation was also important during 1989 through 2002. Predation was the cause of 89% of the documented mortality among radiocollared cows ≥4-months-old since 1991. Hunting was allowed during the herd's initial decline (1989–1994). Harvest was restricted to bulls and removed about 2%

or less of the population annually. Even this level of harvest slightly accelerated the declining bull:cow ratio. Legal hunting did not limit the herd's ability to grow, but subsistence harvest along the Alaska Highway in Yukon may have had some limiting effect during some years. Winter range quality in the eastern portion of the herd's range is below average compared with other Interior herds and may have contributed to higher overwinter adult mortality during 1994 and 1995. Lichen availability on winter range in Yukon is lower compared to other caribou herds but herd body condition is comparable except following severe winters. For the herd to stabilize, the calf recruitment rate must increase to 25 calves:100 cows while maintaining the cow mortality rate at 12–15% and the bull mortality rate at 21–25%. In order for calf survival to increase, pregnancy and natality rates must remain high and mortality caused by predators must decline.

The low recruitment rates experienced by the CCH over the past 13 years have never been documented in any other wild caribou herd. Sufficient funding to determine pregnancy and natality rates, fall composition counts, and winter range use and mortality should be continued. The YDE has allocated money to purchase radio collars and continue supporting the genetics study. The NPS has allocated money to supply fuel for field projects and conduct 2 radiotracking flights.

When hunting was allowed, the primary users of the Chisana Herd were nonresidents. Since 1990, 43% of the hunters participating in the Chisana caribou hunt were nonresidents who took 58% of the harvest. Local subsistence users harvested 8 (9% of the harvest) caribou during this time. Once the herd recovers and hunting is allowed, harvest regulations should provide for guided nonresidents.

We met our management objective. The Alaska Department of Fish and Game, NPS, and YDE developed a draft Chisana caribou management plan. YDE will begin a captive rearing program in spring 2003 in an attempt to improve calf survival. ADF&G will continue to monitor pregnancy and parturition rates and calf survival, as well as assist with the captive rearing project. NPS has not yet decided on its role in the recovery effort.

Based on management direction that will be implemented in spring 2003, the management objective will be changed for the next reporting period to: Cooperatively, with YDE and NPS, develop and implement management strategies to increase calf recruitment to 25 calves:100 cow by 2005.

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TABLE 1 Chisana caribou fall composition counts and estimated population size, 1987–2002

Date	Bulls: 100 Cows	Calves: 100 Cows	% Calves	% Cows	% Small bulls (% of bulls)	% Medium bulls (% of bulls	% Large bulls (% bulls)	% Bulls	Composition sample size	Estimated herd size[a]
10/9/87	39	28	17	60	53	26	21	23	760	1800
9/27/88	36	31	19	60	28	46	26	21	979	1882
10/16–17/89[b]			9						625	1802
10/4–5/90	36	11	7	68	37	44	19	25	855	1680
9/29/91	40	1	1	71	45	42	13	28	855	1488
9/27/92	31	0	0[c]	76	34	43	23	24	1142	1270
10/5/93	24	2	2	79	30	45	24	19	732	869
9/29/94	27	11	8	72	20	44	35	20	543	803
9/30/95	21	4	4	80	30	23	47	17	542	679
9/30/96	16	5	4	83	40	18	42	13	377	575
10/1/97	24	14	10	72	3	68	28	18	520	541
9/28/98	19	4	3	81	49	14	37	15	231	493
10/1/99	17	7	6	81	57	16	27	14	318	470
9/30/00	20	6	5	80	52	25	23	15	412	425
10/01/01	23	4	3	79	42	23	34	18	356	375
9/30/02	25	13	10	72	28	23	49	18	258	315

[a] Based on population modeling.

[b] Classification accomplished from fixed-wing aircraft rather than from a helicopter.

[c] Only 1 calf was seen in this survey.

TABLE 2 Chisana caribou postcalving composition counts, 1989–2002

Date	% Calves (*n*)	% Adults (*n*)	Composition sample size
6/21/89	10 (160)	90 (1380)	1540
6/20/90	12 (147)	88 (1032)	1179
6/20/91	2 (21)	98 (1264)	1285
6/22/92	1 (10)	99 (1224)	1234
6/24/93	6 (39)	94 (612)	651
6/17/94	8 (37)	92 (449)	486
6/22/95	5 (34)	95 (689)	723
6/20/96	2 (9)	98 (533)	542
7/10/97[a]	8 (13)	92 (153)	166
6/23/02	11 (33)	89 (272)	305

[a] Herd was scattered and composition count results are suspect.

TABLE 3 Chisana caribou harvest and accidental death, regulatory years 1989–1990 through 2002–2003

Regulatory year	Alaska harvest							Yukon harvest		
	Reported				Estimated					
	M	F	Unk	Total	Unreported	Illegal	Total	Reported	Unreported	Total
1989–1990	34	0		34	0	0	0	18	5–20	57–72
1990–1991	34	0	0	34	0	0	0	11	5–20	50–65
1991–1992	21	0	0	21	0	0	0	0	5–20	26–41
1992–1993	16	0	0	16	0	0	0	0	5–20	21–36
1993–1994	19	6	0	19	0	0	0	0	5–20	24–39
1994–1995	0	0	0	0	0	0	0	0	5–20	5–20
1995–1996	0	0	0	0	0	3	7	0	1–3	4–6
1996–1997	0	0	0	0	0	3	3	0	7	10
1997–1998	0	0	0	0	0	3	3	0	3–5	6–8
1998–1999	0	0	0	0	0	3	3	0	20	23
1999–2000	0	0	0	0	0	3	3	0	3–5	6–8
2000–2001	0	0	0	0	0	1	1	0	1–3	2–4
2001–2002	0	0	0	0	0	1	1	0	1–3	2–4
2002–2003	0	0	0	0	0	1	1	0	0	1

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: Portions of Units 12 and 20D (1900 mi^2)

HERD: Macomb

GEOGRAPHIC DESCRIPTION: Eastern Alaska Range between Delta River and Yerrick Creek south of the Alaska Highway

BACKGROUND

Little was known about the Macomb caribou herd (MCH) before 1972 when herd size was estimated at 350–400 and it received little sport harvest (Jennings 1974). Hunting pressure increased in 1972 when restrictions were placed on hunting other road-accessible herds, including the Fortymile, Nelchina, and Mentasta herds.

With increased hunting pressure on the MCH, the bag limit was reduced from 3 to 1 caribou in 1973. The Macomb Plateau Management Area (MPMA) was established in 1974 to prohibit the use of motorized vehicles for hunting from 10 August–20 September, except for floatplanes at Fish Lake. The MPMA included the area south of the Alaska Highway, draining into the south side of the Tanana River between the east bank of the Johnson River upstream to Prospect Creek, and the east bank of Bear Creek (Alaska Highway Milepost 1357.3).

The MCH numbered about 500 during the early 1970s (Larson 1976). By 1975 the MCH numbered 700–800 caribou, but the apparent increase in herd size from 1972 to 1975 was probably because of increased knowledge about the herd rather than an actual increase in the number of caribou. Hunting pressure and harvest continued to increase on the MCH, despite a reduced bag limit and restrictions imposed by the MPMA. In 1975 hunting pressure increased 72% over 1974 levels, and in 1976 there were 70% more hunters than in 1975 (Larson 1977). Despite the larger known herd size, the harvest was equal to or exceeding recruitment.

During the 1977 hunting season, it was necessary to close the season by emergency order (EO) on 8 September. Even with the emergency closure, the reported harvest totaled 93 caribou and exceeded recruitment. The large harvest, combined with predation by wolves and bears, led to a determination that harvest had to be reduced (Davis 1979). In 1978 the bag limit for the MCH was further restricted from 1 caribou of either sex to 1 bull by drawing permit. The drawing permit hunt reduced the reported harvest from 93 caribou in 1977 to 16 in 1978.

In addition to concerns about excessive hunting of Macomb caribou, there was also concern the herd was limited by predation. Wolf control in the eastern Alaska Range during winter 1980–1981 removed most of the wolves believed to prey on the MCH. With wolf control, fall calf survival increased from 13 calves:100 cows in 1980 to 33 calves:100 cows in 1981.

The MPMA was renamed the Macomb Plateau Controlled Use Area (MPCUA) in 1981 to more accurately reflect the access restrictions that were in effect. The boundaries and access restrictions remained the same.

Previous management objectives for the MCH (Alaska Department of Fish and Game 1976) included maintaining a population of at least 350 caribou in Unit 20D south of the Tanana River. This population objective was based upon incomplete data on herd size, movements, and identity of the MCH.

On 29 June 1988, we estimated 800 caribou in the MCH. Historical information from local residents had indicated more caribou between the Robertson and Delta Rivers than we estimated. Therefore, a population objective was established to increase MCH size to 1000 caribou by 1993.

For the 1990–1991 hunting season, the hunt was changed from a drawing permit hunt to a registration permit hunt. This change was enacted because customary and traditional use determinations precluded conducting the hunt as a drawing permit hunt.

The hunting season was closed from 1992–1993 through 1996–1997 because the herd was below the population objective of 1000 animals. Also, a registration permit hunt did not allow adequate control of harvest because of relatively high hunter interest and low harvest quotas.

In 1995 the Alaska Board of Game adopted a 5-year Wolf Predation Control Implementation Plan (5 AAC 92.125) for Unit 20D. It established a new objective to reverse the decline of the MCH and increase the fall population to 600–800 caribou with a harvest objective of 30–50 caribou annually by the year 2002. Although these harvest objectives remain in place, the plan expired without wolf control occurring.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

- Increase the fall population to 600–800 caribou with a sustainable harvest of 30–50 caribou.

METHODS

We used a Robinson R-22 helicopter in late September–early November to count total numbers and classify caribou sex and age. A fixed-wing aircraft accompanied the helicopter to help find radiocollared caribou and groups without radios and to help count total numbers. Caribou were classified according to criteria specified by Eagan (1995).

Fall radiotracking flights were flown in August and September to determine Macomb caribou distribution during the hunting season and to determine if any Delta Herd caribou were in

Unit 20D. Flights were flown in a Piper PA–18 Super Cub. Radio collars from both herds were monitored from a high altitude while flying over the Delta River from the mouth of Jarvis Creek to Black Rapids Glacier for 2–3 passes of the river, and then a thorough search was made of the area between McCumber Creek and the Delta River. Herd distribution was monitored in the remainder of Unit 20D by flying a single high altitude pass along the Alaska Range from the Delta River to the Robertson River. General locations were obtained by recording the approximate latitude and longitude of the radiocollared caribou.

Hunting was conducted by registration permit. Within 2 days of harvest, hunters were required to report the kill date and location, transportation mode, and commercial services used. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The MCH was below the herd size objective in RY01. A poor quality survey in RY02 did not result in a population estimate of sufficient accuracy to determine compliance.

RY01. We conducted a census on 9 October 2001 and counted 467 caribou (Table 1) and observers estimated herd size to be 500–550 caribou. Survey conditions were marginal with patchy snow conditions and high wind (Table 1).

RY02. We conducted a census on 2 November 2002 in poor survey conditions and counted only 234 caribou. The late timing of the count also resulted in the herd being dispersed and no longer in rutting aggregations. Due to poor surveys conditions it was not possible to estimate population size (Table 1). The census was conducted late because of very poor survey conditions during October.

Population Composition

During the previous 3 years (2000–2002) the bull:cow ratio in the MCH has averaged 45:100 and 26% of all bulls were classified as large bulls (Table 1). It is apparent that hunting is having a minor effect on population composition or age structure.

Distribution and Movements

The MCH occupies the mountains of the eastern Alaska Range from the Delta River to the Mentasta Highway. Their core range is in Unit 20D between the Robertson River and the Delta River, and the primary calving grounds are on the Macomb Plateau. The MCH also uses the lowlands of the Tanana River valley as winter range.

RY01. During the MCH fall 2001 census, most radiocollared caribou were located on the Macomb Plateau, and in the Bear Creek and Berry Creek drainages. One radiocollared caribou was located in the Granite Mountains.

A fall radiotracking flight was flown on 18 September 2001 to determine the distribution of Macomb and Delta caribou during the hunting season. Sixteen of a possible 24 Macomb caribou were located. Two radiocollared caribou were located in the Jarvis Creek drainage where most hunting has occurred in recent years, with 1 in upper McCumber Creek and 1 in the Granite Mountains. Eleven were located east of the Johnson River in the Macomb Plateau–Bear Creek–Berry Creek area. One was located on the east side of the Gerstle River and 1 was located in upper Bradford Creek.

One caribou in each of the Macomb and Delta herds have radio collars with the same frequency and visual collar. A caribou with this frequency was located on the Macomb Plateau and was assumed to be the Macomb caribou. No other Delta caribou were located in Unit 20D. Therefore, during the fall hunting season, no radiocollared Delta caribou were in Unit 20D.

RY02. During the MCH November 2002 census, caribou were widely dispersed. Fifty-one percent of caribou counted were in southwestern Unit 20D in the McCumber and Jarvis Creek drainages, 26% were in the Upper Little Gerstle River drainage, and 23% were in the vicinity of the Macomb Plateau.

A fall radiotracking flight was flown on 25 August 2002 to determine the distribution of Macomb and Delta caribou during the fall hunting season. Fifteen of a possible 24 radiocollared Macomb caribou were located. No Macomb caribou were located west of the Delta River and no Delta Herd caribou were located in Unit 20D. One caribou in each of the Macomb and Delta herds have radio collars with the same frequency and visual collar. A caribou with this frequency was located on the Macomb Plateau and was assumed to be the Macomb caribou. Eight of the 15 radio collars were located in the Macomb Plateau area, 4 were located between the Delta River and McCumber Creek, 1 was in the Little Gerstle River drainage, and 1 was located in the Sheep Creek drainage.

MORTALITY

Harvest

Season and Bag Limit.

RY01 — The RY01 hunting season was conducted as registration permit hunt RC835 (Table 2) from 10–20 September with a harvest quota of 25 bulls. The hunt opening date was 10 September in an attempt to reduce incidental caribou harvest by moose hunters during most of the moose hunting season and to make large, mature bulls more accessible to hunters. This was an attempt to make harvest more compensatory rather than additive.

RY02 — The RY02 hunting season was conducted as registration permit hunt RC835 (Table 2) from 15–25 August with a harvest quota of 25 bulls. The season was changed from September to August because moose hunters were taking caribou incidentally resulting in harvest that exceeded quotas and necessitated frequent EOs to close the season.

Alaska Board of Game Actions and Emergency Orders. At the March 2002 Alaska Board of Game meeting the board considered a proposal from the Delta Fish and Game Advisory Committee to establish a predation control implementation plan for the MCH that would involve

a wolf sterilization program; the proposal failed. The board considered a proposal from the public to eliminate the Macomb Plateau Controlled Use Area; the proposal failed. The board also considered a proposal from the department to modify the boundary of the Delta Controlled Use Area (DCUA) to benefit Macomb caribou. This change, combined with changing registration permit hunt RC835 season dates to August, restricted hunters from using motorized vehicles in the DCUA portion of the RC835 hunt area. These changes were an attempt to reduce RC835 harvest rates and to eliminate incidental harvest by moose hunters during the September moose hunting season; the proposal passed.

In RY01 the department issued an EO to close the 10–20 September hunting season at midnight on 12 September because we expected the harvest quota to be met by that date. In RY02 we issued an EO to close the 15–25 August hunting season at midnight on 20 August because we expected the harvest quota to be met by that date.

Hunter Harvest.

The RY01 harvest unintentionally met the harvest objective of 30 caribou, but exceeded the harvest quota of 25 caribou. The 30 caribou harvest objective was not met during RY02, but the harvest quota of 25 caribou was met.

Permit Hunts.

RY01 — Macomb caribou were hunted under registration permit hunt RC835 (Table 2). Permits were issued to 255 hunters (Table 2), and 174 (68%) hunters actually hunted (Table 3), killing 43 caribou (Table 4).

RY02 —Permits were issued to 158 hunters (Table 2) for registration permit hunt RC835, with 91 reporting hunting (Table 3) and killing 25 caribou (Table 4).

The decrease in permits issued, number of hunters, and harvest during FY02 was accomplished by changing the season from 10–20 September to 15–25 August, with no motorized vehicles allowed in the DCUA portion of the hunt area. However, it was still necessary to close the season by EO.

Hunter Residency and Success.

RY01 — Most hunters (55%) were nonlocal residents (Table 3). Nonlocal hunters had a 31% success rate compared to local hunters who had a 17% success rate. All hunters had a 25% success rate that was similar to the previous year (Table 3).

RY02 — Most hunters (56%) were nonlocal residents (Table 3) and they had a slightly higher success rate (29%) than local hunters who had a 25% success rate.

Harvest Chronology.

RY01 — An opening day kill of 34 caribou exceeded the harvest quota of 25 (Table 5) and the department began the process for issuing an EO, and informing hunters that the harvest quota

had been exceeded. The harvest rate then decreased to 4 and 5 on 11 and 12 September respectively. The season was open for only 3 days and the harvest quota was exceeded by 72%.

RY02 — With the opening day changed from 10 September to 15 August, the opening day kill of 11 equaled 44% of the harvest quota, rather than exceeding the quota as in RY01 (Table 5). With 4 and 5 caribou killed each day on 16 and 17 August respectively, EO proceedings were begun, and 5 additional caribou were killed by the time the season closed on 20 August.

Changing the season from September to August accomplished the objective of slowing the rate of harvest during RC835, but it did not accomplish the objective of managing the hunt without the necessity of EOs.

Harvest Location.

RY01 — Most caribou (56%) were taken in the Upper Jarvis Creek drainage, which includes the Coal Mine Road (Table 6). Thirteen caribou (31%) were taken within the MPCUA, and 1 (2%) was taken in Unit 12.

RY02 — Harvest increased substantially within the Upper Jarvis Creek drainage–Coal Mine Road area with 80% of caribou taken there (Table 6). Only 2 caribou (8%) were taken within the MPCUA, and 1 was taken in Unit 12.

Transport Methods.

RY01 — The most commonly used modes of transportation for successful hunters were 3- or 4-wheelers, other off-road vehicles, and highway vehicles (Table 7).

RY02 — The most commonly used modes of transportation for successful hunters were 3- or 4-wheeler, other off-road vehicles, and highway vehicles (Table 7).

Other Mortality

No other mortality was recorded for the MCH during this reporting period.

HABITAT

Assessment and Enhancement

During 1995–2002 both the Delta Herd and the MCH have used winter range in the western Granite Mountains and the Jarvis Creek drainage. In total, about 500–1000 caribou used this range continuously during RY00–RY01. How long winter food supplies will last in this area is unknown. However, a large amount of potential winter range for the MCH exists north of the Tanana River and sporadic radiotracking flights during the mid-to-late 1990s indicated that MCH caribou used this range. Because calves are relatively large in fall (Valkenburg et al. 2002), it does not appear that summer range is limiting herd growth, and it is therefore most likely that herd growth is primarily limited by predation or limited availability of habitats where MCH caribou can successfully avoid predators.

CONCLUSIONS AND RECOMMENDATIONS

The MCH size objective of 600–800 was not met during RY01 and compliance was unknown for RY02. The MCH was hunted during RY01–RY02 with a harvest quota of 25 caribou each year, which is below the minimum harvest objective of 30 caribou. The harvest objective was unintentionally met during the RY01 hunting season when the harvest quota was exceeded with a kill of 43 caribou. Hunting has a negligible effect on herd growth and a minor effect on population composition and age structure of bulls. Hunting will be continued in the future if harvest does not compromise maintaining the herd size goal and the bull:cow ratio does not decline below 30:100. The most significant factor required to maintain population size and achieve the harvest objective will be adequate calf survival. MCH population and harvest goals were drafted as part of the Wolf Control Implementation Plan. These goals should be reevaluated because the plan has expired.

Conducting the MCH hunt as a registration permit hunt with a small harvest quota is proving difficult for the department and frustrating for hunters because the season must be managed by EO. The hunting season was changed during RY02 to 15–25 August when DCUA regulations restricted motorized vehicles for much of the RC835 hunt area. Although this change resulted in a slower rate of harvest, it was still necessary to close the season by EO. The ideal solution would be to conduct RC835 as a short hunt of 3–5 days during August. However, a short hunting season raises concerns about providing reasonable opportunity for harvest on this herd, which has a positive customary and traditional use determination. Therefore, the hunt will be monitored for the next few years to determine if the change in season dates allows for a 10-day hunting season, and the season will continue to be closed by EO as necessary. Intensive management activities to increase caribou calf survival and stimulate herd growth would allow a larger harvest quota and thus a longer hunting season.

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TABLE 1 Macomb caribou fall composition counts and estimated population size, 1982–2002

Survey date	Bulls: 100 cows	Calves: 100 cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	Total bulls %	Composition sample size	Count or estimate of herd size
10/82	21	26	18	68	61	29	10	14	218	700
10/83[a]	33	24	15	64	48			21	238	700
12/1/84	28	40	24	60	45	34	21	17	351	700
10/30/85	45	31	17	57	43	38	20	26	518	700
10/16/88	46	32	18	56	41	31	28	26	671	772
10/26/89	33	34	20	60	54	31	15	20	617	800
10/9/90	44	17	11	62	34	34	32	27	600	800
9/25/91	34	9	6	70	21	42	37	24	560	560
9/26/92	25	14	10	72	30	36	33	18	455	527
10/2/93	22	18	13	72	38	34	28	16	374	458
10/2/94	21	13	10	74	53	16	31	16	345	532
10/1/95	39	10	7	67	44	17	39	26	477	477[b]
10/2/96	43	30	17	58	29	31	40	25	586	586
10/28/97	28	18	12	69	40	26	33	19	451	597[c]
9/30/98	50	25	14	57	32	46	22	28	472	522–572[d]
10/15/99	57	22	12	56	49	21	30	32	606	640
10/2/00	45	11	7	64	43	29	29	29	605	650[d]
10/9/01	39	11	7	66	40	30	30	26	467	500–550[d]
11/2/02	51	21	12	58	39	43	19	30	234	Unk[b]

[a] Large and medium bulls not classified in this survey.

[b] Poor survey conditions due to lack of snow cover.

[c] Based on population modeling estimate.

[d] Estimated.

TABLE 2 Macomb caribou harvest data by permit hunt, regulatory years 1985–1986 through 2002–2003

Hunt	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Harvest			Total harvest
						Bulls (%)	Cows (%)	Unk	
530[a]	1985–1986	140	61	9	31	12 (100)	0 (0)	0 (0)	12
	1986–1987	100	6274	269	7417	10 (100)	0 (0)	0 (0)	109
						9			
570[b]	1986–1987	15	5360	147	8633	1 (100)	0 (0)	0 (0)	1
530[a]	1987–1988	150	53	7622	2425	53 (100)	0 (0)	0 (0)	53[c]33[c]
						33			
	1988–1989	150	57	5524	4519	36 (100)	0 (0)	0 (0)	36[d]
	1989–1990	150	47	5528	4525	44 (100)	0 (0)	0 (0)	44[d]42[d]
						42			
535[e]	1990–1991	351	42	2112	7944	42 (100)	0 (0)	0 (0)	4243
						43			
	1991–1992	317	33	16	50	48 (96)	0 (0)	2 (4)	50
	1992–1993[f]								
	1993–1994[f]								
	1994–1995[f]								
	1995–1996[f]								
	1996–1997[f]								
RC835[e]	1997–1998[g]	143	34	15	50	22 (100)	0 (0)	0 (0)	22
	1998–1999	167	32	19	49	32 (100)	0 (0)	0 (0)	32
	1999–2000[f]								
	2000–2001[g]	274	31	8	60	22 (100)	0 (0)	0 (0)	22
	2001–2002[g]	255	32	17	51	43 (100)	0 (0)	0 (0)	43
	2002–2003[g]	158	41	16	42	25 (100)	0 (0)	0 (0)	25
Totals for	1985–1986	140	61	229	7831	12 (100)	0 (0)	0 (0)	12
all permit	1986–1987	115	6170	249	7619	11 (100)	0 (0)	0 (0)	1110
						10			
hunts	1987–1988	150	53	7622	2425	53 (100)	0 (0)	0 (0)	53[a]33[a]
						33			
	1988–1989	150	57	5524	4519	36 (100)	0 (0)	0 (0)	36[b]
	1989–1990	150	47	5328	4825	44 (100)	0 (0)	0 (0)	44[b]42[b]
						42			

Hunt	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Harvest			Total harvest
						Bulls (%)	Cows (%)	Unk	
	1990–1991	351	42	2312	7744	42 (100)	0 (0)	0 (0)	4243
	1991–1992	317	33	16	50	43 48 (96)	0 (0)	2 (4)	50
	1992–1993[f]								
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	1998–1999	167	32	19	49	32 (100)	0 (0)	0 (0)	32
	1999–2000[f]								
	2000–2001[g]	274	31	8	60	22 (100)	0 (0)	0 (0)	22
	2001–2002[g]	255	32	17	51	43 (100)	0 (0)	0 (0)	43
	2002–2003[g]	158	41	16	42	25 (100)	0 (0)	0 (0)	25

[a] Drawing permit hunt.
[b] Subsistence registration permit hunt for Dot Lake residents only.
[c] Thirty-three caribou killed during the permit hunt, an estimated 20 killed in Unit 12 outside the permit area, and 4 (not included in the total) killed by subsistence hunters.
[d] Nonpermit subsistence harvest was 2 (not included in 1988 and 1989 total).
[e] Registration permit hunt.
[f] Hunt canceled.
[g] Hunt closed by emergency order.

TABLE 3 Macomb caribou hunter residency and success of permit hunters, regulatory years 1986–1987 through 2002–2003

Regulatory year	Successful					Unsuccessful					Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	Local[a] resident	Nonlocal resident	Nonresident	Total	(%)	
1986–1987[b]	9	0	1	10	(18)	19	27	1	47	(82)	57
1987–1988[b]	21	36	0	57	(61)	15	21	1	37	(39)	94
1988–1989[b]	15	18	0	33	(54)	4	22	0	28	(46)	61
1989–1990[b]	18	20	0	38	(54)	8	24	0	32	(46)	70
1990–1991[c]	28	14	0	42	(23)	80	64	0	144	(77)	186
1991–1992[c]	23	27	0	50	(24)	77	81	0	158	(76)	208
1992–1993[d]											
1993–1994[d]											
1994–1995[d]											
1995–1996[d]											
1996–1997[d]											
1997–1998[c]	15	7	0	22	(23)	50	22	0	72	(77)	94
1998–1999[c]	22	10	0	32	(28)	39	43	0	82	(72)	114
1999–2000[d]											
2000–2001[c]	11	11	0	22	(12)	89	75	0	164	(88)	186
2001–2002[c]	13	30	0	43	(25)	65	66	0	131	(75)	174
2002–2003[c]	10	15	0	25	(28)	30	36	0	66	(73)	91

[a] Resident of Unit 20D.

[b] Hunt by drawing permit.

[c] Hunt by registration permit.

[d] Hunt canceled.

TABLE 4 Macomb caribou harvest[a] and accidental death, regulatory years 1985–1986 through 2002–2003

Regulatory year	Hunter harvest							Accidental death	Total
	Reported				Estimated				
	M	F	Unk	Total	Unreported	Illegal	Total		
1985–1986	12	0	0	12	0	2	2	0	14
1986–1987	10	0	0	10	0	2	2	0	12
1987–1988	57	0	0	57	0	2	2	0	59
1988–1989	42	0	0	42	0	2	2	0	44
1989–1990	44	0	0	44	0	2	2	3	49
1990–1991	42	0	0	42	0	2	2	0	44
1991–1992	48	0	2	50	0	2	2	0	52
1992–1993[b]	0	0	0	0	0	2	2	0	2
1993–1994[b]	0	0	0	0	0	2	2	0	2
1994–1995[b]	0	0	0	0	0	2	2	0	2
1995–1996[b]	0	0	0	0	0	2	2	0	2
1996–1997[b]	0	0	0	0	0	2	2	0	2
1997–1998	22	0	0	22	0	2	2	0	24
1998–1999	32	0	0	32	0	0	0	0	32
1999–2000[b]	0	0	0	0	0	0	0	0	0
2000–2001	22	0	0	22	0	0	0	0	22
2001–2002	42	1	0	43	0	0	0	0	43
2002–2003	25	0	0	25	0	0	0	0	25

[a] Includes permit hunt harvest.

[b] Hunt canceled.

TABLE 5 Macomb caribou harvest by date during permit hunt RC835 with a 10–20 September hunting season, regulatory years 1997–1998 through 2001–2002, and 15–25 August in 2002–2003

Regulatory year	Harvest date: August 15	16	17	18	19	20	21	22	23	24	25	September 10	11	12	13	14	15	16	17	18	19	20	*n*
1997–1998												8	1	3	4	3	2	0	0	0	0	1	22
1998–1999												13	6	4	0	0	2	7	0	0	0	0	32
1999–2000[a]																							
2000–2001												9	3	1	3	5	0	0	0	1	0	0	22
2001–2002												34	4	5	0	0	0	0	0	0	0	0	43
2002–2003	11	4	5	1	1	3	0	0	0	0	0												25

[a] Hunt cancelled.

TABLE 6 Harvest location for caribou killed in Unit 20D registration hunt RC835, regulatory years 1997–1998 through 2002–2003

Uniform coding unit	General location	Harvest by regulatory year					
		1997–1998	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003
Unit 20D							
901	Lower Jarvis Creek	1	0	0	0	0	0
902	Upper Jarvis Creek–Coal Mine Road	7	16	0	18	24	20
984	Richardson Highway	0	0	0	0	0	2
1000	Granite Mountain	0	0	0	0	1	0
1001	Granite Creek–Sawmill Creek	0	1	0	0	2	0
1100	Gerstle River	0	0	0	0	0	0
1201	Little Gerstle River	3	2	0	2	0	0
1401	Horn Mountain	9	9	0	0	12	2
1402	Plateau Lake	1	0	0	0	1	0
1403	Fish Lake	0	0	0	0	0	0
1500	Robertson River	0	2	0	0	0	0
1502	Robertson River	0	1	0	0	0	0
Unit 12		0	0	0	0	1	1
Unk		1	1	0	2	2	0

TABLE 7 Macomb caribou harvest percent by transport method, regulatory years 1986–1987 through 2002–2003

Regulatory year	Percent harvest by transport method[a]									
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Walking[b]	Unk	*n*
1986–1987	21	21	0	4	0	0	54		0	24
1987–1988	6	37	0	6	0	3	49		0	68
1988–1989	15	25	0	6	0	5	49		0	65
1989–1990	5	45	0	0	5	39	7		0	44
1990–1991	2	5	0	24	0	14	17	38	0	42
1991–1992	4	10	0	32	0	8	20	0	26	50
1992–1993[c]										
1993–1994[c]										
1994–1995[c]										
1995–1996[c]										
1996–1997[c]										
1997–1998	0	32	0	14	0	23	18	0	14	22
1998–1999	0	9	0	25	0	25	22	0	19	32
1999–2000[c]										
2000–2001	0	0	0	46	0	46	5	0	5	22
2001–2002	0	12	0	56	0	7	16	0	9	43
2002–2003	0	4	0	0	0	8	40	0	48	25

[a] Includes permit hunt harvest.

[b] Walking was not listed as a transportation type for regulatory years 1986–1987 to 1989–1990.

[c] Hunt canceled.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 13 and 14B (25,000 mi^2)

GEOGRAPHIC DESCRIPTION: Nelchina Basin

HERD: Nelchina Caribou Herd

BACKGROUND

The Nelchina caribou herd (NCH) contained 5,000–15,000 caribou in the late 1940s. The herd increased during the early 1950s, aided by intensive predator control conducted by the Federal Government. The NCH continued to grow and peaked at about 70,000 caribou by the mid 1960s. A dramatic decline began in the late 1960s, and the herd numbered between 7,000 and 10,000 caribou in 1972. During 1973–74, the NCH began to increase and continued to grow through the mid 1990s, peaking at an estimated 50,000 animals in 1995. Herd size declined between 1996 and 2000.

The NCH has been important to hunters because of its accessibility and proximity to Anchorage and Fairbanks. The Board of Game (BOG) increased bag limits and extended seasons when the NCH began to increase in the late 1950s. Annual harvests from 1955 through 1971 ranged from 2,500 to more than 10,000 caribou. After the herd declined, the bag limit was reduced to one caribou in 1972 and seasons were dramatically curtailed. In 1976 the season was closed by emergency order after hunters killed 800 caribou in only 5 days. It became apparent that a general open season with unlimited participation was no longer possible for the NCH. Since 1977 Nelchina caribou have been hunted by permit only. Between 1977 and 1990 most permits issued were random drawing permits under sport hunting regulations. Unit residents took a few caribou under a subsistence registration permit hunt. Since 1990, Nelchina permits have been issued only for state and federal subsistence hunts, except for a very limited drawing hunt in Unit 14. Both the number of permits and the allowable harvest have fluctuated, depending on herd status. During the last 12 years (1989–01) there have been over 40,000 caribou harvested from the NCH.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a fall population of 35,000–40,000 caribou, with a minimum of 40 bulls:100 cows and 40 calves:100 cows.

- Provide for an annual harvest of between 3,000–6,000 caribou.

METHODS

Biologists conduct yearly censuses and sex and age composition counts. The censuses involve aerial counts of caribou observed during June in postcalving aggregations and are followed immediately by sex and age composition surveys. Count technique includes either a fixed-wing photocensus using aerial photography, or a traditional census using hand-held cameras and direct field estimates made from the aircraft. Aggregation of caribou and weather conditions determine the census technique; loosely aggregated caribou cannot be photographed effectively. Composition data is collected via helicopter immediately after the census in June to determine productivity, and again in October during the rut to determine the bull:cow ratio and calf survival. Extrapolated fall post hunt population estimates are then calculated from the spring counts and fall composition data. Population data are modeled to determine future population trends and allowable yearly harvest rates.

Radiocollared caribou are located seasonally to delineate herd distribution, determine seasonal range use, and mortality rates. To accomplish this, a minimum of 40 and 60 radiocollared cow caribou are maintained in the herd each year. Collars are also placed on four-month-old female calves to obtain survival and parturition data for known age females. Radiocollared cows are located every other day during the calving period to determine pregnancy rates and the mean calving date.

Female calves are captured during the fall and spring to obtain body condition indices. Neonatal calves are captured to obtain estimates of birth weights. Biologists use permit reports, radio-telemetry flights, and hunter field checks to monitor hunt conditions and harvests.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The NCH fall population estimate increased 16% from 29,601 caribou in 2000 to 34,380 in 2002 (Table 1). The estimated density was 0.8 caribou/km^2 in 2002 based on an approximate range of 44,200 km^2 (Lieb et al. 1988).

Population Composition

Herd productivity in 2002 was the highest in 4 years with 52 calves:100 cows observed during the spring postcalving survey. This was the second consecutive year of improved productivity. Calf production in 1999 and 2000 was 32 and 31 calves:100 cows respectively, the lowest ever

observed in the NCH and 38% below the 10-year average spring ratio of 52:100 reported between 1985 and 1996. The drop in calf production was attributed to a decline in physical condition of the cows that resulted in a delay in age of first reproduction (from 2 to 3 or 4 years of age) and a reproductive pause in many adult cows. Lactating cow caribou that are nutritionally stressed because of poor forage conditions during dry summers often skip a breeding season to regain body condition (Whitten 1995). Calf mortality during the first 4 months of life is monitored by comparing changes in calf:cow ratios between summer and fall. Calf mortality in the first 4 months of life during 1999 and 2000 was very high with a loss of 9 and 11 calves:100 cows respectively, to 23 and 20 calves:100 cows (Table 1). Survival improved in 2001 and 2002 with fall calf:cow ratios of 40 and 48 calves:100 cows dropping only by 4 calves:100 cows from spring to fall in both years. Fall calf ratios historically ranged from 38 to 48 calves:100 cows.

The bull:cow ratio during the 2001 fall composition count was 37:100 and 31:100 in 2002. Fall bull ratios have been below the management objective of 40 bulls:100 cows since 1995. Bull:cow ratios during the 1980s when the herd was increasing were often in the range of 50–60 bulls:100 cows. The reduction in the bull:cow ratio was caused in part by increased bull harvests. Subsistence permittees select for large bulls. As more subsistence permits were issued, not only did the number of bulls decline, but the age structure of the bull population became skewed toward younger animals. Additionally, increased wolf predation because of higher wolf numbers in the late 1990s also contributed to the decline in large bulls. Older bulls are more susceptible to wolf predation than younger cohorts (Colman et al. 2003). Composition data from fall 2000 included 64% small bulls, 25% medium bulls, and only 11% large bulls. In prior years when the bull:cow ratio was higher, the age classes for bulls were more evenly represented. With bull harvests reduced the last 2 years, and declining wolf numbers, the percent of large bulls has increased to 23% in 2002.

Distribution and Movements

Calving takes place in the eastern Talkeetna Mountains from Fog Lakes southeast to the Little Nelchina River. The core calving area extends from the Little Nelchina River to Kosina Creek. This area is also used during the postcalving and early summer period. During summer and early fall, caribou distribution extends from the upper Denali Highway near Butte Lake on the west, across the Lake Louise Flats, and as far east as the Gulkana River. Much of this summer range is relatively inaccessible compared to other portions of Unit 13. In 2001, the rut occurred in the eastern portion of 13B from the Alphabet Hills to the Tangle Lakes, while the rut in 2002 was dispersed from Lake Louise in 13A east to the slopes of Mt. Drum in Unit 11. Between 1995 and 2000 there was little use of traditional wintering areas in Unit 13. During the winter of 2001, much of the herd remained in Unit 13. In 2002, most of the herd wintered in northern Unit 11, Units 12 and 20E. In recent years, spring migration back to the calving grounds has occurred during late April or early May.

MORTALITY

Harvest

Season and Bag Limit. The 2001–2002 season dates for the state Tier II (TC566) subsistence hunt in Unit 13 were 10 August to 20 September and 21 October to 31 March. The bag limit was one bull. There was no state registration subsistence hunt (RC 460) for NCH in Unit 12 during

the 2001–2002 season. A state drawing hunt (DC 590) for any caribou with season dates of 10 August to 20 September was held in Subunit 14B. The Unit 13 federal subsistence seasons (RC 513 and 514) during 2001–2002 were 10 August to 30 September and 21 October to 31 March. The federal bag limit was 2 bulls. The Unit 13 federal subsistence hunt is a registration hunt administered by the Bureau of Land Management; only residents of Units 11, 13, or along the Nabesna Road in Unit 12 and Unit 20 residents from Delta Junction were eligible. A Unit 12 federal subsistence hunt (RC 512) for residents of Tetlin and Northway was opened by emergency order when the NCH migrated through Tetlin during November 2000. This hunt was not held in 2001.

Board of Game Actions and Emergency Orders. Sport hunting for NCH was eliminated in 1989 after the McDowell Decision by the Alaska Supreme Court resulted in all Alaskans being eligible for a NCH subsistence permit, not just rural residents. Only Tier II subsistence hunting was allowed between 1990 and 1995. In 1996, the Board of Game created a Tier I subsistence registration hunt for all state residents, with no limit on the number of permits issued. This action was taken to increase the harvest of cows, thus reducing the herd size in order to meet management objectives. This Tier I hunt lasted only two years. Beginning in 1998 all state NCH subsistence hunting was again by Tier II permit only. The 2000 and 2001 NCH Tier II hunt was for bulls only. The 2001 season was closed on 21 November by emergency order.

Hunter Harvest. The reported harvest in 2001–2002 for the combined state and federal hunts for the NCH was 1,500 caribou, down 39% from the 1999–2000 take of 2,456 (Table 2). The current combined NCH harvest has declined 73% since 1996, when the combined NCH harvest peaked at a reported 5,601 caribou.

Illegal and unreported harvests of Nelchina caribou are an additional source of mortality. The most common type of illegal harvest occurs when a permittee fails to validate the permit after taking a caribou. Once a permittee transports a caribou from the field without validating the permit, there is minimal chance of citing them for taking additional caribou on the same permit. Individuals also transfer permits to family members or friends. After 1997, the estimated illegal and unreported take (Table 3) was reduced because of the large decrease in hunting pressure after closure of the Tier I registration hunt.

Wounding loss is probably quite high because caribou are herd animals; caribou are often shot while in groups, so more than one animal can be hit with a single shot. Also, identifying a specific animal from a group is difficult, especially cows and small bulls. If a caribou is not knocked down with the first shot, it may be lost in the herd and another caribou shot until one eventually drops. Wounding loss is thought to be lower under bulls-only seasons. While there are some cows mistakenly taken when a hunter is required to take only bulls, more care is exercised to be sure of the target, especially with subsequent shots.

Permit Hunts. Nelchina caribou were harvested by 5 separate permit hunts. Permit and harvest data are presented in Table 2.

A State Tier II subsistence hunt (TC566) is the primary way of allocating harvests from the NCH and, with the exception of the Tier I hunt in 1996 and 1997, has accounted for 90% of the

harvest. All Alaska residents may apply for this hunt, and permits are scored according to certain subsistence criteria and are issued based on an applicant's rank. This is one of the most popular hunts in the state with over 17,000 applicants for up to 10,000 permits that may be issued. The hunt takes place entirely in Unit 13 with both fall and winter seasons. The bag limit is usually any caribou, but has been changed to bulls only in years when harvests need to be reduced. In 2001–2002, 2000 permits were issued and hunters reported a harvest of 977 bulls (Table 2).

A State Tier I registration hunt (RC567) for cows and small bulls (6 or fewer points on 1 side) was established in 1996 to increase the cow harvest. This hunt lasted two years, then was closed in 1998. A decline in calf production coupled with the increase in harvests brought the size of the NCH to within the management objectives. During the two seasons this hunt was held, 4,856 caribou were reported taken with cows comprising 76% (N = 3,670) of the harvest. Overall harvests under this hunt were not much higher than reported in the prior two seasons under a Tier II hunt and were well below the expected kill. The observed impact of this hunt was only a slight reduction in herd size.

The federal registration hunts (RC513 & RC514) in Unit 13 are for residents of Units 13, 11, and residents along the Nabesna Road in Unit 12 and Delta Junction in Unit 20. The number of participants and the harvest have increased in recent years. The 2001–02 harvest was 501 caribou (Table 2). The highest reported harvest under this hunt was 647 caribou that occurred in 1991 when the hunt first opened. Hunting opportunity is limited because of the reduction in available federal lands for hunting following state land selections. The state selected most of the federal lands in Units 13B and 13E along the Denali Highway that were previously open to caribou hunting. Under federal regulations, state-selected lands are currently closed to federal subsistence hunting. The potential for a high harvest under this hunt still exists, however, because the fall caribou migration route between Paxson and Sourdough along the Richardson Highway is still on federal land open to federal subsistence hunting. Ideal access along the Richardson provides hunters an easy opportunity to kill caribou should large numbers of animals use this area during the open season.

The state registration hunt (RC460) in Unit 12 is opened when the NCH migrates into Unit 12, but the Mentasta and Forty-Mile Caribou herds are not yet mixed in. This hunt allows Alaskan residents, especially Unit 12 residents, the opportunity to harvest a caribou when these animals are available. Season dates and bag limits are controlled by emergency order. Historic harvests were low and fluctuated between 155 and 361 bulls however, in 1998 the hunt was for cows only and 380 were harvested (Table 2). The hunt was very popular and has the potential for a high harvest if held when caribou migrate into the area in large numbers. This hunt has not been held since 1998.

The federal registration hunt (RC512) is a local subsistence hunt for residents of Northway and Tetlin. This hunt is held by emergency order when a sufficient number of Nelchina caribou migrate into the hunt area. The U.S. Fish and Wildlife Service administers this hunt on the Tetlin National Wildlife Refuge. The hunt was held in 2000 and the harvest was very low with only 43 bulls reported taken (Table 2).

The state drawing permit hunt (DC590) is for any caribou and is held in Unit 14B. It is the only NCH hunt that is not a subsistence hunt and is open to both residents and nonresidents. Up to 100 permits are issued. Bulls predominate the harvest, but the overall take has been very low ranging from 9–19 animals during this reporting period (Table 2).

Hunter Residency and Success. Only Alaska residents are allowed to hunt Nelchina caribou in Units 12 and 13. Nonresident hunters are allowed to hunt the NCH only in 14B under a drawing permit hunt, but there were no nonresident permittees during this report period. Table 4 lists hunter residency for local (Units 11, 13 and along the Nabesna road in Unit 12) or nonlocal hunters and their success for the state Tier II hunt only. Most of the Tier II permits were issued to nonlocal Alaska residents. Local hunters comprised 13% of the total Tier II hunters and took 10% of the total harvest. Both federal hunts (RC512 and RC513) are open only to residents of defined subsistence zones thus only federally defined local rural residents harvest caribou from these federal hunts.

Hunter effort varies somewhat between years depending on caribou distribution and migration patterns in relation to the road system and hunter access points. Over the last 5 years, successful Tier II hunters spent between 4 and 7 days hunting to get a caribou, while unsuccessful hunters averaged 7 to 15 days in the field. Federal subsistence hunters reported approximately the same hunting effort.

Hunter success for all NCH hunts increased from 11% in 1997–98 to 32% in 2001–2002. The increase in hunter success was primarily attributable to the dramatic decline in the number of permits issued – the number went from 37,726 in 1997 to 4,703 in 2001. Fluctuations in hunter success between years with similar hunting effort are usually attributed to fall caribou distributions away from the road system or winter migrations out of the unit. Another factor that affects hunter success in all Tier II hunts is the way permits are issued to the same high scoring individuals every year. Because the same individuals get the permits every year, a Nelchina Tier II permit is not the valued prize it was under the old drawing system when an individual was fortunate to get drawn for a permit once every 3 or 4 years and success rates often exceeded 60%.

Harvest Chronology. The fall caribou season occurs in August and September and is the most popular time to hunt caribou. Sixty to 100 percent of the yearly TC566 harvest occurred in August and September during this reporting period (Table 5). Harvests are higher in September because of the onset of the rut when bulls are more vulnerable. Hunting pressure also increases during moose season by hunters on combination hunts. Historically, winter seasons have been important, with high harvests in those years when caribou remain in Unit 13. However, the winter season is subject to emergency closures in those years when the harvest quota is reached before the season ends on 31 March.

Transport Methods. For successful Tier II subsistence hunters during this reporting period, 4-wheelers were the predominant method of transportation, followed by highway vehicles, boats, and snowmachines (Table 6). During the early 1990s, highway vehicles were the most important method of transportation, but in 1993 success rates for hunters using 4-wheelers began to climb. The use of snowmachines has fluctuated widely and is dependent on both the length of the

winter hunt and the availability of caribou. Highway vehicles have been the most important transportation method in the Unit 13 federal subsistence hunt (RC513) and the Unit 12 state registration hunt (RC460), with 40–70% of successful hunters reporting their use. Aircraft were the most important transportation method in the Unit 14B drawing hunt (DC590).

Other Mortality

The mortality rate for radiocollared yearling and adult cows during 2000 and 2001 was 11% and 10% respectively, down from the 20% mortality observed during 1999. The high mortality rate in the late 1990s was attributable to increased predation from high wolf numbers. Wolves are present throughout the NCH range, and predation by wolves is thought to be an important source of mortality. Ballard et al. (1987) reported that Unit 13 wolves preyed on caribou whenever they were available. During the early-to-mid 1980s, the number of wolves occupying both the core Nelchina caribou range and winter range was relatively low because of high human harvests, and annual mortality rates on radiocollared caribou typically were at or below 10%. Since 1988 wolves have increased over most of the Nelchina caribou range, especially in Subunit 13A where recent wolf numbers were the highest observed in over 25 years on the core calving grounds. A wolf census in 1998 resulted in a density estimate of 12 wolves/1000 km^2 (Testa, ADF&G files) in 13A. High wolf harvests the last 3 years have reduced wolf numbers on the core calving area, thus the observed increase in caribou survival. A wolf survey in 2002 resulted in a density estimate of 7 wolves/1000 km^2 in 13A (Golden, ADF&G files).

An important factor limiting winter predation on caribou by wolves in Unit 13 is the migratory pattern of the NCH. In most years, a large percentage of the caribou in the NCH leave Unit 13 in October and do not return from wintering areas in Units 11, 12 and 20 until April, and thus are unavailable to Unit 13 wolves. Predation rates during the winter depend on the number of wolves present in these other units. Mortality rates include overwinter loss as part of the yearly total mortality.

Grizzly bears are present and considered numerous throughout the NCH summer range. Grizzlies are also known to be important predators of caribou (Boertje and Gardner 1998); however, predation rates and their effects on the NCH have not been studied.

Winter snow accumulations were severe in Units 13, 12, and 20E in 2000, and were above average in 2001. In winters with deep snow pack, caribou are most vulnerable to wolf predation and are more nutritionally and energetically stressed, impacting future productivity.

HABITAT

Assessment

Between 1955 and 1962 ADF&G established 39 range stations, including exclosures, throughout much of the Nelchina caribou range. Biologists examined these stations at approximately 5- to 6-year intervals from 1957 through 1989. A complete description of the Nelchina caribou range, range station locations, and results of long-term monitoring is presented by Lieb (1994). Lieb concluded that lichen use was high during the 1960s when caribou were abundant, and the result was an overall decline in lichens on the Nelchina range. Following a decline in caribou numbers, lichen increased over much of the fall and traditional winter range from the early 1970s to 1983.

However, as the herd doubled in size between 1974 and 1983, increases in lichen biomass ceased in areas of substantial caribou use. Between 1983 and 1989 continued increases in caribou numbers resulted in a decline in lichen biomass. Lieb concluded that in 1989, 77% of the Nelchina range exhibited poor lichen production, 2% was considered to have fair production, and only 21% good production. This compared to 33% of the range in each category in 1983. On the important calving and summer range in the Eastern Talkeetna Mountains, Lieb (1994) reported the lowest lichen biomass ever recorded, with all the preferred lichen species virtually eliminated. In this area caribou have a diet comprised primarily of vascular plants. Lichen standing crops are expected to improve now that there has been a reduction in herd size.

Initial research in the early 1990s designed to evaluate body condition in various caribou herds led to the conclusion that Nelchina animals were in poorer body condition than animals from the Alaska Peninsula or Mulchatna Caribou Herds (Pitcher 1991). Since 1992, female calves have been captured and radiocollared or collected to assess body condition and future age specific productivity data. Four-month fall and ten-month spring weights have ranged between 103 and 129 lbs. These represent the lightest and most variable weights for the Interior herds (Valkenburg, ADF&G Files).

Variations in summer weather conditions that influence plant growth, forage quality, and nitrogen levels may be responsible for much of the variation in the fall body condition. Insect harassment may also be an important factor in influencing body condition (Colman et al. 2003). This may be especially important for the NCH because traditional calving grounds and summer range have been heavily grazed for years, allowing annual variations in weather to significantly impact foraging conditions. Unfortunately, the same hot dry conditions that limit forage production also favor high insect harassment. Increased stress from low forage availability combined with insect harassment minimizes summer weight gain and some of the lowest calf weights have been observed following hot dry summers. Alternately, cool cloudy summer conditions minimize insect activity as well as increase forage quality in terms of higher nitrogen levels in vascular plants (Lenart 1997). During this reporting period, lowest four-month old calf weights (106.5 lbs.) were observed after a dry summer in 1996 and the highest (129.0 lbs.) in 2001 following a summer with a wet, cold July. The NCH has the genetic potential to produce heavier caribou provided adequate nutrition is available. Female calves weighed in Kenai, which were the progeny of NCH animals translocated in 1986 and 1987, weighed up to 145 lbs., and were among the heaviest in the state (T. Spraker, pers. commun.).

Neonatal calf weights were obtained on the calving grounds in Unit 13A during the peak of calving beginning in 1996. Weights have fluctuated slightly between years and are 1–2 lbs. less than those from the adjacent Mentasta herd, but additional data are needed before comparisons and conclusions concerning neonatal calf weights are possible.

Herd productivity was assessed by monitoring age of first reproduction among radiocollared cows that were captured as four-month old calves. Since 1992, no two-year old cows have produced a calf. In years with conditions favorable to good forage production and availability, 65% of the three-year old cows had calves, but during years with drought or deep snow conditions, no three-year old cows calved. Pregnancy rates in 2002 were high, with 65% of the three-year-old and 87% of the four-year-old and older radiocollared cows pregnant. Productivity

increases when favorable weather patterns result in high annual forage growth that allows cows to improve their overall body condition going into the rut.

Enhancement

Short-term caribou habitat enhancement is dependent upon reducing the number of animals utilizing the range. Because of this need, the current herd objective is to maintain 35,000–40,000 caribou on the range and monitor the results. Because a herd reduction occurred only in the last four years, more time is needed to fully evaluate the impact of the current decline on range condition and forage production.

Long-term caribou habitat enhancement is dependent on the occurrence of wildfire or controlled burns. The Copper River Basin Fire Management Plan, an interagency plan, designates areas in Unit 13 where wildfires will not necessarily be suppressed. The plan provides for a natural fire regime to benefit wildlife habitat. Wildfire may play a role in the recovery of depleted or decadent stands of forage lichens important for over wintering caribou. In addition, wildfire likely enhances summer range conditions that currently limit productivity of the Nelchina herd. Thus, long-term fire suppression can be detrimental to caribou range. It may take preferred lichens five or more decades after an intense fire to become abundant; therefore, small periodic wildfires ensure the availability of both winter and summer caribou range and a constant lichen supply. Effective fire suppression increases fuel buildup and the possibility of an intense fire over a large area. This type of wildfire creates less diversity and decreases year-round habitat availability for caribou. In spite of the current fire management plan and the benefits of wildfire, Unit 13 has had only one significant fire (5,000 acre Tazlina lake burn) since 1950 as most wildfire ignitions have been suppressed. A separate plan is also underway for a controlled burn in the Alphabet Hills and Lake Louise flats to improve moose and caribou habitat.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Current management needs include: (1) Monitoring range condition. The immediate repair and reading of the existing Nelchina range stations is needed if they are to remain a useful tool for evaluating range condition and trend. Additional stations should be added in important habitats such as the Eastern Talkeetna Mountains and wintering grounds in eastern Unit 13 and Units 11 and 12. (2) Continued monitoring of body condition parameters. (3) Monitoring sources and rates of natural mortality. (4) Minimizing land use activities that adversely affect the Nelchina range. The use of ORVS in Unit 13 has increased and may be disrupting normal caribou behavior patterns.

CONCLUSIONS AND RECOMMENDATIONS

The fall 2002 NCH herd estimate of 34,380 caribou indicates the size of the herd has increased from the 2000 low of 29,601 but is still below the population management objective of 35,000–40,000 caribou. The large declines in herd size observed between 1998 and 2000 were attributed to both low productivity and increased wolf predation. Calf production in 1999 and 2000 was the lowest ever observed, but increased in 2001 and 2002. Calf survival to fall also increased during the last two years as high wolf harvest in 13A appreciably reduced the number on wolves

on the core calving ground. Also, caribou remained on the calving ground until later in the summer and did not expose themselves to higher wolf densities in other parts of Unit 13.

Declines in herd productivity are often attributed to lower pregnancy rates due to reduced forage production or availability because of severe winter conditions, summer droughts, late spring or early fall snow conditions. Similar to Cameron and Ver Hoeff (1994) conclusions, declines in body condition of NCH cows in 1998 and 1999 may have caused caribou to skip a calving interval until body condition improved, explaining record low calf numbers in 1999 and 2000. A prolonged decline in herd productivity, especially during periods with favorable weather, is most likely attributable to over utilization of the range (Messier et al. 1988). In the case of the NCH, the conclusion that the range was over utilized when the herd exceeded 40,000 animals is supported by observed declines in body weights of female calves, delayed age for first pregnancy and reduced pregnancy rates in adult cows.

The current bull:cow ratio is well below the management objective of 40 bulls:100 cows in the NCH. Composition data for the bull segment of the population show most of the decline has occurred in the large bull category. Heavy harvest on the bull segment during the fall seasons by subsistence hunters may be partly responsible for the decline in the bull:cow ratio and the number of large bulls. Subsistence hunters select for older, larger bulls when they are available. Wolf predation also decreases the number of large bulls as they are vulnerable to predation when isolated after the rut. Bull:cow ratios should be increased to allow more adult bulls in the population to participate in the rut. While young bulls are capable of breeding, adequate numbers of large bulls are considered essential for an efficient and timely rut. Cows are stimulated and estrus induced by bull physiology and behavior. Synchrony of the rut is important to achieve synchrony in parturition, which provides a survival advantage for calves.

Caribou harvests need to be kept low until the population is again within the management objective of 35,000–40,000 caribou. Harvest objectives should be established for the Tier II hunt annually. Individual yearly harvest objectives for cows and bulls should be based on annual recruitment, bull:cow ratios, and the population trend. Harvest objectives for the NCH can be successfully attained by adjusting the number of Tier II permits issued and closing the season for bulls and cows by emergency order when the management goal for each has been reached.

Another important issue is the proliferation of 4-wheelers and snowmachines. The increased use of these vehicles raises questions of animal and habitat disturbance. The short-term impact of vehicle disturbance is increased energy expenditure and reduced time foraging while long-term impacts may include range abandonment. Effects of vehicles on NCH caribou need to be considered in future land use planning activities by BLM and DNR for federal and state lands used by the herd.

The NCH is the only large herd in the state that can have its upper population limit controlled solely by human harvests. This is only possible because the NCH is accessible by the road system from the major population centers of Fairbanks and Anchorage. Because of this, limiting and maintaining the herd's size to 35,000–40,000 animals is considered a management experiment. The management objective of having hunters control herd size at a level that is below prior peak herd numbers but well above herd lows, over a prolonged number of years has

never been accomplished on a large herd. A major benefit of this management strategy is to provide a more stable and predictable harvest of caribou from the herd over the long term. Historic harvests, when the NCH peaked in the 1960s, averaged 3,600 caribou a year (range 360–10,100), then dropped dramatically after the crash in the 1970s. If the herd could be stabilized at 35,000–40,000, and wolf predation limited to 10% or less, the projected annual harvest would be 3,000 – 4,000 caribou each year, thus eliminating the peak or bust cycle. Also, a consistently moderate sized herd may provide a more stable prey supply for wolves and somewhat reduce the predation pressure on moose.

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Table 1 Nelchina caribou fall composition counts and estimated herd size, regulatory years 1997–2002

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Total bulls (%)	Composition sample size	Total adults	Estimate of herd size	Postcalving[a] count
1997–98	26	26	17	66	17	3,553	26,438	31,893	34,894
1998–99	21	38	24	63	13	2,394	29,338	38,552	44,192
1999–00	30	23	15	65	20	3,000	26,650	31,365	33,125
2000–01	25	20	14	69	17	3,017	25,518	29,601	33,795
2001–02	37	40	22	57	21	3,949	26,159	33,745	35,106
2002–03	31	48	27	56	17	1,710	25,161	34,380	35,939

[a] Spring census.

Table 2 Nelchina caribou harvest data by permit hunt, regulatory years 1997–2001

Hunt No. /Area	Regulatory year	Permits Issued	Percent did not hunt	Percent Successful Hunters	Percent Unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
TC566[a]	1997–98	10,000	27	21	48	2,078	(100)	2	(0)	17	2,097
	1998–99	10,020	53	25	18	2,454	(99)	14	(1)	6	2,474
	1999–00	8,015	31	25	40	1,422	(71)	589	(29)	6	2,017
	2000–01	2,000	18	38	41	760	(99)	4	(1)	1	765
	2001–02	1,996	16	49	31	977	(99)	4	(1)	1	982
RC567[b]	1997–98	25,376	71	6	15	438	(28)	1,151	(72)	12	1,601
RC	1997–98	1,618	22	10	38	105	(64)	58	(35)	1	164
513/514[c]	1998–99	2,413	31	17	42	230	(55)	185	(44)	3	418
	1999–00	2,631	24	15	39	207	(53)	181	(47)	1	389
	2000–01	2,367	32	12	51	193	(71)	79	(29)	1	273
	2001–02	2,607	24	19	37	492	(98)	3	(1)	6	501
RC460[d]	1997–98	632	14	25	60	150	(98)	3	(2)	2	155
	1998–99	920	10	43	47	16	(4)	380	(96)	1	397
	1999–02	No hunts									
RC512[e]	1997–98	No hunt									
	1998–99	47	34	23	43	11	(100)	--	--	--	11
	1999–00	207	26	18	27	38	(100)	--	--	--	38
	2000–01	192	21	22	33	43	(100)	--	--	--	43
	2001–02	No hunt									

Table 2 Continued

Hunt No. /Area	Regulatory year	Permits Issued	Percent did not hunt	Percent Successful Hunters	Percent Unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
DC590[f]	1997–98	100	57	10	29	7	(70)	3	(30)	0	10
	1998–99	100	42	19	36	13	(68)	6	(32)	0	19
	1999–00	100	56	12	28	6	(50)	6	(50)	0	12
	2000–01	100	63	9	27	5	(56)	4	(44)	0	9
	2001–02	100	51	17	30	7	(41)	10	(59)	0	17
Totals for all permit hunts	1997–98	37,726	56	11	25	2,778	(70)	1,217	(30)	32	4,027
	1998–99	13,500	46	25	25	2,724	(82)	585	(18)	10	3,319
	1999–00	10,953	29	22	39	1,673	(68)	776	(32)	7	2,456
	2000–01	4,659	26	23	46	1,001	(92)	87	(8)	2	1,090
	2001–02	4,703	21	32	34	1,476	(98)	17	(1)	7	1,500

[a] Tier II subsistence drawing permit.
[b] Tier I subsistence registration permit.
[c] Subsistence registration for local residents (Unit11 & 13), administered by BLM as federal hunt RC513 in 1990, and includes 20D residents in hunt 514. Bag limit was 2 caribou, so percentages related to permits, not hunters.
[d] A winter registration hunt for Alaska residents, held in Unit 12.
[e] Subsistence registration for Unit 12 residents, administered by Fish and Wildlife Service as Federal Hunt RC512.
[f] A drawing hunt.

Table 3 Nelchina caribou harvest and accidental death, regulatory years 1997–2001

Regulatory	Reported						Estimated			Accidental	Grand
Year	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	death	total
1997–98	2,778	(70)	1,217	(30)	32	4,027	500	300	800	200	5,027
1998–99	2,724	(82)	585	(18)	10	3,319	200	100	300	200	3,819
1999–00	1,673	(68)	776	(32)	7	2456	200	100	300	200	2956
2000–01	1,001	(92)	87	(8)	2	1,090	200	100	300	200	1,590
2001–02	1,476	(98)	17	(1)	7	1,500	200	100	300	200	2,000

Table 4 Nelchina caribou Hunt TC566 annual hunter residency and success, regulatory years 1997–2001

	Successful				Unsuccessful				
Regulatory	Local[a]	Nonlocal			Local[a]	Nonlocal			Total
year	resident	resident	Nonresident	Total	resident	resident	Nonresident	Total	hunters
1997–98	105	1,992	--	2,097	368	4,393	--	4,761	6,858
1998–99	129	2,345	--	2,474	52	892	--	944	3,418
1999–00	75	1,942	--	2,017	291	2,889	--	3,180	5,197
2000–01	74	691	--	765	128	698	--	826	1,591
2001–02	99	883	--	982	110	508	--	618	1600

[a] Local resident is a resident of Units 13, 11, or 12 along the Nabesna Road.
[b] Tier I and II combined.

Table 5 Nelchina caribou Hunt TC566 annual harvest chronology percent by harvest period, regulatory years 1997–2001

	Harvest Periods														
	Weeks (fall)								Months (winter)						
Regulatory year	1	2	3	4	5	6	7	8	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	n
1997–98	4	5	5	8	9	9	12	10	10	24	2	0	0	1	2,052
1998–99	6	8	9	10	9	16	13	11	11	8	--	--	--	--	2,434
1999–00	6	16	15	12	23	15	12	--	--	--	--	--	--	--	2,002
2000–01	0	5	10	6	9	14	17	12	8	7	3	1	2	5	760
2001–02	9	7	5	11	12	17	12	0	7	20	--	--	--	--	955

Table 6. Nelchina caribou Hunt TC566 harvest percent by transport method, regulatory years 1997–2001.

	Percent of harvest									
Regulatory year	Airplane	Horse	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Airboat	Unk.	n
1997–98	9	1	10	28	22	9	19	0	1	2,097
1998–99	6	1	11	38	4	11	27	1	1	2,478
1999–00	8	1	17	41	0	15	15	1	1	2,017
2000–01	6	1	11	33	18	12	18	2	1	765
2001–02	6	1	7	38	8	12	26	1	1	980

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 18 (41,159 mi^2)

HERD: Kilbuck Mountain and Mulchatna Herds

GEOGRAPHIC DESCRIPTION: Yukon–Kuskokwim Delta

BACKGROUND

Historically, caribou ranged throughout the Yukon–Kuskokwim Delta, including Nunivak Island, and populations probably peaked during the 1860s (Skoog 1968). By the early 1900s, there were few caribou in the lowlands of the Delta. From the 1920s to the 1930s, reindeer herds ranged throughout much of the area but declined sharply in the 1940s (Calista, 1984). Since the decline of the reindeer herds, the abundant caribou habitat throughout Unit 18 was only lightly used until the regular seasonal arrival of large numbers of caribou from the Mulchatna Caribou Herd (MCH) beginning in 1994.

The Andreafsky Caribou Herd (ACH) existed in Unit 18 north of the Yukon River until the mid 1980s. The origin of this small herd is unknown and there was disagreement whether these *Rangifer*-type animals were caribou or reindeer. Poor compliance with the hunting regulations probably contributed to their disappearance.

Caribou from the Western Arctic Caribou Herd (WAH), the largest herd in Alaska, occasionally venture into the northern part of Unit 18. Hunting regulations north of the Yukon River are liberal to allow hunters to take advantage of these infrequent hunting opportunities.

The Kilbuck Caribou Herd (KCH), or Qavilnguut Herd, was located in the Kilbuck and Kuskokwim mountains southeast of Bethel. Their range included the eastern portion of Unit 18, encompassing the edge of the lowlands of the Delta and the montane western border of Units 19B and 17B. Conservative management techniques were used to protect this small, discrete resident herd. Since 1994 and through this reporting period, large numbers of MCH caribou have seasonally invaded the entire range of the KCH. Our current interpretation is that the KCH has been assimilated by the MCH, and caribou hunting regulations in Unit 18, south of the Yukon River, should reflect that interpretation.

Since 1985, ADF&G and Fish and Wildlife Service (FWS) have cooperated to study the KCH, and more recently the MCH, in Unit 18. We deployed radiocollars and completed numerous

aerial surveys and radiotelemetry flights during this study. A technical paper detailing this effort is pending.

In 1990, we initiated cooperative management planning for the KCH and ADF&G joined with local residents and FWS to develop the Kilbuck Caribou Herd Cooperative Management Plan. Due to the assimilation of the KCH by the MCH, the plan is no longer followed, however, the Cooperative Planning Group continues to provide a forum to discuss caribou management with local residents in Unit 18.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The caribou management goals for Unit 18 are:

- Increase the number of caribou,
- Improve compliance with caribou hunting regulations, and
- Better understand the interaction between the KCH or other caribou in Unit 18 and the MCH.

MANAGEMENT OBJECTIVES

We no longer follow the specific management objectives outlined in the Qavilnguut (Kilbuck) Caribou Herd Cooperative Management Plan which were reported in previous management reports. Our current objectives are:

- Gather accurate caribou harvest information in Unit 18,
- Increase compliance with caribou hunting regulations,
- Monitor caribou in Unit 18 to assess sex and age composition, numbers, distribution, and calving, and to address questions of herd identity, and determine other population parameters of caribou using Unit 18.

METHODS

Since December 1990, we have met and corresponded with representatives from local villages and other agencies to discuss caribou management in Unit 18. More recently, we've also discussed the status of the KCH and the future of the working group.

We continued the cooperative caribou study and completed multiple flights using fixed-wing aircraft to monitor radiocollars deployed among KCH and MCH caribou and recorded radiocollar locations using Global Positioning System (GPS) equipment. Detailed methodology for the Kilbuck caribou study is available in Hinkes (1989) and Ernst (1993).

We conducted fall sex and age composition counts in the Kilbuck Mountains during October 2000 and October 2001. As in previous years, large numbers of MCH caribou were present and our results were pooled with other MCH data. Two observers and a pilot used an R44 helicopter to sample caribou for composition. A fixed-wing Cessna 185 aircraft equipped with radiotelemetry equipment was used to locate groups of caribou throughout the area.

We conducted spring calving and sex and age composition counts throughout the western, northern, and southern drainages of the Kilbuck Mountains. We used a fixed-wing Husky aircraft during 5 flights between May 16 and early June 6 in 2001 and 3 flights between June 7 and June 11 in 2002. Classification by age and sex from a fixed-wing aircraft would typically be difficult. However, the population was composed largely of bulls in bull groups that were easily identified by antler conformation. Multiple passes with the airplane were necessary only for cows and cow-like animals and because there were few such animals, this type of survey was possible.

We flew a Cessna 172 with members of the working group into the Kilbuck Mountains during June 2001 to show them the composition of the caribou in the area. This flight was instrumental in explaining our interpretation that the KCH was assimilated by the MCH.

Caribou harvest reporting has been minimal and deficient. In 1999–2000, we began an incentive program to increase compliance with harvest reporting requirements and we have continued this program through this reporting period. We offer prizes through a drawing to hunters who properly report their harvest. We utilized public service announcements and paid advertisements to educate the public about harvest reporting requirements and to encourage hunter participation in this program.

We conducted a single caribou reconnaissance flight north of the Yukon River during June 2002 but no caribou were located.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Before 1994, the KCH was small but growing and was expanding its range when approximately 35,000 Mulchatna caribou overran it in September/October 1994. There have been annual influxes of approximately 15,000 to 40,000 Mulchatna caribou ever since.

We located a calving group of approximately 150 caribou in the Heart Lake area along the border between Units 17 and 18 in June of 2000. This was the last time a significant number of caribou were found calving in a traditional KCH area. Nine radiocollars were deployed among yearling females within or near this group. We did not find any of these or other radiocollars in Unit 18 during subsequent calving area searches of 19.8 hours and 18.0 hours in spring of 2001 and 2002 respectively. Further, we did not find any groups of caribou larger than 10 that included calves. We found only 1 to 3 calves in any group and these were scattered from the southernmost portion of Unit 18 to just south of Eek Lake. Since June 2000, we have not found any obvious fidelity to any calving area. These data support our interpretation that the KCH has been assimilated by the MCH.

Population Composition

We conducted fall sex and age composition counts among MCH caribou in Unit 18 during October 2000 and again in October 2001 (Table 1). Complete MCH composition data can be found in the MCH caribou management report.

We conducted spring sex and age composition counts during calving throughout the eastern portions of Unit 18, including the former range of the KCH, to assist herd identity interpretations. We found few calves scattered throughout the area with the largest group (3 calves) found near Nanvak Bay, south of the southernmost portion of Unit 18 and outside the former range of the KCH. We also found that over 90% of the caribou in this area were bulls (Table 2). The overwhelming number of bulls in our samples suggests that the caribou in Unit 18 are part of a much larger population and supports our interpretation that the KCH has been assimilated by the MCH.

Distribution and Movements

Since 1994 and continuing through this reporting period, approximately 15,000 to 40,000 Mulchatna caribou entered Unit 18 from the east, generally during mid August to mid September. They wintered throughout the eastern lower Kuskokwim River and Kuskokwim Bay drainages, extending from the Whitefish Lake area near Aniak to the southernmost portions of Unit 18 and stayed through late March to early April when they moved westward into Units 17A, 17B, and 19B.

The routes used by Mulchatna caribou to leave Unit 18 in late winter are obvious from trails. Former calving areas such as those near Kisaralik Lake and others have major trails through them. We surmise that KCH caribou followed the thousands of MCH caribou that migrated through traditional KCH calving areas and that this was an important mechanism for the assimilation of the KCH by the MCH.

Occasionally, caribou are reported west of the Kuskokwim River. These reports are sporadic and no long-term presence of caribou west of the Kuskokwim River has been established.

Caribou from the Western Arctic Caribou herd (WAH) occasionally use portions of Unit 18 north of the Yukon River. The number of WAH caribou using this area is small relative to the size of the entire herd. Unit 18 is on the periphery of the WAH's range and use of this area is occasional and intermittent. We did not find any evidence of WAH caribou in Unit 18 during a reconnaissance flight conducted in June of 2002.

MORTALITY

Harvest

Season and Bag Limit

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season

Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18, north of the Yukon River.		
RESIDENT AND NONRESIDENT HUNTERS:		
1 caribou per day		
Bulls	16 May–30 Jun	16 May–30 Jun
Any Caribou	1 Jul–15 May	1 Jul–15 May
Unit 18, south of the Yukon River.		
RESIDENT HUNTERS:		
Up to 5 caribou	Season to be announced by emergency order	
NONRESIDENT HUNTERS:		No open season.

Board of Game Actions and Emergency Orders. To minimize the harvest of Kilbuck caribou, we opened the season by emergency order only when enough Mulchatna caribou were present in Unit 18 to overwhelm the Kilbuck herd. The 2000–2001 season was open from 9 September–31 March and the 2001–2002 season was open from 25 August–31 March. The bag limit was 5 caribou during both seasons. We coordinated with federal managers when we announced these openings and federal and state seasons and bag limits were aligned.

The Board of Game adopted 2 public proposals to change caribou regulations in Unit 18, south of the Yukon River during their November 2001 meeting. The resident season was changed from a season to be announced by emergency order to a 1 August–31 March season and a nonresident season of 1 September–1 October with a bag limit of 1 bull was added. These changes become effective during the 2002–2003 regulatory year and reflect a shift toward managing Unit 18 caribou for MCH rather than KCH caribou.

Hunter Harvest. In 2000–2001, 178 hunters reported killing 138 caribou including 104 bulls, 31 cows, and 3 of unknown sex. In 2001–2002, 208 hunters reported killing 383 caribou including 267 bulls and 116 cows.

Harvest reporting continues to be poor. We're addressing this issue through a harvest report prize drawing incentive and other public information and education tools. However, the value of our reported harvest data is still limited. Coffing, et al. (2000) report that Akiachak residents (population of 560) harvested 374 caribou during the 1998 calendar year. If we apply a similar harvest rate to approximately 10,000 residents having similar access to caribou in Unit 18 (4792 people in 13 villages and 5449 people in Bethel), we can clearly see the harvest of caribou is grossly under reported.

Permit Hunts. There were no permit hunts for caribou in Unit 18 during the reporting period.

Hunter Residency and Success. All caribou hunters in Unit 18 are residents because there was no open season for nonresidents during this reporting period. In 2000–2001, 80.7% of the hunters who reported were successful taking at least one caribou. In 2001–2002, 76.4% reported taking at least one caribou.

Harvest Chronology. Harvest occurs throughout the season. Typically, most of the harvest is unreported and occurs during the winter months when snow conditions are favorable for travel by snowmachine. Harvest is generally greatest during February and March.

Transport Methods. During the open water months of September and October, most hunters use boats to access hunting areas. Only a small proportion of hunters use airplanes. Most hunters use snowmachines after snow conditions improve enough to permit safe travel. Only rarely are other transportation methods used.

Other Mortality

Little direct information is available regarding other mortality of caribou in Unit 18. Caribou are an important prey species for wolves and predation by wolves has probably increased in recent years. The reported wolf harvest has increased more than tenfold in the last decade. Further, most of the wolves harvested in Unit 18 are taken opportunistically by caribou hunters.

Another source of mortality is predation by brown bears. However, we do not have an estimate of predation rates on caribou in Unit 18.

HABITAT

Assessment

The lichen ranges in the Kilbuck and southern Kuskokwim Mountains are in excellent condition. Before the influx of Mulchatna caribou into the KCH range, neither the Andreafsky nor the Kilbuck mountains had been substantially grazed by caribou or reindeer since the 1940s (Calista Professional Services and Orutsararmuit Native Council, 1984).

Enhancement

The existing caribou habitat in Unit 18 is underutilized. Enhancement is not being considered.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Cooperative Management Plan

After extensive agency and public input, the KCH Cooperative Management Plan was developed in 1994, revised in 1995, and again in 1997. The plan provides guidelines for management of the KCH. Now that the KCH no longer exists as a separate herd, this management plan is in limbo. However, members of the working group are still consulted for public input regarding caribou in Unit 18.

CONCLUSIONS AND RECOMMENDATIONS

Since 1986, the FWS and ADF&G have cooperatively studied the KCH and other caribou in Unit 18. Estimated at a minimum of 4220 animals in 1994, the KCH was a distinct resident herd in the Kilbuck and southern Kuskokwim Mountains. We observed these caribou calving for 12 consecutive years on high ridges near Kisaralik Lake, east and north of Greenstone Ridge, ridge tops on the southern edge of the Kilbuck Mountains, and the southwest edge of the Kuskokwim Mountains. The herd continued to grow and extend its range until it was engulfed by large numbers of Mulchatna caribou beginning in late October 1994. By June 2000, the area around Heart Lake was the only area where we could find any groups of caribou calving in the Kilbuck Mountains. Radiocollar locations of Kilbuck caribou and heavy trailing through former calving areas show that Kilbuck caribou mix with Mulchatna caribou and Kilbuck caribou have regularly left their 'traditional' range.

We conducted extensive searches during composition counts in spring of 2001 and 2002 but we did not locate any radiocollared caribou. However, researchers in Unit 17 found caribou with radiocollars in Unit 18 among calving MCH caribou. Further, our searches did not reveal significant calving in Unit 18. In fact, well over 90% of the caribou located were bulls. The most parsimonious explanation for these findings is that the KCH no longer exists as a separate herd.

The assimilation of the KCH by the MCH is a significant event because it changes our management direction. We recommend that management of caribou in Unit 18 focus on MCH caribou rather than KCH caribou. However, we should continue to monitor the Kilbuck Mountains for caribou calving and gather additional information about Mulchatna caribou in Unit 18 including: sex and age composition data, location information, seasonal range use, and number estimates.

We need to improve harvest reporting. The harvest report prize drawing incentive has increased interest and educating the public about reporting requirements is important. This incentive provides a platform for education and should be continued.

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Table 1 Fall composition of caribou from the Mulchatna Caribou herd (MCH) in Unit 18, 1999–2001

			Bulls			
Year	Cows	Calves	Small	Medium	Large	Total
1999	3277	462	594	261	137	4731
2000	1439	350	329	168	140	2426
2001	1299	286	223	153	90	2051

Table 3 Spring composition of caribou in Unit 18, 2000–2001

Year	Bulls	Cows/hard antlers	Cows/no antlers	Calves	Unknown	Total
2000	1132	22	23	4	46	1227
	(92.3%)	(1.8%)	(1.9%)	(0.3%)	(3.7%)	
2001	1095	0	27	4	5	1131
	(96.8%)	-	(2.3%)	(0.4%)	(0.4%)	

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 19 (A, B, C, and D) and 21 (A and E) (60,523 mi^2)

HERDS: Beaver Mountains, Big River–Farewell, Rainy Pass, Sunshine Mountains, and Tonzona (McGrath area herds)

GEOGRAPHIC DESCRIPTION: Drainages of the Kuskokwim River upstream from the village of 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

BACKGROUND

Historically, caribou have played an important role in the McGrath area. During the 1800s caribou occurred sporadically in far greater numbers over a greater range than at present. Discussions with village elders and reports of early explorers corroborate this, although documentation is poor (Hemming 1970). The Mulchatna caribou herd once roamed throughout the Kuskokwim Basin, but as numbers dwindled, this herd retreated south to better range (Whitman 1997). As the Mulchatna Herd increased during the 1990s, it expanded its winter range northward into portions of Unit 19.

Small caribou bands have apparently existed in the Kuskokwim Mountains, which divide Unit 19 from Unit 21, since at least the turn of the twentieth century. Reindeer herders from the Yukon River villages of Holy Cross and Shageluk traditionally herded their animals to summer range in these mountains. In areas where reindeer were herded, animals were occasionally lost. Some people believe the *Rangifer* herds in the Kuskokwim Mountains today are descendants of feral reindeer or reindeer–caribou hybrids. This theory is supported by the fact that the Beaver Mountains caribou herd calves much earlier than many other caribou herds (early-to-mid May), although this may be due to abundance of food rather than the influence of reindeer genes.

The Beaver Mountains Herd and Sunshine Mountains Herd are the only 2 herds in the Kuskokwim Mountains north of the Kuskokwim River (Pegau 1986). Previous reports described these herds as the Kuskokwim Mountains Herd/Herds or the Beaver Mountains Herd and Sunshine (Sunshine/Nixon) Mountain Herd (Shepherd 1981; Pegau 1986). In the early 1980s Pegau (1986) radiocollared caribou in the Beaver and Sunshine Mountains. Range overlap was

not documented during the 4-year study. However, radiocollared caribou from the Beaver Mountains ranged south almost to Horn Mountain. Caribou in that vicinity were previously called the Kuskokwim Mountains Herd, but are now considered Beaver Mountains Herd animals.

Herds presently recognized south of the Kuskokwim River include the Tonzona, Big River–Farewell (previously called Big River), Rainy Pass, and Mulchatna herds. Radiotelemetry data confirmed the separate identity of the Tonzona Herd, although there is some interaction between this herd and the Denali Herd (Del Vecchio et al. 1995). Pegau (1986) radiocollared caribou in the Big River–Farewell Herd near Farewell in the early 1980s. During the first year of the study, these caribou remained in the Farewell area, but some moved near the Swift River the following year and did not return for at least 2 years. These observations raised as many questions as they answered, and the discreteness and extent of the range of the Big River–Farewell Herd is still poorly understood.

The Rainy Pass Herd occupies the Rainy Pass area, drainages at the head of the South Fork Kuskokwim River, and surrounding area. This herd is perhaps the least studied and least understood in the state. Issues concerning the Rainy Pass Herd are herd size, delineation of the range, and discreteness and interaction with other local herds.

Hunting effort on these 5 caribou herds has decreased over the past decade, probably because the herd populations have decreased. Most local residents (residents of Unit 19A) harvest Mulchatna herd caribou, although changing migration patterns affect each village's annual use of caribou. Nonresident and nonlocal residents also primarily harvest Mulchatna caribou migrating into Unit 19.

Hunter effort is low on the Beaver Mountains and Sunshine Mountains herds. Local residents stopped hunting them since the winter season was closed in the 1990s. Travel in winter was the only affordable access to these herds' ranges. Nonresidents hunt these herds in low but stable numbers, mostly in combination with moose hunts in adjacent Unit 21A. Total harvests for these herds has been <15 caribou annually since the winter season was suspended. The Tonzona Herd is used by local hunters from Nikolai and Telida when the herd moves near those villages during the late fall and winter. Nonresidents and nonlocal residents harvest the greatest proportion of this herd. Residents of Nikolai periodically hunt the Big River–Farewell Herd during winter. Nonresidents and nonlocal residents hunting for moose, sheep and bison take the majority of animals harvested from this herd. The Rainy Pass Herd is hunted entirely by nonlocal and nonresident hunters primarily hunting moose and sheep.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Big River–Farwell Herd (Unit 19):

- Provide for a harvest of up to 100 bull caribou.

Rainy Pass Herd (Units 16B, 19B and 19C):

- Provide for a harvest of up to 75 bull caribou.

Sunshine and Beaver Mountains herds (Units 19A, 19D, and 21A):

- Provide for a combined harvest of up to 25 caribou from the Sunshine and Beaver Mountains herds.

Tonzona Herd (Units 19C and 19D):

- Provide for a harvest of up to 50 caribou.

METHODS

We reviewed hunter harvest reports and compiled harvest data annually. Harvest data were summarized by regulatory year (RY = 1 Jul–30 Jun; e.g., RY00 = 1 Jul 2001 through 30 Jun 2002) and do not include Mulchatna Herd animals taken in Unit 19. In RY98, ADF&G's Information Management Section began to send out reminders to hunters who failed to report their harvests, resulting in higher reporting rates. While data with higher reporting rates are more precise, they must not be interpreted necessarily as increases in harvests. Also, some harvest reports are difficult to code to specific location because hunters provide ambiguous information. This causes difficulty in discerning which herd the harvested animal was from, especially in Unit 19C where there are 3 different herds.

Incidental observations of caribou numbers and calving areas were made from small, fixed-wing aircraft. Composition surveys were conducted using a Robinson R-44 helicopter. Caribou were classified by sex, age, and for bulls, by the size of antlers (Eagan 1993).

Five-month-old female calves in the Rainy Pass Herd were captured and fitted with radio collars in October 1999 and 2000 to facilitate composition counts and general monitoring. These caribou were captured using the helicopter darting technique (Valkenburg 1997). Composition counts were conducted during the October 1999 and 2000 capture operations. During RY00–RY01, we did not complete a population census of any McGrath area herds. However, we did conduct a single aircraft search of the Beaver Mountains Herd's range during June 2001 and composition counts of the Rainy Pass caribou herd during October 2000.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Overall, the McGrath area caribou herds probably declined or remained stable during this reporting period (RY00–RY01), based on survey flights, composition counts, hunter information and mortality of radiocollared caribou.

Population Size

The current population estimate for the Beaver Mountains Herd is 150–200 caribou. The Beaver Mountains Herd has declined since the early 1960s. In 1963 Skoog (1963) estimated 3000 animals, Pegau (1986) estimated 1600 in 1986, Whitman (1995) estimated 865 in 1992, and 536

animals in 1994 (Whitman 1997). In early summer 1995, Whitman counted about 400 animals concentrated on the calving area. The normal herd range was searched in June 2001 and we observed 86 caribou in a single group. A second group of caribou of more than 50 animals was observed in an adjacent area by a member of the public.

The current population estimate for the Sunshine Mountains Herd is 100–150 animals. This herd has also declined in recent years. Whitman (1997) estimated the population was 700 animals in 1994 and 500 in 1995. This herd seems to mirror the population dynamics of the Beaver Mountains Herd and other small mountain herds like the Chisana and Mentasta, where predators probably have a major impact on calf survival (Jenkins 1996; Whitman 1997; Mech et al. 1998). In July 2000 a search of the Sunshine Mountains was conducted from the Cloudy Mountains north to Von Frank Mountain, mostly along ridges and open hillsides. No caribou were observed, however, Sunshine Mountains caribou were observed calving in the Nixon Fork of the Takotna during 2001 and 2002. Based on these summer observations and the July 2000 search, it is possible that Sunshine Mountains caribou use lower elevation areas during summer, contrary the habits of most Interior caribou herds.

The Rainy Pass Herd probably numbers 1500–2000 caribou. The Rainy Pass Herd probably also declined during RY00–RY01. In July 1996, 1093 caribou were counted in Unit 16 incidental to sheep surveys. Whitman (ADF&G, personal communication) suspected that 1000–1500 more caribou of the Rainy Pass Herd were located in Unit 19 at that time but were not counted.

The current estimate for the Big River–Farewell Herd is 750–1500 animals. Whitman (1997) estimated the Big River–Farewell Herd at 1000–2000 animals. The herd has probably declined since that estimate, including during RY00–RY01, based on information collected from the adjacent Rainy Pass Herd.

The current estimate for the Tonzona Herd is 750–1000 animals, based on hunter observations and extrapolation of information collected on the adjacent Rainy Pass Herd. The Tonzona Herd has probably declined during this reporting period. In 1991, National Park Service staff estimated 1300 caribou in the Tonzona Herd. This estimate was done as a comparison to the nearby Denali Herd in Denali National Park and Preserve.

The Mulchatna Herd is not a subject of this report. However, this herd of approximately 147,000 caribou has extended its range into the Kuskokwim drainage. The ranges of the Beaver Mountains, Sunshine Mountains, and Big River–Farewell herds currently overlap the periodic dynamic winter range of the Mulchatna Herd.

Composition

Herd composition counts were conducted on the Rainy Pass caribou herd during October 1999 and during this reporting period in October 2000 (Table 1). During the October 1999 survey, 441 caribou were classified and a large part of the suspected winter range was searched. Calf:cow ratios were low at 8 calves:100 cows, bull:cow ratios were 28:100. During the October 2000 survey, 152 caribou were classified. Because of bad weather, half of the area searched in 1999 was searched in 2000. During this survey the calf:cow ratio was 12:100 and the bull:cow ratio was 115:100 (Table 1). Two explanations may account for the apparently skewed bull:cow ratio

for the October 2000 composition count. The first is error in classifying cows as small bulls, which would account for the disproportionate number of small bulls observed and the skewed the bull:cow ratio. The second is that a disproportionate number of males were found due to the small sample size and limited search area. To further evaluate the questionable results of the 2000 survey, composition surveys were planned in 2001 and 2002 but were not conducted because of bad weather.

Distribution and Movements

Beaver Mountains. The Beaver Mountains Herd ranges from the Beaver Mountains in the north to Horn Mountain near Red Devil in the south (Pegau 1986). Calving is in the Beaver Mountains, but postcalving groups occur throughout the herd's range. Wintering areas include the north side of the Kuskokwim Mountains from the Iditarod River north to the Dishna River.

Sunshine Mountains. The range of the Sunshine Herd is predominantly in the drainages of the Nixon Fork from Cloudy Mountain to Von Frank Mountain and in the headwaters of the Susulatna River, including Fossil Mountain and the Cripple Creek Mountains. Calving occurs throughout the range, mostly on the Nixon Flats. Other than the Kenai Lowlands Herd, the Sunshine Mountains Herd is the only herd in Alaska that calves in muskeg and low-lying areas. Wintering areas are mostly in the drainages of the Nixon Fork. In midsummer these caribou are found predominately in the Sunshine Mountains, and small groups were observed in summer 2001 and 2002 in the Nixon Flats.

Tonzona. The Tonzona Herd's range is from the Herron River to the lower Tonzona River near Telida and north to Otter Lake. Summer concentrations are in the foothills of the Alaska Range. Winter range consists of lower elevation areas from Telida up the Swift River and north to the Otter Lake area (Del Vecchio et al. 1995).

Big River–Farewell. The range of the Big River–Farewell Herd is from the South Fork Kuskokwim River southwest to the Swift River. Summering areas are in the foothills on the north side of the Alaska Range. Wintering areas are in the flats north of the summer range.

Rainy Pass. The Rainy Pass Herd's range is not well known. The herd has been found from the confluence of the Post River south through Rainy Pass to the west side of Cook Inlet. Caribou have been observed throughout the mountains in the summer in both Units 16B and 19C. Identified wintering areas of radiocollared individuals are in the Post Lake area, upper South Fork and upper Ptarmigan Valley. However these areas do not constitute the entire winter range of this herd.

MORTALITY

Harvest

Season and Bag Limit.

Unit/Bag limit	Resident open seasons	Nonresident open seasons

Unit/Bag limit	Resident open seasons	Nonresident open seasons
Unit 19A, Lime Village Management Area.		
RESIDENT HUNTERS: 4 caribou.	10 Aug–31 Mar	
4 bulls or 4 cows without calves.	1 Apr–9 Aug	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–31 Mar
Remainder of Unit 19A and all of Unit 19B.		
RESIDENT HUNTERS: 5 caribou, no more than 2 may be bulls.	1 Aug–15 Apr	
NONRESIDENT HUNTERS: 2 caribou.		1 Aug–15 Apr
Note: In 2002 a nonresident closed area was established in Unit 19A. See description in Alaska Hunting Regulations #43. This area is closed to all nonresidents for caribou hunting.		
Unit 19C		
RESIDENT AND NONRESIDENT HUNTERS: 1 bull.	10 Aug–20 Sep	10 Aug–20 Sep
Unit 19D, drainage of the Nixon Fork.		
RESIDENT AND NONRESIDENT HUNTERS: 1 caribou.	10 Aug–30 Sep	10 Aug–30 Sep
Unit 19D, remainder.		
RESIDENT HUNTERS: 1 caribou.	10 Aug–30 Sep 1 Nov–31 Jan	
or		
5 caribou.	Season to be announced.	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–30 Sep
Unit 21A		
RESIDENT AND NONRESIDENT HUNTERS: 1 caribou.	10 Aug–30 Sep 10 Dec–20 Dec	10 Aug–30 Sep 10 Dec–20 Dec
Unit 21E		
RESIDENT HUNTERS: 1 caribou and 2 additional caribou during winter if season announced.	10 Aug–30 Sep	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–30 Sep

Alaska Board of Game Actions and Emergency Orders. During the March 2002 meeting, the Board of Game passed a proposal to restrict caribou hunting by nonresidents in Unit 19A. A nonresident closed area was created which encompasses a 4-mile wide corridor along the mainstem and tributaries of the Kuskokwim River in Unit 19A from and including the Holitna River to Kalskag. The board also passed a proposal to include the Aniak drainage into the Holitna–Hoholitna Management Area, which requires hunters entering Unit 19B by aircraft to fly all big game taken in Unit 19B out of the area by aircraft. This prohibits hunters who float rivers in Unit 19B from transporting big game carcasses from Unit 19B into Unit 19A by boat or raft. The object was to reduce meat spoilage by shortening travel distance and time spent in the field with harvested big game.

Hunter Harvest. The reported harvest of local caribou herds declined in Unit 19 during RY00–RY01. During RY90–RY94 the average reported caribou harvest was 172. Harvest declined between RY95 and RY99 to an average of 97 caribou. These declines in harvest can be attributed to population declines in the Rainy Pass, Big River–Farewell, and Tonzona herds (Table 2). Harvests have declined further since RY99. The average reported Unit 19 caribou harvest during RY00–RY01 was 76 and <1% were females (Table 3).

Hunter Residency and Success. During RY89–RY99 and RY00–RY01, local hunters took <4% of the reported harvest of local caribou herds (Table 4). However, local users are less likely to report hunting activities than nonlocal residents and nonresidents. During RY00–RY01, nonlocal residents harvested about 33%, and nonresidents harvested 66% of harvested animals. Historically (RY89–RY99) nonlocal Alaskans took 43% of the total harvest.

Harvest Chronology. The majority of caribou harvested were taken during August and September. During RY00–RY01, about 33% of the harvest was during August, 63% was in September, and 1% was in October. This harvest chronology did not change significantly in the past 5 regulatory years (Table 5).

Transport Methods. Aircraft were the most common means of hunter transportation to access the area caribou herds. During RY00–RY01, 71% of caribou hunters used aircraft, 22% used 3- or 4-wheelers, <2% used horses, <3% used snowmachines, and zero percent used highway vehicles or boats (Table 6).

Other Mortality

No specific data were collected concerning natural mortality rates or factors during RY00–RY01. However, wolf predation may be high within most McGrath area herds. The early calving dates noted during survey flights in the Beaver Mountains and the low percentage of calves (<1%) in the fall suggest the Beaver Mountains Herd is highly productive but suffers from high neonatal mortality. The Sunshine Mountains Herd may also suffer high predation mortality. Winter mortality during RY94 was probably substantial based on the drop in harvest from RY94 to RY95. Winter 1994–1995 was the most severe winter on record, based on snow-depth data collected in McGrath by the National Weather Service.

HABITAT

Biologists have not investigated caribou range conditions in Units 19 and 21 in recent years, but range is probably not limiting. Lichens appear abundant on winter ranges, and these areas supported 4–5 times as many caribou during the 1960s. Adult body size was also relatively large when radio collars were deployed in the 1990s. Early calving is another indicator that body condition is good, suggesting good habitat.

CONCLUSIONS AND RECOMMENDATIONS

We met our management objectives for all caribou herds in the McGrath area. The objective for the Big River–Farewell Herd was to provide for a harvest of up to 100 bull caribou. The average reported harvest during RY00–RY01 was 28. The objective for the Rainy Pass Herd was to provide for a harvest of up to 75 bull caribou, and the average reported harvest was 21. The objective for the Sunshine and Beaver Mountains herds was to provide for a combined harvest of up to 25 caribou, and the average reported harvest was 5 caribou. The objective for the Tonzona Herd was to provide for a harvest of up to 50 caribou and the average reported harvest was 7 caribou.

Caribou harvests from the Big River–Farewell, Tonzona, and Rainy Pass herds decreased during RY00–RY01 and we estimate that herd size has also declined. Reasons for the decline are unknown but predation may be a key factor, based on Rainy Pass Herd data that shows heavy calf weights and low calf numbers in the fall. A second factor may be the decline in sheep hunter numbers in Unit 19C, which would reduce incidental caribou harvest.

All the herds in the McGrath area are small and exhibit special challenges in developing cost-effective and efficient survey–inventory programs. Some changes were implemented to enhance survey and inventory during this reporting period and plans are being developed to enable better herd monitoring. Research is needed to develop more efficient techniques directed at management applications of these small caribou herds.

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TABLE 1 Composition counts for the Rainy Pass caribou, Unit 19C, 1999–2000

Date	Bulls:100 Cows	Calves:100 Cows	Calves	Cows	Bulls	Total
10/28/99	28	8	25	323	93	441
10/13/00	115[a]	12	8	67	77	152

[a] Bull:cow ratio calculated for 2000 is suspected to be biased due to classification errors or small sample size.

TABLE 2 McGrath[a] area caribou harvest by herd, regulatory years 1989–1990 through 2001–2002

Regulatory year	Successful Hunters						
	Beaver Mtns	Sunshine Mtns	Farewell–Big River	Rainy Pass	Tonzona	Unspecified	Total
1989–1990	12	2	49	84	12	9	168
1990–1991	5	2	72	115	15	2	211
1991–1992	13	0	65	101	37	1	217
1992–1993	4	2	51	62	5	2	126
1993–1994	3	1	61	35	15	19	134
1994–1995	2	0	82	57	25	6	172
1995–1996	1	0	55	30	13	3	101
1996–1997	5	0	35	42	12	1	95
1997–1998	0	0	44	24	11	2	81
1998–1999	5	0	35	28	13	21	102
1999–2000	3	0	41	24	11	26	105
2000–2001	3	0	25	26	8	20	82
2001–2002	2	4	31	16	6	10	69

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.

TABLE 3 McGrath[a] area caribou harvest by sex, regulatory years 1989–1990 through 2001–2002

Regulatory year	Males	(%)	Females	(%)	Unspecified	Total
1989–1990	153	(92)	13	(8)	2	168
1990–1991	188	(90)	22	(10)	1	211
1991–1992	186	(86)	30	(14)	1	217
1992–1993	109	(87)	16	(13)	1	126
1993–1994	131	(98)	3	(2)	0	134
1994–1995	172	(100)	0	(0)	0	172
1995–1996	99	(97)	3	(3)	0	102
1996–1997	94	(100)	0		1	95
1997–1998	79	(99)	1	(1)	1	81
1998–1999	97	(97)	3	(3)	1	101
1999–2000	101	(98)	2	(2)	2	105
2000–2001	78	(93)	4	(5)	2	84
2001–2002	65	(92)	6	(8)	0	71

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.

TABLE 4 McGrath[a] area caribou harvest by location of residence, regulatory years 1989–1990 through 2001–2002

Regulatory year	Local resident[b]	Nonlocal resident	Alien and Nonresident	Total	Percent nonresident
1989–1990	9	129	120	261	47
1990–1991	6	125	160	297	55
1991–1992	12	177	140	332	43
1992–1993	5	86	80	172	47
1993–1994	10	104	98	214	46
1994–1995	3	115	146	264	55
1995–1996	10	72	90	174	52
1996–1997	3	20	68	91	75
1997–1998	2	16	58	81	72
1998–1999	0	21	74	95	78
1999–2000	1	39	65	105	62
2000–2001	0	20	44	64	69
2001–2002	2	21	38	61	62

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.
[b] Local resident is any resident of Unit 19.

TABLE 5 McGrath[a] area caribou harvest by month, regulatory years 1989–1990 through 2001–2002

Regulatory year	Harvest by month									
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Unk	*n*
1989–1990	0	47	104	14	0	0	2	1	1	169
1990–1991	0	47	150	8	0	2	0	0	4	211
1991–1992	0	80	122	11	2	0	0	0	2	217
1992–1993	0	41	80	4	0	1	0	0	0	126
1993–1994	0	53	73	0	2	3	1	0	2	134
1994–1995	0	60	103	9	0	0	0	0	2	174
1995–1996	0	32	69	1	0	0	0	0	0	102
1996–1997	0	34	58	0	1	0	0	0	2	95
1997–1998	0	27	52	1	0	0	0	0	1	81
1998–1999	0	24	70	2	0	0	0	0	0	96
1999–2000	0	30	66	8	0	1	0	0	0	105
2000–2001	0	31	49	0	0	0	0	0	0	80
2001–2002	0	19	46	1	0	0	0	0	5	71

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.

TABLE 6 McGrath[a] area caribou harvest by transport method, regulatory years 1989–1990 through 2001–2002

Regulatory year	Harvest by transport method								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
1989–1990	213	9	14	7	4	3	10	3	263
1990–1991	268	10	5	6	0	2	4	2	297
1991–1992	253	21	7	22	2	7	18	2	332
1992–1993	143	11	5	10	1	2	0	0	172
1993–1994	160	20	9	10	5	7	3	0	214
1994–1995	219	10	5	33	0	5	0	2	274
1995–1996	132	5	6	23	0	4	0	4	174
1996–1997	78	8	0	6	1	2	0	0	95
1997–1998	65	0	0	15	0	1	0	0	81
1998–1999	71	5	1	25	0	0	0	0	102
1999–2000	77	6	3	16	1	2	0	0	105
2000–2001	50	2	0	10	0	2	0	0	64
2001–2002	39	0	0	17	3	2	0	0	61

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 20A (6796 mi^2)

HERD: Delta

GEOGRAPHIC DESCRIPTION: Central Alaska Range and Tanana Flats

BACKGROUND

The Delta Herd primarily inhabits the foothills of the central Alaska Range between the Parks and Richardson Highways and north of the divide separating the Tanana and Susitna drainages. In recent years, the herd has also used the upper Nenana and Susitna drainages north of the Denali Highway. Like other small bands of Alaska Range caribou, the herd drew little attention until population identity studies began in the late 1960s. During the early-to-mid 1980s, the department recognized a small group of caribou in the Yanert drainage as a separate herd. The growing Delta Herd eventually mixed with the Yanert Herd, and after 1986 the Yanert caribou adopted the movement patterns of the larger herd (Valkenburg et al. 1988).

By the mid 1970s the herd rose from anonymity to a herd of local and scientific importance. Its close proximity to Fairbanks and fairly good access made it popular with Fairbanks hunters. For the same reasons, it has been the subject of intensive management and research. Long-term studies of caribou population dynamics, ecology, and predator–prey relationships resulted in numerous publications and reports. Boertje et al. (1996) and Valkenburg et al. (1996, 2002) provide summaries and citations.

Estimated at 1500–2500 in 1975, by 1989 the Delta Herd had grown to a peak of nearly 11,000. It declined sharply in the early 1990s, as did other central Alaska Range herds, to less than 4000. Valkenburg et al. (1996) present a detailed analysis of the decline. The herd continued a slow decline and dropped to less than 3000 animals by the late 1990s.

Since statehood in 1959, 2 wolf control programs have been conducted in Unit 20A. During 1976–1982, state biologists killed wolves from helicopters to increase moose numbers and harvest. Boertje et al. (1996) summarized the influence of this program on moose, caribou, and wolves. From October 1993 to December 1994 state biologists and trappers reduced wolf numbers by trapping to halt the decline of the caribou herd. This ground-based control

program was terminated amid considerable controversy. Valkenburg et al. (2002) summarized the effects of this program on the Delta caribou.

Harvest and harvest regulations also varied widely due to population fluctuations and strong hunter interest. The Alaska Board of Game suspended hunting in 1992 in response to declining numbers, and the herd remained closed to hunting through regulatory year (RY) 1995 (e.g., RY95 begins 1 Jul 1995 and ends 30 Jun 1996). Hunting has been by drawing permit for bull caribou only since the hunt was resumed in RY96.

Research and enhancement of Delta caribou remain regional priorities. The department initiated an experimental diversionary feeding program in 1996 to determine whether wolves can be diverted from calving areas during the peak of calving. The project was intended to evaluate the feasibility of this technique for increasing neonate survival (Valkenburg et al. 2002).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

Since the mid 1970s, goals for the herd included providing high-quality hunts, maximum harvests, and trophy caribou. The recent decline of the herd gave impetus to the current management goals of restoring the herd and resuming consumptive use. Likewise, the current management objectives reflect regulations (5 AAC 92.125) enacting the 1993–1994 wolf control effort to reverse the decline. Although the wolf control program was suspended prematurely, the regulations remain in place.

MANAGEMENT OBJECTIVES

- Maintain a bull:cow ratio of ≥30:100 and a large bull:cow ratio of ≥6:100.
- Reverse the decline of the herd and increase the midsummer population to 5000–7000 caribou.
- Sustain an annual harvest of 300–700 caribou.

METHODS

POPULATION STATUS AND TREND

Population Census

We estimated population size using the radio-search technique and complete visual searching of areas where aggregations were most likely to occur (Valkenburg et al. 1985). We photographed large groups from a DeHavilland Beaver aircraft with a belly-mounted Zeiss RMK-A 9×9 camera and from Piper Cubs and Bellanca Scouts with 35-mm cameras loaded with 100 or 200 ASA Kodak color print film. Caribou in photographs were counted with an 8× magnifying glass.

In 2001 the herd was counted on 10 July using 4 fixed-wing aircraft including the DeHavilland Beaver. Due to weather and pilot availability, the 4 fixed-wing flights were flown over a 2-week period between 27 June and 10 July. The first flight searched for caribou on the south side of the Alaska Range between the Susitna Glacier and the Parks Highway. During that flight, 229 caribou were located that were believed to be Delta Herd animals (no radio collars were located). On the second flight, on 3 July, we concentrated search effort on the north side of the Alaska Range between the Granite Mountains and the West Fork of the Little Delta River. During that flight, 113 Delta Herd caribou were counted, including 6 radiocollared animals. Two flights, including the photography flight with the Beaver, were flown on 10 July in clear, windy conditions in the general vicinity of the Wood River. A fixed-wing aircraft searched peripheral areas for caribou, but strong winds prevented an effective search, and only 2 additional caribou were observed. The crew of the DeHavilland Beaver photographed or counted 9 major groups consisting of 2046 caribou and 48 radio collars. Most of these were located in the upper Gold King/Mystic/Moose Creek drainages with the remainder of the herd scattered in small groups across their range. Windy conditions prevented searching the western drainages of Unit 20A, including Healy and Moody Creeks, and the Yanert River drainage.

In 2002 the herd was counted on 28 June using 6 fixed-wing aircraft including the DeHavilland Beaver. The crew of the DeHavilland Beaver photographed 7 major groups consisting of 1678 caribou. Seven hundred and thirty-two caribou in numerous smaller groups were photographed or counted from 5 fixed-wing aircraft. The majority of caribou photographed and counted were located in upper Mystic Creek and along the divide between the upper Wood and Yanert Rivers, although caribou were scattered across their entire range. Three radiocollared Delta Herd caribou, associated with 514 caribou, were located in the upper Nenana River and Butte Lake areas. Assuming 1 Delta Herd radio collar represented about 50 caribou, we estimated that approximately 150 of the caribou found on the south side of the Alaska Range were Delta Herd animals and, therefore, were included in the census. All other groups of caribou located during the census were believed to be composed entirely of Delta Herd caribou. We were able to search all appropriate habitat between Jarvis Creek on the east and the Parks Highway on the west because conditions were good with clear skies and light winds.

Population Composition

We conducted composition surveys using R-22 or R-44 helicopters and Bellanca Scout or Piper Super Cub aircraft. Biologists in the fixed-wing aircraft located the radiocollared caribou. Observers in the helicopter classified caribou that were in groups with radiocollared members and also classified any caribou found in a search of the surrounding area. We broadly searched areas containing numerous radiocollared caribou for additional groups. We also classified any caribou encountered while in transit between search areas. Classification categories consisted of cows; calves; and large, medium, and small bulls. Observers identified bulls by the absence of vulva and classified bulls by antler characteristics (Eagan 1993). We tallied the composition of each group on a 5-position counter and recorded the tallies on a data sheet.

In 2000 we classified 1010 caribou on 3–4 October under adequate conditions. During the survey, several hundred Nelchina and Delta Herd caribou were mixed during the rut in the upper Nenana/Susitna drainages. A large group of caribou located in the Monahan Flats (63°14', 147°52'), in which 404 caribou were classified (48 small bulls, 41 medium bulls, 16 large bulls, 222 cows, and 77 calves), was not included in the results because radiocollared caribou from the Delta Herd were not present in the group.

In 2001 we classified 1378 caribou in 19 groups on 30 September. Weather conditions consisted of a heavy overcast with some light rain and snow and moderate winds. The majority of the caribou were located in the West Fork of the Little Delta River and Yanert River drainage near Dick Creek. Although snow cover was incomplete during the survey, sightability was adequate.

We monitored harvest characteristics through drawing permit hunt reports and summarized harvest data by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The Delta Herd declined from over 10,000 in 1989 to less than 4000 in 1993 (Table 1). The decline resulted from interrelated effects of adverse weather and predation and also occurred in neighboring herds (Valkenburg et al. 1996). However, the Delta Herd declined more than the neighboring Denali and Macomb herds. The Delta Herd existed at a much higher density than Denali and Macomb herds, indicating that density-dependent food limitation might have influenced the magnitude of the decline (Valkenburg et al. 1996). Since the decline, estimates of the size of the herd have varied. Survey data indicated the herd increased slightly in 1994 and 1995, but subsequent data indicated a declining trend. The minimum herd size declined from 4646 caribou in 1995 to 3227 caribou in 2000.

In 2001 we counted 2390 caribou in the Delta Herd and accounted for 54 of 67 active collars. Given the number of caribou counted and the proportion of radio collars found, we estimated the herd at approximately 2965 caribou (Table 1). That was a decrease of approximately 262 caribou from the 2000 census. Given the relatively low calf:cow ratios observed during composition counts the past 5 years, this decrease was not unexpected.

In 2002 we counted 2410 caribou in the Delta Herd and accounted for 49 of 57 active radio collars. Given the number of caribou counted and the proportion of radio collars found, we estimated the herd at approximately 2800 caribou (Table 1). This is a decrease of approximately 160 caribou from the 2001 census. Again, given the relatively low calf:cow ratios seen the past 5 years, this decrease was not unexpected. The slightly higher calf:cow ratio observed in 2002 (24:100) will likely result in a stable or slightly increasing herd between 2002 and 2003.

Population Composition

Bull:cow ratios have varied considerably since 1990, ranging from 24:100 to 46:100, but have remained consistently high since 1998 (Table 1). The ratio of large bulls:100 cows improved once the steep population decline ended in about 1993. Most of the short-term variance in bull:cow ratios is probably a result of variable behavior and distribution of bulls during counts. Weather can affect herd distribution, movements, and behavior during rut counts.

In general, calf:cow ratios have been relatively low and declining through the 1990s and that trend continued into the early 2000s (Table 1). Ratios in 2000 and 2001 were the lowest observed since 1993. Calf mortality studies conducted during 1995–1997 indicate this was primarily due to predation by wolves, grizzly bears, and golden eagles (Valkenburg et al. 2002). Analysis of fecal samples collected in late winter 1989 and 1993 indicated depletion of the foothill lichen range in Unit 20A (Valkenburg 1997; Valkenburg et al. 2002). The proportion of lichens in the diet was relatively low and the proportion of mosses high compared to caribou from other Interior herds.

Distribution and Movements

Through the mid 1980s, the Delta Herd showed strong fidelity to calving areas between the Delta and the Little Delta Rivers in southeastern Unit 20A (Davis et al. 1991). However, as the herd increased, the area used for calving extended to the foothills between Dry Creek and the Delta River (Valkenburg et al. 1988). After 1993, the herd also used the upper Wood River, Dick Creek, upper Wells Creek, and the upper Nenana and Susitna drainages for calving (Valkenburg et al. 2002). During the remainder of the year, the herd is generally distributed among the northern foothills from the Delta River to the Nenana River. However, during fall and early winter 2000, a significant portion of the Delta Herd was located east of the Delta River in the Donnelly Dome/Flats area.

MORTALITY

Harvest

Season and Bag Limit.

	Resident open season	Nonresident open season
Unit 20A		
1 bull by drawing permit only; up to 100 permits may be issued.	10 Aug–20 Sep	10 Aug–20 Sep

Alaska Board of Game Actions and Emergency Orders. In response to a proposal at the March 1996 meeting, the board authorized a drawing permit hunt beginning RY96. As noted previously, harvest had been suspended in RY92. We recommended 75 permits based on improvement in recruitment and large bull:cow ratios, and issued 75 permits in RY96 and in RY97. We issued 100 permits annually during RY98–RY01 in response to proposals to increase the number of permits. No emergency orders were issued during this reporting period.

Permit Hunts. Since RY98, when the department first issued 100 permits for DC827, both the number of hunters and success rate have declined (Table 2). During that period, slightly more than 1 in 3 permittees reported not hunting. Success rate declined sharply between RY99 and RY00 to 35%, the lowest recorded since the hunt began in RY96. Success rate improved in RY01, but remained lower than those reported in RY97–RY99. Declining hunter participation and success rate may be a function of the herd being more widely dispersed and a larger portion of the herd being distributed across the eastern portion of their range during recent hunting seasons. The eastern portion of the herd's range is relatively inaccessible compared to the western portion where access is good, especially by ATV and horseback.

Hunter Residency and Success. Local residents of Unit 20 harvested more caribou than nonlocal residents or nonresidents during RY00–RY01 (Table 3). This may simply be a function of local hunters holding the majority of the permits. Sixty-seven percent of the hunters reporting from RY97 through RY01 were local hunters. In addition, local hunters have advantages over nonlocal hunters, such as proximity to the hunt area and local knowledge of access, herd distribution and movements, which may result in differential harvest rates. Whereas local residents harvested the most caribou, nonresidents on the other hand had the highest success rates (67%). A likely explanation is that nonresidents are more inclined to participate in guided hunts, which typically have higher success rates than nonguided hunts preferred by resident hunters. In RY00 and RY01, 42% (5/12) of the nonresident hunters reported using a guide compared to 0% (0/113) for resident hunters.

Harvest Chronology. No clear trends were apparent in harvest chronology for RY96 through RY01 (Table 4). During RY96 harvest was, for the most part, evenly distributed with slightly fewer caribou taken in late August. During RY97 the highest harvest of caribou occurred late in the season, whereas in RY98 the highest harvest occurred early in the season. In RY99 the highest harvest occurred in late August, while in RY00 and RY01 the highest harvests were in early September. Variations in harvest chronology within and among years were likely influenced by seasonal and annual variations in weather and caribou distribution.

Transport Methods. Overall, the most common mode of transportation used by successful hunters (RY96–RY01) was 3- or 4-wheelers followed by aircraft, ORVs, highway vehicles, horses, and boats (Table 5). Interestingly, RY00 was the first year since this permit hunt began in which successful hunters accessed the hunt area by boat. The Fairbanks area received above average rainfall (Aug $\bar{x}$ = 1.96 in, Sep $\bar{x}$ = 0.95 in; National Weather Service) during August (2.59 in) and September (1.28 in) 2000 and water levels in local rivers and creeks were correspondingly high, which may explain this apparent anomaly. It is also worth noting that RY01 was the first year since RY96 that horses were not reported as a method of transport used by successful hunters.

Other Mortality

Research staff conducted calf mortality studies during 1995–1997, and wolves, grizzly bears, and eagles were primary predators of caribou in the unit. Details of causes and trends in calf and adult mortality are in research reports and publications (Davis et al. 1991; Boertje et al. 1996; Valkenburg et al. 1996; Valkenburg 1997; Valkenburg et al. 1999; Valkenburg et al. 2002). Calf and adult survival were poor during the population decline; consequently, the

board adopted a wolf predation control implementation plan in Unit 20A to reduce wolf numbers in order to rebuild the caribou population. In addition, Valkenburg (1997) and Valkenburg et al. (2002) tested a diversionary feeding program that addressed predation by a wolf pack in the Wells Creek area.

HABITAT

Assessment and Enhancement

Research and management staff members periodically collect fecal samples on the winter range to monitor the status and use of lichen ranges. We also weigh female caribou calves to determine body condition and relate body condition to natality rates. Analysis of fecal samples collected in late winter 1989 and 1993 indicated depletion of lichens on winter ranges used by caribou in Unit 20A. The proportion of lichens in the diet was relatively low, and the proportion of mosses was high compared to caribou in other Interior herds (Valkenburg et al. 2002). Two studies, Valkenburg (1997) and Valkenburg et al. (2002) detailed trends in weights of caribou calves.

CONCLUSIONS AND RECOMMENDATIONS

The primary concern at this juncture is whether the herd will be able to grow or support improved harvests with increasing wolf densities. Currently, wolf numbers are moderately high (ca. 31 wolves/1000 mi^2; or ca. 12 wolves/1000 km^2) due to the abundant moose population. The degree to which high wolf:caribou ratios will influence predation rates on caribou is unknown. While high ratios seem bound to increase caribou mortality to some degree, a variety of mechanisms may have mitigating effects. Wolf behavior patterns, prey selection, and hunting patterns may result in wolves primarily preying on moose. Low vulnerability of caribou due to improved nutritional status could also reduce kill rates on caribou. Adams et al. (1995) presented data indicating that caribou spatial distribution may also reduce wolf predation risk for caribou calves. Nonetheless, it is unlikely that the Delta Herd will grow substantially at this time and moderate declines are possible.

We met the objective to maintain 30 bulls:100 cows and 6 large bulls:100 cows. We did not meet our objectives to reverse the decline of the herd and increase the midsummer population to 5000–7000 and to sustain an annual harvest of 300–700 caribou. Continued research on the Delta Herd, including analysis of fecal samples and condition of caribou will help to determine if the current population objective is still too high. However, even with favorable weather, meeting the management objectives will be unlikely without more effective management of predation.

Because hunter participation has been declining and the harvest of bulls has been below the estimated annual harvestable surplus, I will recommend to the board that the maximum number of drawing permits the department may issue for hunt DC827 be increased from 100 to 200. The proportion of large bulls in the population has remained high, and our estimates indicate that additional bulls can be harvested from the population without affecting herd dynamics. We will continue to monitor sex ratios during fall surveys to ensure that our management objectives concerning bull:cow ratios continue to be met.

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TABLE 1 Delta caribou fall composition counts and estimated population size, 1983–2002

Survey date	Bulls: 100 Cows	Large bulls: 100 Cows	Calves: 100 Cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	% Total bulls	Composition sample size	Minimum herd size[a]	% Herd sampled
10/4/83	35	12	46	25	55	59	6	36	20	1208	5055	24
10/17/84	42	17	36	20	56	28	32	40	24	1093	6227	18
10/9–12/85	49	9	36	20	54	57	24	19	26	1164	8083	14
10/22/86	41	9	29	17	59	49	30	21	24	1934	7204[b]	27
10/05/87	32	8	31	19	61	53	23	24	20	1682	7780[b]	22
10/14/88	33	4	35	21	60	50	38	12	20	3003	8338[c]	36
10/10/89	27	2	36	22	62	64	28	7	16	1965	10,690	18
10/4/90	38	6	17	11	65	45	39	16	24	2411	7886[c]	31
10/1/91	29	5	8	6	73	55	29	16	21	1705	5755	30
9/28/92	25	3	11	8	74	46	43	11	19	1240	5870	21
9/25/93[d]	36	7	5	3	72	45	33	22	25	1525	3661	42
10/3–6/94[d]	25	10	23	16	68	33	29	39	7	2131	4341	49
10/3/95	24	10	20	14	69	41	19	40	17	1567	4646	34
10/3/96	30	9	21	14	66	51	20	29	20	1537	4100	37
9/27/97	27	9	18	12	69	48	20	32	19	1598	3699	43
10/1/98	44	9	16	10	62	31	49	20	27	1519	3829	40
10/2/99	44	10	19	11	62	37	40	23	27	674	3625	19
10/3–4/00	46	10	11	7	64	41	37	22	30	1010	3227	31
9/30/01	39	9	13	8	66	46	30	24	26	1378	2965	46
9/28/02	50	17	25	14	57	43	23	34	29	924	2800	32

[a] Numbers of caribou counted during summer survey from the same calendar year.
[b] Census results probably considerably lower than true herd size.
[c] Excludes Yanert Herd, which included approximately 600 caribou.
[d] Composition data was weighted according to the distribution of radio collars.

TABLE 2 Delta caribou harvest data by permit hunt, regulatory years 1996–1997 through 2001–2002

Hunt	Regulatory year	Permits issued	Did not hunt (%)	Unsuccessful hunters[a] (%)	Successful hunters[a] (%)	Bulls (%)	Cows (%)	Unk (%)	Harvest	3-Year $\bar{x}$
DC827	1996–1997	75	31 (41)	22 (50)	22 (50)	22 (100)	0 (0)	0 (0)	22	
	1997–1998	75	13 (17)	18 (29)	44 (71)	44 (100)	0 (0)	0 (0)	44	
	1998–1999	100	29 (29)	21 (30)	50 (70)	49 (98)	1 (2)	0 (0)	50	39
	1999–2000	100	37 (37)	25 (40)	38 (60)	37 (97)	0 (0)	1 (3)	38	44
	2000–2001	100	31 (31)	45 (65)	24 (35)	24 (100)	0 (0)	0 (0)	24	37
	2001–2002	100	38 (38)	29 (47)	33 (53)	33 (100)	0 (0)	0 (0)	33	32

[a] Unsuccessful and successful hunters includes only permittees that hunted.

TABLE 3 Delta caribou annual hunter residency and success, permit hunt DC827, regulatory years 1996–1997 through 2001–2002

Regulatory year	Successful					Unsuccessful					Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Unk	Total (%)	
1996–1997	19	3	0	0	22 (50)	17	4	1	0	22 (50)	44
1997–1998	32	11	1	0	44 (71)	16	2	0	0	18 (29)	62
1998–1999	32	13	5	0	50 (70)	16	4	1	0	21 (30)	71
1999–2000	28	7	3	0	38 (60)	15	8	2	0	25 (40)	63
2000–2001	17	2	5	0	24 (35)	30	15	0	0	45 (65)	69
2001–2002	24	6	3	0	33 (53)	10	14	4	1	29 (47)	62

[a] Residents of Unit 20.

TABLE 4 Delta caribou annual harvest chronology percent by harvest periods, permit hunt DC827, regulatory years 1996–1997 through 2001–2002

Regulatory year	Harvest periods				Unk	*n*
	8/10–8/20	8/21–8/31	9/1–9/11	9/12–9/20		
1996–1997	27	18	27	27	0	22
1997–1998	27	18	14	41	0	44
1998–1999	34	14	26	26	0	50
1999–2000	29	37	16	16	2	38
2000–2001	33	17	38	13	0	24
2001–2002	21	18	48	12	0	33

TABLE 5 Delta caribou harvest percent by transport method, permit hunt DC827, regulatory years 1996–1997 through 2001–2002

Regulatory year	Percent harvest							
	Airplane	Horse	Boat	3- or 4-Wheeler	ORV	Highway vehicle	Unk	*n*
1996–1997	32	0	0	36	18	9	5	22
1997–1998	14	9	0	52	11	11	2	44
1998–1999	20	8	0	52	14	6	0	50
1999–2000	29	8	0	45	5	13	0	38
2000–2001	17	13	8	33	21	8	0	24
2001–2002	39	0	0	45	9	3	3	33

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNIT: 20B, 20C, 20D, 20E, 25C, and adjacent Yukon, Canada (20,000 mi^2)

HERD: Fortymile

GEOGRAPHIC DESCRIPTION: Charley, Fortymile, Salcha, Goodpaster, and Ladue Rivers, and Birch and Shaw Creek drainages between the Tanana River and the south bank of the Yukon River; the Fortymile caribou herd presently ranges up to 50 miles into the Yukon, Canada

BACKGROUND

The Fortymile caribou herd (FCH) is 1 of 5 international herds shared between Alaska and Yukon, Canada, and is an important herd for consumptive and nonconsumptive uses in Interior Alaska and southern Yukon. Like other caribou herds in Alaska, the FCH has displayed major changes in abundance and distribution. During the 1920s it was the largest herd in Alaska and was one of the largest in the world, estimated at 568,000 caribou (Murie 1935). For unknown reasons, the FCH declined during the 1930s to possibly 10,000–20,000 caribou (Skoog 1956). Timing of the subsequent recovery phase is unclear, but by the 1950s the FCH reached at least 50,000 caribou (Valkenburg et al. 1994). Herd recovery was likely aided by a federal predator control program that began in 1947. Until 1963 the herd fluctuated slightly, but most population estimates were about 50,000 animals (Valkenburg et al. 1994).

Between the mid 1960s and 1975, the herd again declined, probably due to a combination of high harvests, severe winters, and high numbers of wolves (Davis et al. 1978; Valkenburg and Davis 1989). The population low occurred during 1973–1976 when the herd was 5740–8610 caribou (Valkenburg et al. 1994). Due to decreased herd size between 1966 and 1975, the FCH reduced its range size and changed its seasonal migration patterns. The herd stopped crossing the Steese Highway in significant numbers in 1963, and by 1973 few animals moved into the Yukon each year. During the early 1970s to 1998, the herd's range was about 19,300 mi^2 (50,000 km^2), less than 25% of the historical size.

The FCH began increasing in 1976 in response to favorable weather conditions, reduced harvests, and a natural decline in wolf numbers. In 1990 the herd was estimated at 22,766 caribou (the annual rate of increase during 1976–1990 was 5–10%). During 1990–1995 the herd

remained relatively stable with an estimated population between 21,884 and 22,558 caribou. Population growth ceased due to high adult mortality, unusually poor pregnancy rate in 1993, and low to moderate calf survival during this period (Boertje and Gardner 2000*a*). During 1996–1999 the herd increased 4–19%, due to elevated pregnancy rates and higher adult and calf survival.

Within its range, the FCH historically provided much of the food needed by the villages and communities, Alaskan and Yukon mining camps, and other early residents. From the late 1800s to World War I, the herd was subject to market hunting in both Alaska and Yukon. Most hunting was concentrated along the Steese Highway and along the Yukon River above Dawson before the Taylor Highway was constructed in the mid 1950s. During the 1960s, hunting was concentrated along the Steese and Taylor Highways in Alaska and along the Top of the World Highway in Yukon. During the late 1970s and the 1980s, FCH hunting regulations were designed to benefit the subsistence hunter and to prevent harvest from limiting herd growth. Bag limits, harvest quotas, and season openings tailored to benefit local residents were primarily used to meet these objectives. Hunting seasons were deliberately set to avoid the period when road crossings were likely. Consequently, hunter concentration and harvest distribution shifted from along highways to along trail systems accessed from the Taylor Highway and to areas accessed from small airstrips within the Fortymile and Charley River drainages.

Harvest was further restricted during the 1990s to ensure little impact on herd growth. Harvest regulations also became increasingly complex due to a change in Alaska's subsistence law that initiated federal management of the herd on federal lands. Competition increased among Alaska hunters because of the reduced quotas and complex regulations. During this period, many residents within the herd's range were unhappy with the ineffectiveness of dual federal and state management in administering the hunts and bringing about a herd increase. In response, the Upper Tanana/Fortymile Advisory Committee, the Tr'ondëk Hwëch'in First Nation, and other public groups requested that ADF&G, the federal agencies, and Yukon Department of Renewable Resources (YDRR, now called Yukon Department of Environment) work with the public in developing a Fortymile Caribou Herd Management Plan.

In July 1994 a Fortymile Caribou Herd Management Planning Team (Team) was established. The Team comprised 13 public members representing subsistence users from Alaska and Yukon, sport hunters, Native villages and corporations, environmental groups, and agency representatives from ADF&G, Bureau of Land Management (BLM), US Fish and Wildlife Service (FWS), National Park Service (NPS), and YDRR.

The Team developed a management plan that included management recommendations for herd population, harvest, and habitat. The plan recommended a combination of agency-conducted nonlethal wolf control and public wolf trapping to reduce wolf numbers within the herd's summer ranges and, specifically, to reduce wolf predation on calves. Harvest management recommendations required the state and federal management boards to develop new harvest regulations. The Alaska Board of Game, the Federal Subsistence Board (FSB), and the Yukon Fish and Wildlife Management Board endorsed the plan, developed new harvest regulations that satisfied the plan, and guided regulatory decisions during 1996 through 2000.

The Team sunsetted in December 2000. The 5 Fish and Game advisory committees within the herd's range recognized the need to cooperatively develop harvest regulations that would benefit hunters and carry on the goals of the Fortymile Caribou Herd Management Plan. During this report period, the harvest plan developed by these advisory committees was enacted.

MANAGEMENT DIRECTION

A review of Fortymile caribou herd management direction during 1970s–1993 was presented in Gardner (2001). In brief, agencies and the public supported Fortymile caribou herd recovery but a number of management programs failed to meet this goal because of inadequate public process or disagreements between ADF&G and federal subsistence management.

The Fortymile Caribou Herd Management and Harvest Plans changed management direction. The Team was able to develop effective management recommendations that minimized public and political objections and were effective. The harvest system that was developed by public Fish and Game advisory committees and the Eastern Interior Regional Subsistence Council continues to be the best joint state–federal program in the state, benefiting the user and the herd. The Harvest Plan had the public support to withstand a number of state and federal proposals that would have caused higher harvests or a return to the traditional dual management methods, to the detriment of the herd and users.

Following are management goals and objectives for regulatory years (RY) 2001–2002 through 2006–2007 (RY = 1 Jul through 30 Jun, e.g., RY01 = 1 Jul 2001 through 30 Jun 2002). They were developed by the 5 advisory committees (Central, Delta, Eagle, Fairbanks, and Upper Tanana/Fortymile) within the herd's range and were endorsed by the Alaska Board of Game. Population and harvest objectives were developed by the advisory committees and the board to meet both the Fortymile Caribou Herd Management and Harvest Plan goals and to satisfy the intensive management law.

MANAGEMENT GOAL

- Restore the FCH to its traditional range in Alaska and Yukon.

OBJECTIVES

- Provide conditions for the Fortymile Herd to grow at a moderate annual rate of 5–10% to a minimum herd size of 50,000–100,000 caribou.
- Manage the herd to sustain an annual harvest of 1000–15,000 caribou.
- Maintain an October bull:cow ratio of at least 35:100.
- Provide for increased caribou hunting, viewing, and other wildlife-related recreation in Alaska and Yukon.

ACTIVITIES

- Minimize the impact of human activities on caribou habitat.

- Work with land agencies, landowners, and developers to mitigate developments detrimental to Fortymile caribou.

- Maintain a near-natural fire regime.

METHODS

POPULATION CENSUS

We attempted photocensuses of the FCH between late June and mid July 1988–2002, excluding 1993. We used 3–5 spotter planes (Super Cub PA-18 or Bellanca Scout), 1 radiotracking airplane (Cessna 185 or 206, Bellanca Scout, or Super Cub), and a DeHavilland Beaver equipped with a belly-mounted, 9-inch format aerial camera. We located most postcalving aggregations by tracking the herd's radiocollared caribou. We photographed all groups that could not be counted accurately by the spotter planes (>50 caribou). All photographs were counted twice, each time by a different person. If counts were within 3% of each other, the 2 counts were averaged; otherwise, photographs were counted a third time. No correction factors were used to account for caribou missed during the search. We derived the population estimate by adding individual caribou counted on photographs to caribou counted from spotter planes. During 2001 and 2002, caribou were too scattered to effectively census the herd, so estimates were based on population models developed by P. Valkenburg and D. Reed (ADF&G unpublished data, Fairbanks) and by R. Boertje (Boertje and Gardner 2000*b*).

FALL COMPOSITION SURVEYS

Each year we estimated herd sex and age composition between late September and mid October. To locate most of the herd, we used a Bellanca Scout to radiotrack collared animals. Since 1993 we have used a Robinson-22 helicopter for transportation to these counts. During counts, we classified each caribou as a cow, calf, or bull. Bulls were further classified as small, medium, or large based on antler size (Eagan 1993). We attempted to classify 12–15% of the herd. Since 1996, costs for the composition surveys have been shared between ADF&G and BLM.

SPRING COMPOSITION SURVEYS

We have not conducted spring composition surveys since 1993 because similar data were collected during the 1994–2002 calf mortality studies. During 1988, 1991, 1992, and 1993 we conducted herd sex and age composition surveys in mid-to-late June. Techniques followed were the same as those used during fall surveys, except bulls were not classified by size, and large groups (i.e., >1000) were sometimes classified from the ground with spotting scopes. The Yukon government contributed money and personnel for the 1992 survey. Although the calf mortality study ended in May 2003, we will only fly a postcalving composition survey if fall calf survival declines and we need to determine the timing of mortality.

HERD AND RANGE CONDITION

During RY01–RY02 we used 3 indices to evaluate herd condition: 1) fall calf weights, 2) pregnancy rates of radiocollared cows, and 3) median calving date. Fall calf weights were obtained during fall capture activities conducted during 1991–2002. We evaluated the other 2

indices by radiolocating at least 50 adult cows (≥3 years old) on a daily basis during calving. Median calving date was the day by which 50% of the adult collared cows gave birth. We assessed range condition by evaluating the percent lichen fragments in relation to the percent moss in Fortymile caribou fecal samples (Boertje 1984).

RADIOTELEMETRY DATA

We obtained herd distribution, movements and estimates of annual mortality by radiotracking 50–70 radiocollared adults. From May 1994 to May 2002 an additional 50–80 newborn calves were also collared. Calves were located daily in May, weekly during June, July, and August, and at least once every month thereafter. Adults were located approximately once every month throughout the year. We retrieved radio collars from dead caribou as soon as possible after detection to determine cause of death.

HARVEST

Harvest was monitored using a hunter checkstation, hunter contacts in the field, and registration hunt reports. We analyzed data on harvest success, hunt area, hunter residence and effort, and transportation type. To guard against overharvest, successful hunters were required to report their kill within 5–7 days. Harvest data were summarized by regulatory year.

MANAGEMENT PLANNING

No formal meetings to plan management were held during this report period. The advisory committees and subsistence council expect to begin a planning process during winter 2004–2005 concerning Fortymile caribou harvest management after RY06. This plan will be presented to the Alaska Board of Game and Federal Subsistence Board in spring 2006.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The herd doubled in size since 1995 (annual growth rates = 4–14%) when the Fortymile Management Plan was written (Table 1). Annual increases in herd size resulted from improved adult and calf survival rates and improved adult pregnancy rates (Table 1; Boertje and Gardner 1998*b*, 1999, 2000*a*). Of 4 nutritional indices, only pregnancy rates increased significantly (P = 0.02, chi-square test) during the period of population increase (1996–2002) compared to the period of population stability (1990–1995). Birthweights of calves, October weights of calves, and median calving dates did not change significantly between these 2 periods.

The primary cause of caribou mortality in the Fortymile Herd has consistently been wolf predation since studies began in 1984. Reduction in wolf numbers in recent years undoubtedly contributed to increased survival. Wolf numbers were reduced on a portion of the herd's winter range during 1995 and 1996 by elevated wolf harvest rates (28–57%) as part of a public wolf trapping program. Wolf numbers were reduced 75% within the herd's summer range excluding Yukon–Charley Rivers National Preserve during 2000–2002 by public wolf trapping and by

ADF&G's nonlethal wolf control program. This summer range was also used extensively by the herd during winters 1997–1998 and 1998–1999.

Population Composition

During 1996 through 1999, 2001, and 2002, the average percent calves (20.7%) in the fall was the highest since the late 1950s. In contrast, percent calves in the herd was 18.1% during the herd's growth phase in the 1980s, 16.8% during the stable phase between 1990 and 1995, and 16% during 2000, an anomalous year (Table 1). Beginning in 1996, elevated pregnancy rates and favorable calf survival (Table 1) caused a substantial increase in the number of reproductive cows in the herd. In May 2002 an estimated 16,000–17,000 calves were born compared to about 8100 during 1994.

Due to low harvests during 1977 through 2000, the bull:100 cow ratio was similar to lightly harvested herds and remained in the high 30s and low-to-mid 40s, except for a few anomalous years. Harvest quotas were elevated in 2001 but still limited to a level that allowed the herd to increase. Up to 25% of the harvest quota could be cows. During 2001 and 2002, 493 and 667 bulls were harvested, the highest bull harvests since the 1970s. Harvest quotas will increase with herd size, but will remain conservative through 2006 to allow continued herd growth and a stable bull:cow ratio. This harvest strategy should also maintain the ratio of large bulls in the herd.

Estimated ratios in late June counts were more variable than fall counts and difficult to interpret (Table 2). During 1994 through 2002, we conducted calf mortality studies which gave us much better information on the timing and magnitude of early summer calf mortality. These data indicated that most mortality occurred during May through mid July. The fall composition counts were less variable than the calf mortality data, suggesting that fall surveys are the best indicator of herd trend. Only fall surveys allow for a large sampling of the herd when bulls are largely mixed with the groups. A summer composition count may be a good indicator of calf survival, if most of the herd is distributed in a few large groups. However, these distributions are often difficult to predict. I recommend summer composition surveys not be conducted on the Fortymile Herd unless an estimate of early calf survival becomes necessary for management decisions.

Distribution and Movements

In 2001 the herd primarily calved in Copper, Ruby, Slate, and Independence Creeks and drainages of the Seventymile River and spent the remainder of the summer between Mosquito Mountain, Mount Harper, and Glacier Mountain and the upper Salcha and Chena Rivers. During August, approximately 2000 were in the Birch Creek drainage and the remainder of the herd primarily ranged in the upper Salcha River, Charley River, and Slate Creek drainages. During late September through the rut the herd was in the Birch Creek drainage.

During winter 2001–2002 about 10,000 caribou extended FCH range use to the Preacher Creek drainage, west of the Steese Highway. The remainder of the herd was widely scattered in small groups in the Mosquito, Middle, and North Forks of the Fortymile River and in the Goodpaster and Salcha Rivers and Birch Creek.

In late April and early May 2002, the Fortymile Herd moved back to its calving grounds. Calving began in Independence and Granite Creeks (11 May). As the calving period progressed, most of the parturient cows moved down Independence Creek to the south side of Happy Mountain and Portage Creek. A secondary calving area was from Butte Creek to Mission Creek. During peak calving (21 May) most calves were born between Pittsburg Creek and Joseph Creek. The remaining parturient cows calved primarily in Ruby and Three-finger Charley Creeks. Calving ended about 27 May.

By early June most of the herd moved south onto Mosquito Mountain and Mount Harper. In mid June about half of the herd was on the Glacier Mountain and the remaining portions were in Copper Creek and upper Goodpaster River. During August and September, the herd ranged primarily between the Charley River to east of the Taylor Highway.

Beginning in mid September 2002, most of the herd traveled west and most of the rut occurred in the upper Middle Fork of the Chena River, Birch Creek, and the Salcha River. Immediately after the rut the herd moved east. By November over 30,000 were in Yukon, Canada and of these about 5000 were north of the Yukon River outside of Dawson. This is the first time since the early 1960s most of the Fortymile Herd wintered in Yukon, Canada. The herd starting coming back to Alaska during March and most of the herd was between Chicken and Glacier Mountain. Snow depth was below average and did not impede movements or range use throughout the herd's range.

During fall and winter 2001–2002, the herd increased its use of traditional range abandoned for about 40 years. The herd continues to calve in the central portion of its range. As the herd increases, we expect calving expansion towards the Steese Highway as occurred during the early 1900s through 1960 (Valkenburg and Davis 1986). Increased range use has meant the herd has been in contact with more wolf packs that were not reduced by control activities. We observed elevated wolf predation by nontreated packs during the past 4 years.

MORTALITY

Harvest

Season and Bag Limit. See Table 3 for unit-specific bag limits and seasons for state and federal hunts during RY01 and RY02 and for the regulatory history for the FCH. This table illustrates regulations that are complex or simple depending on whether state and federal management directions differ or are complementary.

Alaska Board of Game Actions and Emergency Orders. In spring 2000 the board reviewed and endorsed the Fortymile Caribou Herd Harvest Plan, 2001–2006 (Harvest Plan). The Central, Delta, Eagle, Fairbanks, and Upper Tanana/Fortymile advisory committees cooperatively developed this plan with input from the Team, other state advisory committees, the Eastern Interior Regional Advisory Council, and public special interest groups and individuals. The plan's recommendations were designed to allow for increased harvest but at levels that allow for moderate herd growth (≥10%). Harvest quotas will be set annually based on herd trend. Using the plan's recommendations, the board passed a regulation that lengthened the autumn resident season by 10 days in Units 20B and 20D, changed the resident bag limit from 1 bull to 1 caribou

throughout the herd's range, created a nonresident season with a bag limit of 1 bull in Units 20E and 25C, and adopted a quota system that ensured hunting opportunity across the herd's range during both the autumn and winter seasons while maintaining adequate protection against overharvest. The board also established a harvest quota for cows, limiting the number taken to 25% of the quota. These regulatory changes became effective autumn 2001.

Increasing opportunity to hunt Fortymile caribou caused an increase in the number of hunters in Unit 20E, and the board was concerned about possible excessive incidental take of moose by caribou hunters. In response, the board created a joint caribou–moose registration permit hunt in Unit 20E, excluding the Middle Fork Fortymile River. The regulation requires hunters to choose to hunt either caribou or moose and allows them to complete 1 hunt for 1 species, turn in that permit, and then hunt the other species. The intent is to stop incidental take of moose without limiting caribou hunting opportunity. This change did not affect most subsistence hunters because they traditionally hunt moose and caribou in different areas of Unit 20E and at different times.

The FSB endorsed the Harvest Plan during their May 2001 meeting. This decision benefited Fortymile caribou harvest management by ensuring that for the next 5 years, regulatory changes will have to meet the intent of the Harvest Plan, which protects the joint state–federal management program. Under this program the state and federal hunts are managed under one permit with one harvest quota, reducing paperwork and confusion for hunters and protecting against overharvest. To better meet the intent of ANILCA and to benefit federally eligible subsistence hunters, the FSB adopted a regulation that ensured that at least 50 caribou in the winter quota would be allocated to the federal season.

In 2002 the Alaska Board of Game established winter seasons for Fortymile caribou in portions of Units 20B and 20D. To guarantee hunting opportunity across the herd's range, ADF&G was authorized to set a maximum winter quota of 60% in the unit with the most caribou, ensuring that 40% of the quota could be taken by hunters in other areas of the herd's range. The board also further liberalized grizzly bear regulations by exempting the $25 resident tag fee in Unit 20E, excluding Yukon–Charley Rivers National Preserve. This has the potential to reduce predation on calves, e.g., if grizzly bear harvests above sustainable levels occur within the FCH calving ground. The effects of the regulatory change on grizzly bear hunting, harvest, and predation will be monitored.

Hunter Harvest. The harvest quotas during RY01 and RY02 were 850 and 950 caribou, respectively. These quotas were the first to be established using the 2001–2006 Harvest Plan and followed 5 years of minimal harvest (150 bulls/year). Annual quotas were subdivided between 3 fall hunts and 1 winter hunt. Yukon, Canada also had a quota of 300 in RY01 and 465 in RY02 but residents and First Nation members chose to forego hunting through regulation (for sport hunters) and by not exercising constitutional rights to hunt (Tr'ondëk Hwëch'in First Nation).

We issued 4539 permits in RY01 and 4161 permits in RY02 (Table 4). In comparison, we issued an average of 1141 permits during the 5 years of reduced quotas and 1909 permits during 1990–1995, when the harvest quotas ranged from 395–450 bulls. During RY01, 2931 hunters took 693 caribou and in and RY02, 2863 hunters took 864 caribou.

The Harvest Plan recommended that Fortymile caribou harvest should be administered using registration permits for at least 2 years or until harvest is no longer a concern or a reporting system is developed that allows a general hunt. Public interest in hunting Fortymile caribou is high and increasing. The Fortymile Herd is the only relatively large caribou herd along the road system that allows both residents and nonresidents to participate without substantial access restrictions. Hunter knowledge of the herd and expanding hunting opportunity is also increasing because the hunt is well advertised.

To ensure that the annual harvest quota is not exceeded, a registration hunt requiring quick reporting of success remains necessary (Table 5). However the combination of increasing number of hunters and multiple hunts has caused hunt administration to become very labor intensive. Also, because the number of hunters new to a registration hunt system is increasing, compliance to the conditions of the hunt is declining. In RY02 about 25% of the successful hunters reported late. The 3 following steps need to be taken to increase the efficiency of this hunt: 1) increased public education using *The Comeback Trail* and the Fairbanks and Anchorage newspapers, and seminars at least at the military bases in Fairbanks; 2) establish hunter checkstations along the Taylor and Steese Highways; and 3) convince Fish and Wildlife Protection to issue more citations for late reporting. The latter step is difficult due to the large number of infractions and the amount of paperwork and time required of FWP to write and serve the tickets.

During 1993–2000 we have had good success with registration hunts but the hunts were confined to a smaller area and fewer hunters participated. We were able to limit late reporting to less than 15 cases/year, using an educational program including newspaper articles, hunt clinics, a video, and more one-to-one contact with the hunters when the permit was issued. During RY01 and RY02, we operated a checkstation on the Taylor Highway to monitor hunting activity and compliance with the moose and caribou regulations. Not only were we able to better monitor the hunts, but by checking all hunters, we caused an improvement in hunter behavior. For example, we issued over 30 citations the first year compared to 5 the second year, yet the number of hunters and harvest were greater the second year. I believe if checkstations were periodically operated on the Taylor and Steese Highways, Fortymile caribou harvest management and hunter compliance would improve.

Illegal Harvest. Establishing a 1 caribou bag limit but with a cow quota minimized illegal harvest and allowed the herd to continue to increase at ≥10%/year. Only 2 hunters were cited during RY01 and RY02 for violating the requirement to hunt either caribou or moose in Unit 20E.

Harvest Plan. The Yukon territorial government, the Tr'ondëk Hwëch'in First Nation, and the Yukon public began working on a Yukon Fortymile caribou harvest plan in 2001 but little has been accomplished due to political reasons. It is still a goal in Yukon to complete a comprehensive FCH management plan that will complement Alaska's Harvest Plan. There has been agreement between the Yukon and the board that the initial harvest allocation would be 65% to Alaska and 35% to Yukon.

Hunter Residency and Success. During RY01–RY02, 2863–2931 people annually participated in FCH hunts (Table 6). The range of hunters who annually participated in each registration permit hunt were: RC863, 186–393 hunters; RC865, 757–908 hunters; RC866, 1006–1023 hunters; and

RC867, 514–758 hunters. Success rates by hunt were 18–32% for RC863, 15–57% for RC 865, 8–14% for RC866, and 39–48% for RC867. Residency and harvest success information for all hunts combined is included in Table 6.

Since caribou are both migratory and gregarious, hunt success is directly related to the hunter's ability to respond to herd movements. During RY01 and RY02, the herd was accessible during the winter season. In RY01 most of the herd was along the Steese Highway and in RY02 most of the caribou were accessible along the Taylor Highway. Hunters were very quick in responding to these areas resulting in season closures 1–7 days after the opening. In RY01 the herd spent most of the fall season in primarily inaccessible areas and harvest was low throughout its range. In RY02 most of the herd was in Unit 20E throughout August and September but hunters did not respond in large numbers until late August–early September.

Hunters appear to have a good memory of where caribou hunting was good in the past and many return to those areas without considering caribou behavior. This may be one reason why hunters did not respond quicker to the availability of caribou in Unit 20E in RY02. For example, during fall RY00 and winter 2001–2002, hunters had good success finding Fortymile caribou along the Steese Highway. These successes became common knowledge, resulting in over 1000 hunters traveling the Steese in fall 2001 and 2002 when few caribou were available. This scenario also occurred in Unit 20E during the early 1990s when it was common knowledge the best place to hunt caribou was Chicken Ridge. It took 3 years of low success before the number of hunters began to decline.

Some people believe herd location should be given to hunters. However, the ability of hunters to quickly exceed a hunt quota is well documented with the Fortymile Herd. Supplying success data from an on-going hunt will give hunters an accurate measure of what portion of the herd's range they may wish to explore, without causing hunters to flock to one area. As long as there are harvest quotas, which have the potential to be quickly exceeded, I recommend herd location information from ADF&G only include harvest success by unit.

During RY01 and RY02, after a 5-year closure, nonresidents could hunt Fortymile caribou during the fall season throughout the herd's range. Nonresidents composed 7–9% of the hunters and took 9–18% of the fall harvest. Hunting by nonresidents occurred throughout the herd's range but most nonresidents selected Units 20E (36–52%) or 25C (33–51%). Airplanes were used by most (56%) successful nonresident hunters.

Harvest Chronology. During RY01 no fall Fortymile caribou hunts were closed early by emergency order. The herd spent most of the season in the central portion of its range, mostly inaccessible to hunters except by airplane. There were a few scattered bull groups accessible from the Steese and Taylor Highways but most of the animals along the Taylor were within the Glacier Mountain Controlled Use Area where motorized access is prohibited. The greatest harvest occurred during the first week (Table 7) in Unit 25C (76%). In RY02 most of the herd was accessible from the Taylor Highway in the eastern portion of its range, resulting in an early closure (6 Sep) in Unit 20E. The herd moved back into the Birch Creek drainages during late September but few hunters were in the field.

Harvest quotas during the winter season in RY01 and RY02 were 305 and 240 caribou, and Fortymile caribou were available from both the Steese and Taylor Highways. The state winter seasons were closed 2–7 days after opening. Hunter participation and success ranged from 514 to 758 hunters and 39–48% success, illustrating the popularity of winter caribou hunts, the ability of hunters to take large numbers of caribou quickly, and the difficulty of managing relatively low quota hunts.

Transport Methods. Transportation types used by successful hunters in each of the 4 Fortymile caribou registration permit hunts differed depending primarily on the number of trails and whether air taxi companies worked the area. During RY01–RY02 all successful hunters in RC863 used boats and airplanes. This hunt area is remote with no trails and cannot be reached by ground transportation.

RC865 covers most of the herd's range in Unit 20E and is accessible by trails, rivers, and airplane landing areas. During RY01–RY02 the 2 most common transportation types used by hunters in RC865 were highway vehicles and 4-wheelers. Herd distribution dictates the most efficient transportation type. In RY01 the herd remained in the central or western portion of its range for most of the fall season and was difficult to access. Hunters using 4-wheelers to access the herd took the most caribou (46) but their success rate was 17%. In comparison, hunters using airplanes took 32 caribou but had a 65% success rate and hunters along the Taylor Highway had an 8% success rate. In RY02 most of the herd was accessible by ground transportation throughout the season. Hunters using 4-wheelers and highway vehicles took 88% of the harvest and had success rates of 71% and 44%, respectively.

Hunt RC866 takes place in southeastern Unit 25C and most hunters accessed the area using 4-wheelers on trails that intersect the Steese Highway or hunt along the highway using highway vehicles. During the first 2 weeks of the fall RY01 season, there were several bull groups in the vicinity of the highway and trails and 79% of the harvest was by hunters using 4-wheelers for transportation. In RY02 few caribou were available until the last few days of the season. Only 62 and 7 caribou were taken by hunters using 4-wheelers or highway vehicles and their success rates were 14% and 2%. Airplanes were not commonly used in this hunt even though there are vast areas suitable for airplane access.

RC867 is a winter hunt and hunters primarily access the herd using snowmachines and highway vehicles along the Taylor and Steese Highways. During RY01 and RY02, hunters using snowmachines for access took 57% and 65% of the harvest and had success rates of 66% and 65%.

Table 8 illustrates transportation use combined for all hunts and indicates that the Fortymile Herd is accessible to all hunters during some point of the season, regardless of what transportation type they have at their disposal. This accessibility magnifies the importance of Fortymile caribou recovery to Alaska. Accessibility will only improve as the herd increases. The most important factors to ensure access for all hunters are for the seasons to go to term and for hunters to have patience to wait for the herd to migrate to the areas they can hunt.

Other Mortality

Boertje and Gardner (1998*a*, 1998*b*, 1999, 2000*b*) and Gardner (2001) described in detail the factors limiting the FCH and management steps taken to benefit herd recovery during 1996–2000. Between November 1997 and May 2001, about 80% of the wolves in 15 pack territories were removed by either public trapping or ADF&G nonlethal wolf relocation. Low wolf numbers were maintained by sterilizing the 2 alpha wolves in each of those territories.

Preliminary analyses indicate that calf mortality declined significantly as indicated by increased calf:cow ratios during early winter (Table 1). Decreased wolf predation (the major factor controlling the herd) was likely the primary cause of the herd's recent increase. Depending on herd movements during the year, the number of wolf packs preying on the FCH was 26–40 (Boertje and Gardner 2000*a*), and only 15 packs were treated by ADF&G.

As of April 2003, 18 of the 15 pack territories were being maintained by 2 wolves, of which at least 1 was sterilized. Trapping and mortality of other wolves caused the other 7 territories to become open. Two of those territories were colonized by pairs of wolves in spring 2002. Both packs had pups last summer and each pack numbered 9 wolves during winter 2002–2003.

Grizzly bear numbers have not been reduced by either department-conducted control activities or by hunter harvest. As a result, annual grizzly bear predation rates on calf and on adult caribou remain similar to pretreatment years.

Apparently, the combination of wolf control and favorable weather during 1996–2001 allowed the Fortymile Herd to increase faster than any other Interior or Southcentral Alaska herd. Based on the herd's current young age composition, I expect this trend to continue even though wolf recovery is occurring.

HABITAT

Assessment

During winters 1991, 1992, 1995, 1996, and 1999, range conditions were excellent, as evidenced by high proportions of lichen fragments (72–81%) and a low proportion of mosses (8%) in fecal samples. Fecal samples from overgrazed winter ranges contain a relatively high proportion of mosses or vegetation other than lichens (Boertje 1984). W. Collins (ADF&G, personal communication) has been evaluating Fortymile caribou winter range. He found excellent range conditions with high incidence of lichens. The Nelchina Herd has been wintering in portions of the Fortymile winter range since 1999. B. Dale (ADF&G, personal communication) captured and weighed a sample each spring and found that Nelchina Herd calves that winter in the Fortymile area are significantly heavier than calves that wintered in adjacent Units 11 and 13. Also, Nelchina calves on Fortymile range gain weight over winter, except in years when snow depth is above average.

The multi-year density of the FCH exceeded 500 caribou/1000 km^2 (500/386 mi^2) in 1998, the first time in 3 decades. Beginning in 2001, the herd expanded its range use, apparently as a result of increased herd size. It moved farther west near the Steese Highway in fall 2001 and utilized winter range in the Yukon during winters 2000–2001 through 2002–2003. In winter 2002–2003

the herd expanded its range use further by crossing the Yukon River in Canada. Still, more than 60% of the historic Fortymile range has not been used for over 40 years, and the far eastern portion of the range has not been used for over 50 years. The historic range supported hundreds of thousands of caribou.

In 1993 nutritional stress was indicated by low pregnancy rates (66%, $n = 47$) probably due to many adult cows not gaining sufficient fat to ovulate in 1992 (Boertje and Gardner 1996). The growing season was short; the number of snow-free days during 1992 was the shortest on record. Also, high adult mortality during 1989–1992 may have been related in part to stress from adverse weather. Until 2001, we found consistent data for moderate-to-high nutritional status in the Fortymile Herd when compared to other Alaska herds (Boertje and Gardner 1998*b*, 1999, 2000*b*). However, during May 2000 and 2001 birth weights were the lowest since 1996. Also, weights of 5-month-old calves during October 2001 and 2002 were the first and fifth lightest during the past 13 years. We have not determined if these indicators of declining nutrition are due to declining range quality or were due to unfavorable weather on the summer range. Pregnancy rate data conflicts with the hypothesis that herd condition is declining. Pregnancy ranged from average to above average (88–95%) during 2000–2002. There are indications that drier than average conditions existed during the past 2 summers in the herd's range. These conditions may have contributed to reduced caribou nutritional status. These data will be analyzed and presented in future reports.

A draft EIS for the proposed Pogo mine project in the Goodpaster River was developed in spring 2003. As planned, this project is expected to have limited impact on the Fortymile Herd but concern remains focused on future plans in this area. If an all-weather road is built to Pogo Mine, it may lead to a complex of roads that reach to the upper Goodpaster River and Mount Harper area. If so, careful access management will be required to ensure that the herd is not negatively impacted. It does not appear that future access decisions have been adequately addressed.

Enhancement

The Alaska Interagency Fire Management Plan, implemented in the early 1980s, should ensure a near-natural fire regime necessary for the long-term management of caribou range in Interior Alaska. In July 1998, 58,000 acres of spruce forest were burned in the eastern portion of the herd's range in Alaska. In 1999, 31,000 acres of spruce forest were burned within the Ketchumstuck Creek drainage, which has been an important wintering area. Both these areas were covered by climax spruce forest. Based on caribou range recovery in adjacent burns, we expect benefits to caribou from this fire beginning in 10–20 years and optimal range and extensive caribou use in 50 years (B. Dale, ADF&G, personal communication).

One of the ongoing goals of the Fortymile Caribou Management Plan was to ensure adequate protection for the herd's range during and after recovery. Current habitat and development issues are mostly related to mining and military activities in the herd's calving and postcalving areas. The herd is most sensitive to disturbance during calving and postcalving. Working together with the mining community and the Air Force, we minimized the effects of mining exploration and low flying military aircraft during calving and postcalving by maintaining a website that displayed the areas the herd was using. The website was updated when the herd changed distribution. The mining industry and military have used this website to plan their activities

around the herd and have minimized their impacts during calving and postcalving 1999 through 2002.

To evaluate the impacts of jet overflights on Fortymile caribou, we conducted a study during the 2002 calving season (Magoun et al. 2003). The hope was that these findings could be used in determining mitigation for jet-training exercises during calving and postcalving, realizing they are based on 1 year's data and that long-term effects on the herd are still unknown. Mitigation levels will be decided by the Resource Protection Committee composed of representatives of state and federal agencies and the Air Force.

Short-term responses by Fortymile caribou to overflights were generally mild compared to reactions to predators or perceived predators (Magoun et al. 2003). However, caribou did show strong-level reactions depending on the slant distance, jet speeds, and type of jet. Maintaining a floor of 2000' for all military jet aircraft would eliminate most stronger-level reactions by caribou but would be overly conservative. Based on Magoun et al. (2003), mitigation can be based on jet type, speed, and elevation and can be designed to adequately protect the herd and allow the Air Force to use most of the area to meet their training needs. The recommendation given to the Resource Protection Committee for calving and postcalving periods in 2003 follows: (1) within the four 3-nautical mile circles, which include most of the calving or postcalving caribou, A-10s could fly at any level, but if below 1000', speeds will be limited to <300 knots, and (2) all fighter jets (F-15 and F-16) would maintain the floor at 2000' except west of longitude 143° 45.00 where the floor would be 1500'.

Final language of the Department of Natural Resources Upper Yukon Area Plan gave adequate protection to the Fortymile Herd throughout its range and strong protection for the calving and postcalving ranges. The plan was completed in April 2003 and submitted to the commissioners/directors of the state and federal agencies for signature.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The Fortymile Caribou Herd Management Plan formally ended in May 2001. Two of the plan's objectives are ongoing – habitat protection and a public awareness program. Protecting caribou habitat and informing the public about herd status and consumptive and nonconsumptive use opportunities were essential components of the Team's goal to restore the Fortymile Herd to its traditional range. It was also the Team's goal to promote healthy wildlife populations for their intrinsic value. As of April 2003, habitat protection in Alaska is being addressed through land use plans and agreements with the mining industry and the military.

Several public awareness projects are ongoing. Funding for highway informational signs along the Taylor and Steese Highways has been appropriated and construction is planned for summer 2003. The Fortymile caribou newsletter *The Comeback Trail* is produced 1–2 times/year and is distributed to about 4500 Alaska and Yukon residents, advisory committees, regional councils, state and federal management boards, and area schools. Additional public awareness programs would be beneficial to ensure continued public support for the Fortymile Herd in the future. Currently, the herd is increasing and often those management successes are covered by state and Canadian media. A cooperative state–federal program enhancing the viewing, education, and

hunting opportunities of the Fortymile Herd would benefit the herd and people interested in the herd.

CONCLUSIONS AND RECOMMENDATIONS

We met our objective to provide conditions for the Fortymile Herd to grow at a moderate annual rate of 5–10%. The FCH increased through the 1980s at an annual rate of 5–10%. Between 1990 and 1995, it was essentially stable. The average annual rate of increase was 11% between 1996 and 2002 due to improved pregnancy rates and, apparently, reduced predation. The FCH was the only Interior caribou herd in Alaska and Yukon, Canada to increase continuously during 1996–2001. The summer 2002 herd estimate was 44,750 caribou and I expect to meet the herd size objective of 50,000 by summer 2003. Based on the sex and age structure of the herd, the FCH has the potential to continue to increase. Current winter range conditions are excellent, and >60% of its traditional range remains unused by the herd. Range use is expanding and during winter 2002–2003, large numbers of Fortymile caribou crossed the Yukon River in Yukon, Canada for the first time in about 40 years. Based on radiotelemetry data, about 30,000 Fortymile caribou wintered in Yukon, Canada.

Nonlethal wolf control in combination with public trapping was conducted during November 1997–May 2001. The objective of reducing wolf numbers in 15 pack territories within the calving and summer ranges was achieved. We reduced the wolf population 78% by relocating 120 subordinate wolves, and we maintained low wolf numbers in these territories by sterilizing 41 alpha wolves. Preliminary results indicate that wolf predation has significantly declined during summer, as indicated by elevated calf:cow rates in early October.

During RY01 and RY02, harvest was managed using the Fortymile Caribou Herd Harvest Plan, 2001–2006. This Harvest Plan was developed by the 5 advisory committees within the herd's range. The goal of the plan was to increase harvest but at a rate that allowed herd growth at ≥10%/year.

We were close to meeting the objective to manage the herd with a sustained annual harvest of about 1000+ caribou. During RY01 and RY02, the harvest quotas were 850 and 950 caribou and 2863–2931 hunters took 693–864 caribou. The herd increased about 11–16% annually. Harvest was maintained at a level that did not affect the bull:cow ratio and it met the objective to maintain an October bull:cow ratio of at least 35:100. Currently, the Fortymile Herd offers one of the best opportunities in the state to observe large bulls. The harvest quota for RY03 will be 1150 caribou and is predicted to allow for 10% herd growth and little impact on bull numbers. This level of harvest will meet the harvest objective. We also met the objective to provide for increased caribou hunting, viewing, and other wildlife-related recreation in Alaska and Yukon. Herd recovery has made the Fortymile Herd one of the most accessible herds in the state, benefiting hunters and nonconsumptive users.

Joint state and federal harvest management of the Fortymile Herd continues to benefit the herd and all users and is a model of how dual management can work if hunters and the agencies are willing to work together.

One failure of Fortymile caribou harvest management was the high percentage of late reporting by successful hunters. To meet the harvest objectives, we need to find methods to convince hunters to meet the reporting requirements. I recommend better education, hunter checkstations, and additional enforcement.

The Fortymile Caribou Herd Management Plan was fully implemented during RY98–RY01. The reduced harvest quota and nonlethal wolf control ended in May 2001. The objectives for habitat protection and for public awareness programs are ongoing. We have continued to work with the mining community and the military to protect the herd's calving and postcalving habitats. We were also part of the Upper Yukon Area Plan and were successful in ensuring that adequate habitat protection was included in the plan. The draft EIS for the proposed Pogo Mine project went out for public comment in March 2003. If approved, expected effects of this project on the herd will be discussed in future management reports. Several public awareness programs are ongoing but more are needed to benefit the herd in the future.

We completed a study evaluating the effects of jet overflights on Fortymile caribou during calving and early postcalving periods. To minimize strong-level reactions by the herd, specific mitigations based on jet type, speed, and elevation are necessary. Our recommendations for summer 2003 were to limit jets within four 3-nautical mile circles (<2.5% of the Military Operating Area) inclusive of concentrated calving caribou. Specifically, we recommend allowing: (1) A-10s to fly at any level but if below 1000', speeds would be less than 300 knots, and (2) for all fighter jets (F-15 and F-16), maintain the floor at 2000' except west of longitude 143° 45.00 reduce the floor to 1500'.

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TABLE 1 Fortymile caribou fall composition counts and population size, 1986–2002

Date	Bulls: 100 Cows	Calves: 100 Cows	% Calves	% Cows	% Small bulls	% Medium bulls	% Large bulls	% Bulls	Composition sample size	Estimate of herd size [a]
10/13/86	36	28	17	61	35	24	41	22	1381	15,307
9/28/87	40	37	21	57	13	43	44	22	2253	
10/2–3/88	38	30	18	59	29	41	30	23	1295	19,975
10/13/89	27	24	16	66	34	41	25	18	1781	
9/27–28/90	44	29	17	58	42	39	19	26	1742	22,766
10/10/91	39	16	10	64	41	34	25	25	1445	
9/26/92	48	30	17	56	37	36	27	27	2530	21,884
10/3/93	46	29	17	57	48	36	17	26	3659	
9/30/94	44	27	16	57	45	33	22	24	2990	22,104
10/3/95	43	32	18	57	43	31	27	25	3303	22,558
9/30/96	41	36	20	57	46	31	23	23	4582	23,458
9/30/97	46	41	22	53	48	28	24	25	6196	25,910
9/29/98	40	38	21	56	49	27	24	23	4322	31,029
9/29/99	48	37	20	54	55	29	16	26	4336	33,110
10/01/00	45	27	16	58	48	28	24	26	6512	34,640
9/29/01	49	38	20	53	44	32	24	27	6878	40,204
9/28/02	43	39	21	55	42	28	30	24	6088	44,750

[a] Herd estimates were the result of the summer censuses, except in 2001 and 2002 when caribou were too scattered and population models were used to derive total estimates.

TABLE 2 Fortymile caribou mid- to late June composition counts[a], 1985–1993

Date	Bulls:100 Cows	Calves:100 Cows	% Calves	% Cows	% Bulls	Composition sample size
6/19/85	18	48	29	60	11	3803
6/26/87	46	47	25	52	24	3596
6/30/88	54	36	19	53	29	1799
6/14/91	35	25	16	62	22	2998
6/22/92	41	46	25	54	22	3313
6/16/93	40	23	14	61	24	3143

[a] No counts were done in 1986, 1989, 1990, and 1994–2002.

TABLE 3 Fortymile Caribou seasons and bag limits, regulatory years 1987–1988 through 2002–2003

	Unit 20B SE of Steese		Unit 20D N of Tanana River		Unit 20E		Unit 25C SE of Steese	
	State	Federal	State	Federal	State	Federal	State	Federal
Regulatory year	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit
1987–1988	8/10–9/20 1 bull	–[a]	8/10–9/20 8/10–9/30[b] 12/1–2/28[b] 1 bull	–[a]	8/10–9/20 8/10–9/30[b] 12/1–2/28[b] 1 bull	–[a]	8/10–9/20 1 bull	–[a]
1988–1989	8/10–9/20 1 bull	–[a]	8/10–9/20 8/10–9/30[b] 12/1–2/28[b] 1 bull		8/10–9/20 8/10–9/30[b] 12/1–2/28[b] 1 bull		8/10–9/20 1 bull	–[a]
1989–1990	8/10–9/20 1 bull	–[a]	8/10–9/20 1 bull 8/10–9/30[b] 12/1–2/28[b] 1 caribou	–[a]	EAST: 8/10–9/20[c] 1 bull 8/10–9/30[bd] 12/1–2/28[bd] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[b] 12/1–2/28[b] 1 caribou	–[a]	8/10–9/20 1 bull	–[a]
1990–1991	8/10–9/20 1 bull 2/15–3/15 1 caribou	–[a]	8/10–9/20 1 bull	–[a]	EAST: 8/10–9/30[de] 1 bull 12/1–2/28[de] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[e] 12/1–2/28[e] 1 caribou	–[a]	8/10–9/20 1 bull	–[a]
1991–1992	8/10–9/20	No open	8/10–9/20	No open	EAST:	EAST:	8/10–9/20	8/10–9/20

Regulatory year	Unit 20B SE of Steese		Unit 20D N of Tanana River		Unit 20E		Unit 25C SE of Steese	
	State	Federal	State	Federal	State	Federal	State	Federal
	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit
	1 bull	Season	1 bull	season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[e] 12/1–2/28[e] 1 caribou	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[e] 12/1–2/28[e] 1 caribou	1 bull	2/15–3/15 1 bull
1992–1993	8/10–9/20 1 bull	No open Season	8/10–9/20 1 bull	No open season	EAST: 8/10–9/30[de] 1 bull 12/1–2/28[de] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[e] 12/1–2/28[e] 1 caribou	EAST: 8/10–9/30[de] 1 bull 12/1–2/28[de] 1 caribou WEST: 8/10–9/20 1 bull 8/10–9/30[e] 12/1–2/28[e] 1 caribou	8/10–9/20 1 bull	8/10–9/20 2/15–3/15 1 bull
1993–1994	8/10–9/20[d] 1 bull	No open Season	8/10–9/20 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[f] 1 bull 12/1–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[f] 1 bull 12/1–2/28[f] 1 bull
1994–1995	8/10–9/20[d] 1 bull	No open Season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[f] 1 bull 12/1–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[f] 1 bull 12/1–2/28[f] 1 bull
1995–1996	8/10–9/20[d] 1 bull	No open Season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull	8/10–9/30[f] 1 bull	8/10–9/30[de] 1 bull	8/10–9/30[f] 1 bull

Regulatory year	Unit 20B SE of Steese		Unit 20D N of Tanana River		Unit 20E		Unit 25C SE of Steese	
	State	Federal	State	Federal	State	Federal	State	Federal
	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit
					12/1–2/28[de] 1 bull	11/15–2/28 1 bull[f]	12/1–2/28[de] 1 bull	12/1–2/28[f] 1 bull
1996–1997	8/10–9/20[d] 1 bull	No open season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 11/15–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 12/1–2/28[f] 1 bull
1997–1998	8/10–9/20[d] 1 bull	No open season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 11/15–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 12/1–2/28[f] 1 bull
1998–1999	8/10–9/20[d] 1 bull	No open season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 11/15–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 12/1–2/28[f] 1 bull
1999–2000	8/10–9/20[d] 1 bull	No open season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 11/15–2/28 1 bull[f]	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 12/1–2/28[f] 1 bull
2000–2001	8/10–9/20[d] 1 bull	No open season	8/10–9/20[d] 1 bull	No open season	8/10–9/30[de] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 11/15–2/28 1 bull[f]	8/10–9/30[deh] 1 bull 12/1–2/28[de] 1 bull	8/10–9/30[fg] 1 bull 12/1–2/28[f] 1 bull
2001–2002 Resident	8/10–9/30[d] 1 caribou 12/1–2/28[de] 1 caribou	No open season	8/10–9/20[d] 1 caribou	No open season	8/10–9/30[de] 1 caribou 12/1–2/28[de] 1 caribou	8/10–9/30[de] 1 caribou 11/1–2/28[de] 1 caribou	8/10–9/30[deh] 1 caribou 12/1–2/28[de] 1 caribou	8/10–9/30[fg] 1 caribou 11/1–2/28[f] 1 caribou
Nonresident	8/10–9/20 1 bull	No open season	8/10–9/20 1 bull	No open season	8/10–9/20 1 bull	No open season	8/10–9/20 1 bull	No open season
2002–2003 Resident	8/10–9/30[d] 1 caribou 12/1–2/28[de]	No open season	8/10–9/20[d] 1 caribou	No open season	8/10–9/30[de] 1 caribou 12/1–2/28[de]	No open season	8/10–9/30[de] 1 caribou 12/1–2/28[de]	No open season

	Unit 20B SE of Steese		Unit 20D N of Tanana River		Unit 20E		Unit 25C SE of Steese	
	State	Federal	State	Federal	State	Federal	State	Federal
Regulatory year	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit	Season/Bag limit
Nonresident	1 caribou 8/10–9/20 1 bull	No open season	8/10–9/20 1 bull	No open season	1 caribou 8/10–9/20 1 bull	No open season	1 caribou 8/10–9/20 1 bull	No open season

[a] No separate season.
[b] Subsistence hunters or residents domiciled in communities or units in rural areas as defined by the Federal Subsistence Board and Alaska Board of Game.
[c] Drawing permit for resident hunters only.
[d] Registration hunt.
[e] Definition of subsistence hunter changed to include any resident of the state, Dec 1989.
[f] Registration hunt for federal subsistence users only. Who qualifies as a Fortymile caribou federal subsistence user differs between subunits, i.e., in Unit 20E it is rural residents of Unit 12 north of Wrangell–St Elias National Park and Preserve, Unit 20D and Unit 20E; in Unit 25C eligible federal subsistence are all rural residents in the state.
[g] Federal hunt managed under a joint state/federal permit issued by the state.
[h] Hunt area was changed to east of the east bank of the mainstem of Preacher Creek to its confluence with American Creek, then east of the east bank of American Creek.

TABLE 4 Reported Fortymile caribou harvest by type of hunt, regulatory years 1989–1990 through 2002–2003

Hunt	Regulatory year	Permits issued	% Did not hunt	% Successful hunters	% Unsuccessful hunters	Harvest			Total reported harvest[a]	Notes
						Bulls	Cows	Unk		
572 Drawing permit	1989–1990	750	31	11	89	57	0	0	57	
575[b] Registration permit	1989–1990	681	28			148	98	0	246[c]	
	1990–1991	1478	29	25	75	238	18	8	265	
	1991–1992	1864	21	23	77	335	1	1	337	
	1992–1993[d]	973	17	34	66	262	10	0	272	
	1993–1994	2809	22	15	85	325	10	0	335	
	1994–1995	2472	19	15	85	294	12	0	306	
	1995–1996	1860	26	12	88	160	15	0	175	
	1996–1997[e]	1025	28	16	84	138	7	0	145	150 bull quota
	1997–1998[f]	1305	31	16	84	143	8		151	150 bull quota
	1998–1999[f]	886	38	27	73	151	4		155	150 bull quota
	1999–2000[g]	1317	35	17	83	142	10	3	155	150 bull quota
	2000–2001[g]	1173	28	17	83	142	7	1	150	150 bull quota
	2001–2002[g]	4537	35	24	76	493	196	4	693	850 total quota; 210 cows
	2002–2003[gh]	4163	31	30	70	667	185	12	864	950 total quota; 235 cows
General[i] hunt	1987–1988			25	75	142	0	0	142	561 hunter reports
	1988–1989			42	58	399	2	0	401	964 hunter reports
	1989–1990			47	53	121	0	0	121	255 hunter reports
	1990–1991			10	90	47	2	0	49	467 hunter reports
	1991–1992			27	73	95	4	1	100	424 hunter reports
	1992–1993					60	0	0	60	102 hunter reports
	1994–1995	308	44	9	91	15	0	0	15	
	1995–1996	306	37	23	77	40	0	0	40	
	1996–1997	99	35	36	64	23	0	0	23	

Hunt	Regulatory year	Permits issued	% Did not hunt	% Successful hunters	% Unsuccessful hunters	Harvest			Total reported harvest[a]	Notes
						Bulls	Cows	Unk		
575	1991–1992	20				4	0	0	4	
Federal hunt	1992–1993	244	18	39	61	59	12	11	82	
	1993–1994	77	58	3	97	1	0	0	1	
	1994–1995[j]	<30	100	0	0	0	0	0	0	
	1996–1997[k]	0	0	0	0	0	0	0	0	
Total for all hunts	1987–1988			25	75	142	0	0	142	561 hunter reports
	1988–1989			42	58	399	2	0	401	965 hunter reports
	1989–1990			37	63	326	98	0	424	1264 hunter reports
	1990–1991			21	79	285	20	8	313	1520 hunter reports
	1991–1992			23	77	434	5	2	441	1919 hunter reports
	1992–1993			34	66	382	24	11	417[d]	1086 hunter reports
	1993–1994	2886	23	15	85	326	10	0	337	
	1994–1995	2780	22	15	85	309	12	0	321	
	1995–1996	2166	28	14	86	200	20	0	220	
	1996–1997	1025	28	16	84	138	7	0	145	150 bull quota
	1997–1998	1305	31	16	84	143	8		151	150 bull quota
	1998–1999	886	38	27	73	151	3		154	150 bull quota
	1999–2000	1317	35	17	83	142	2	3	147	150 bull quota
	2000–2001	1173	28	17	83	142	2	1	145	150 bull quota
	2001–2002	4537	35	24	76	493	196	4	693	850 total quota; 210 cows
	2002–2003[h]	4163	31	30	70	667	185	12	864	950 total quota; 235 cows

[a] Total harvest does not include harvest occurring in Canada. Canadian harvest since 1973 has been less than 20 caribou per year. Total does not include extrapolation for nonreporting from general hunts. [b] Hunt 575 was renamed RC865 in 1993. [c] Harvest may include 44 Nelchina/Mentasta caribou taken from southern portion of Unit 20E and 1 Macomb caribou from northern Unit 12. [d] Canadian harvest was estimated to be 50 additional caribou. [e] Includes RC865 and RC867. [f] Includes RC863, RC865, and RC867. [g] Includes RC863, RC865, RC866 and RC867. [h] Preliminary harvest results. [i] During 1994 permit hunt RC863 was set up in Units 20B and 20D. Alaskan residents, nonresidents, and aliens could participate. Approximately 35–40% of successful hunters do not report in general hunts, so totals for these hunts are actually higher. [j] Federal Subsistence office never sent data. Estimates generated through discussions with local federal biologists. [k] During regulatory years 1996–1997 through 2000–2001, state and federal hunts were managed under a joint permit. State and federal quota was 150 bulls.

TABLE 5 Fortymile caribou harvest and accidental death, regulatory years 1985–1986 through 2002–2003

Regulatory	Reported[a]				Estimated			Yukon	
year	M	F	Unk	Total	Unreported[b]	Illegal	Total	harvest	Total
1985–1986	261	0	0	261	160	20	180	0	441
1986–1987	223	0	0	223	137	20	157	0	380
1987–1988	142	0	0	142	87	20	107	0	249
1988–1989	399	2	0	401	244	150[c]	394	0	795
1989–1990	326	98	0	424	74	0	74	3	501
1990–1991	285	20	8	313	28	2	30	0	343
1991–1992	434	5	2	441	59	5	64	0	505
1992–1993	382	14	0	396	0	21	21	50	467
1993–1994	326	0	0	326	0	10	10	10	346
1994–1995	309	0	0	309	0	12	12	7	328
1995–1996	200	0	0	200	0	20	20	5	225
1996–1997	138	0	0	138	0	7	7	1	146
1997–1998	143	0	0	143	0	8	8	0	151
1998–1999	151	0	0	151	0	4	4	0	155
1999–2000	142	0	3	145	0	10	10	0	155
2000–2001	142	0	1	143	0	7	7	0	150
2001–2002	493	196	4	693	5	10	15	0	708
2002–2003[d]	667	185	12	864	5	5	10	1	875

[a] Includes all Alaskan harvest reporting systems.
[b] Unreported harvest calculated by multiplying reported general hunt harvest by 1.59 to compensate for nonreporting by successful hunters.
[c] Forty cows found abandoned within 50 yards of trails; 150 assumed taken.
[d] Preliminary harvest results.

TABLE 6 Fortymile caribou hunter residency and success of hunters reporting residency, regulatory years 1989–1990 through 2002–2003

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total[b] (%)	Local[a] resident	Nonlocal resident	Nonresident	Total[b] (%)	
1989–1990	291			347 (35)	182	453		635 (65)	982
1990–1991	105	157		262 (25)	273	517		790 (75)	1052
1991–1992	91	260	23	374 (21)	339	1052	34	1425 (79)	1799
1992–1993	116	219		335 (35)	261	373		634 (65)	969
1993–1994	45	270	9	324 (16)	431	1278	15	1724 (84)	2048
1994–1995	87	211	11	309 (15)	296	1477	8	1781 (85)	2090
1995–1996	40	138	22	200 (14)	312	950	14	1276 (86)	1476
1996–1997	33	96	17	146 (22)	214	301	1	516 (78)	662
1997–1998	53	83	7	143 (16)	250	480	7	737 (84)	880
1998–1999[b]	52	92	7	154 (29)	109	266	3	378 (71)	532
1999–2000	50	93	4	147 (17)	208	497	2	707 (83)	854
2000–2001	39	97	9	145 (17)	180	504	2	686 (83)	831
2001–2002	88	557	48	693 (23)	255	1885	98	2238 (77)	2931
2002–2003[c]	182	617	59	864 (30)	224	1646	123	1999 (70)	2863

[a] Residents of Unit 12 north of Wrangell–St Elias, Unit 20E, or Unit 20D and residents of Circle and Central.

[b] Unknown residents included in total.

[c] Preliminary data.

TABLE 7 Fortymile caribou autumn harvest by month/day, regulatory years 1988–1989 through 2002–2003

Regulatory year	Harvest by month/day								*n*
	8/10–8/16	8/17–8/23	8/24–8/30	8/31–9/6	9/7–9/13	9/14–9/20	9/21–9/27	9/28–9/30	
1988–1989				189[a]					
1989–1990[bc]	5	8	5	8	0	1	1	1	29
1990–1991	48	61	35	50	19	14	7	10	244
1991–1992	187	67	17	9	17	22	–[d]	–[d]	319
1992–1993[e]	289	0	1	0	1	0	47	7	345
1993–1994	167	16	12	15	10	4	1	0	225
1994–1995	51	16	21	21	17	9	4	19	158
1995–1996	33	10	6	5	12	2	3	1	72
1996–1997[f]	14	10	9	12	13	4	7	7	76
1997–1998[f]	22	3	1	18	12	9	16	6	87
1998–1999	57	20	4	1	0	0	0	0	82
1999–2000	50	8	2	7	19	7	0	0	93
2000–2001	81	13	11	4	1	0	0	0	110
2001–2002	91	45	60	53	49	14	9	7	328
2002–2003	147	75	133	258	11	15	9	5	653

[a] Between 1 Sep and 10 Sep, 189 caribou were harvested.
[b] Data from registration permit only.
[c] An additional 231 caribou were harvested between 1 Oct and 31 Dec.
[d] Closed by emergency order.
[e] State season was closed by emergency order 14 Aug 1992.
[f] Data from RC865 only. Harvest quota was 85 bull caribou.

TABLE 8 Fortymile caribou harvest percent by transport method, regulatory years 1987–1988 through 2002–2003

Regulatory year	Harvest percent by transport method									
	Airplane	Horse	Boat/ Airboat	3- or 4- Wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk	*n*
1987–1988[a]	58	1	3	19	3	3	13	0	0	142
1988–1989[a]	29	1	2	36	1	4	27	0	0	401
1989–1990[b]	27	0	0	10	6	5	52	0	0	424
1990–1991[c]	1	1	0	43	10	1	43	1	0	313
1991–1992[d]	16	1	2	53	5	4	23	5	0	441
1992–1993[c]	5	0	1	58	5	7	21	0	3	378
1993–1994[c]	16	0	2	38	16	8	17	0	2	326
1994–1995[c]	11	0	1	23	28	7	28	0	2	298
1995–1996[c]	33	0	2	14	19	6	26	0	2	326
1996–1997[c]	29	0	4	18	12	5	30	0	1	146
1997–1998[c]	36	1	4	15	22	7	11	0	3	143
1998–1999[c]	10	0	2	34	18	5	27	0	5	155
1999–2000[c]	23	1	1	28	9	3	31	0	3	147
2000–2001[c]	18	0	3	38	16	10	11	0	5	145
2001–2002[c]	10	0	4	29	30	3	21	0	3	693
2002–2003[c]	8	0	3	39	15	4	26	1	3	864

[a] General hunt numbers only.

[b] Drawing and registration permit hunt results.

[c] Registration permit hunt results only.

[d] Registration permit and general hunt results.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT UNITS: 20F, 21C, 21D, and 24 (48,000 mi^2)

HERDS: Galena Mountain, Ray Mountains, Wolf Mountain

GEOGRAPHIC DESCRIPTION: Galena Mountain, Kokrines Hills, and Ray Mountains

BACKGROUND

Named for their distinct calving areas, the Galena Mountain, Wolf Mountain, and Ray Mountain caribou herds occur north of the Yukon River in the Kokrines Hills and Ray Mountains. The Galena Mountain Herd (100–150 animals) typically calves east of Galena Mountain and winters west of the mountain. The Wolf Mountain Herd (600–850 animals) calves and winters to the north and east of Wolf Mountain in the Melozitna and Little Melozitna River drainages. The Wolf Mountain Herd and the Galena Mountain Herd are sympatric on a portion of their ranges near Black Sand Creek of Unit 21C, and the identity of these two herds was never adequately determined. The Ray Mountains Herd (approximately 1800 animals) calves in the Ray Mountains around Kilo Hot Springs, and winters to the north in the Kanuti–Kilolitna or to a lesser degree in the Tozitna drainages to the south. Local residents were aware of these herds for many years, but the Alaska Department of Fish and Game (ADF&G) did not survey them until 1977.

Aerial surveys of the Galena and Wolf Mountain herds are difficult during fall and winter due to small group size and poor sightability in the dense black spruce forests where they occur. Similarly, fall aerial surveys of the Ray Mountains Herd are difficult due to fog, clouds, and high winds.

The origin of these herds is unknown. Some residents suggested they were reindeer from a commercial operation in the Kokrines Hills that ended around 1935. However, evidence suggests these animals are caribou because 1) reindeer physical characteristics are not apparent, 2) reindeer genes were not found when tested, and 3) reindeer calve earlier than these 3 caribou herds.

These caribou herds are rarely hunted because they are relatively inaccessible during the hunting season, and few people outside the local area are aware of them. Since the early 1970s, hunting seasons were 10 August–30 September for the Galena and Wolf Mountain

herds, principally to keep harvest low but also to discourage harvest of cows. During 1984–1985 additional protection was given to the Ray Mountains Herd in southern Unit 24 to prevent overharvest near the Dalton Highway. That area was previously under Western Arctic caribou herd (WACH) regulations. The combined average of reported and known unreported harvest from all 3 herds over the last 10 years was <10 caribou per year.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Ensure harvest does not result in a population decline.
- Provide increased opportunity for caribou hunting.

MANAGEMENT OBJECTIVES

- Harvest up to 50 cows and up to 75 bulls from the Ray Mountains Herd.
- Harvest up to 10 cows and up to 25 bulls from the Wolf Mountain Herd.
- Harvest up to 10 cows and up to 25 bulls from the Galena Mountain Herd.

METHODS

Caribou from these herds were monitored through cooperative radiotelemetry studies involving ADF&G, US Fish and Wildlife Service (FWS), and Bureau of Land Management (BLM). In April 1992, 8 adult females, 2 female calves, and 10 adult male caribou were radiocollared on the winter range of the Galena Mountain Herd north of Galena. Galena Mountain is a local name given the 3274-ft, unnamed mountain northeast of Galena. In October 1993, 4 female calves were radiocollared in the Galena Mountain Herd. In October 1994, 8 female calves were radiocollared in the Galena Mountain Herd, 20 female calves were radiocollared in the Ray Mountains Herd, and 3 female calves were radiocollared in the Wolf Mountain Herd. In October 1995, 8 female calves were radiocollared in the Wolf Mountain Herd. In October 1996, 3 female calves were radiocollared in the Wolf Mountain Herd. On 10 April 2002, 3 short yearling, 1 short 2-year-old and 6 adult females were radiocollared in the Galena Mountain Herd. On 11 April 2002, 1 short 2-year-old and 9 adult females were radiocollared in the Wolf Mountain Herd. We radiocollared 15 short yearling and 2 short 2-year-old females on 29 March 2002 in the Ray Mountains Herd.

We conducted aerial surveys with helicopters (Robinson R-22 or R-44) and fixed-wing aircraft (Super Cub or Scout) during October 1994 through 2002 following techniques outlined by Eagan (1993). Surveys conducted using helicopters allowed for composition data to be collected. Fixed-wing aircraft were used in RY98 and RY02 (RY = regulatory year, which begins 1 Jul and ends 30 Jun [e.g., RY02 = 1 Jul 2002 through 30 Jun 2003]) for the Galena Mountain and Wolf Mountain herds, therefore only numerical counts were completed.

We monitored hunting mortality from hunter harvest reports and hunter interviews. Harvest reports that were submitted by hunters were entered into the statewide harvest database. The

data from these caribou herds was summarized annually from the statewide harvest database and hunter interviews were conducted opportunistically. Data summarized includes total harvest, harvest location, hunter residency and success, harvest chronology, and the types of transportation used. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Galena Mountain Herd. The Galena Mountain Herd has never been censused, but the population was probably down to 100–150 caribou by RY02. The highest number of caribou seen during RY00–RY01 was 105 animals in June 2001 (Table 1). The population probably declined due to 2 factors, predation and shifting between the Galena Mountain Herd and the Wolf Mountain Herd. It is also possible that some caribou were missed during the winter counts. As reported in the previous management report, radiocollaring caribou did not increase the number of caribou found, but did demonstrate that caribou occupy dense black spruce habitat, where sightability is low, during the rut. Continuation of surveys or censuses during winter or spring postcalving aggregations will provide the best estimates of population size for this herd. Regardless, it appears the Galena Mountain Herd was declining to a point where recovery was unlikely without intensive management.

Wolf Mountain Herd. The first fall composition survey of the Wolf Mountain Herd was conducted in October 1995, and 364 caribou were counted (Table 2). The survey conducted in June 2002 counted 617 caribou and was the largest number of animals ever counted in that herd. Based on that count, I estimated the population of the Wolf Mountain Herd was 600–700 caribou. The 2002 count was the highest reported, but may be high because Galena Mountain Herd animals were mixed in with the Wolf Mountain Herd at the time of the survey. Population increase is unlikely because recruitment has been low; only 1 short yearling was found during radiocollaring activities conducted earlier that spring. Continuation of surveys or censuses during summer or postcalving aggregations will provide the best estimates of population size for this herd.

Ray Mountains Herd. The Ray Mountains Herd was first thoroughly surveyed by ADF&G and BLM in fall 1983 and periodically surveyed by BLM during the next 2 years. On 1 November 1983, 400 caribou were counted. In 1987 the population estimate was 500 (Robinson 1988) based on a survey of all known upland ranges, but excluding the Caribou Mountain area. Composition counts during a radiotracking flight in October 2000 indicated a new minimum herd size of 1736 (Table 3). The 2001 survey yielded a count of 1695 caribou. The population probably declines in years of poor recruitment and increases when recruitment is good, but it has increased at a mean rate of about 10% per year since 1983. Continuation of surveys or censuses during summer or postcalving aggregations will provide the best estimates of population size for this herd.

Population Composition

Because some counts of the 3 herds were conducted with fixed-wing aircraft, not all surveys yielded composition data (Tables 1–4). During RY00–RY01, only the Ray Mountains Herd was classified.

The most recent calf:cow ratio data collected for the Ray Mountains, Wolf Mountain, and Galena Mountain herds were in the range of other Interior herds at 15:100, 22:100, and 13:100 for the 3 herds, respectively. Calf:cow ratios for the Fortymile Herd between 1985 and 1994 averaged 29:100 with a range of 16–37:100 (Boertje et al. 1995). The Delta caribou herd calf:cow ratio between 1970 and 1993 averaged 29:100 with a range of 2–65:100. The highest values often occurred following predator control programs (Valkenburg 1994). However, the percent of calves in the herd was down to 5% in 2002 for the Wolf Mountain Herd. During the collaring activities in April 2002 only 1 short yearling was found and it appeared that the 2001 cohort was almost nonexistent.

Distribution and Movements

Galena Mountain Herd. Galena Mountain caribou usually migrated toward alpine areas east of Galena Mountain in April. They were found on the alpine slopes of the southern Kokrines Hills during the calving season. Most radiocollared caribou were in alpine areas west of the Melozitna River from June to September in all years. In September a few bulls have been seen along the Yukon River and also north of Galena. During October the caribou usually migrated from alpine areas across Galena Mountain toward the Holtnakatna Hills and Hozatka Lakes where they wintered. In October 1995 radiocollared caribou from the Galena Mountain Herd were in the Holtnakatna Hills when composition counts were conducted. In 1996 they were scattered from these hills eastward to the Melozitna River where some were mixed with Wolf Mountain caribou (Saperstein 1997).

In late September–early October 1996, 10,000–15,000 caribou from the WACH moved east into Unit 21D. They crossed the Koyukuk River about 50 miles upstream of the mouth of the river. This group did not remain long in Unit 21D, and it is not known if there was any mixing with the Galena Mountain Herd. With only 3 collars remaining from the 2002 efforts, no remarkable information relating to herd distribution was obtained. Seasonal movements appear to be generally consistent with earlier investigations.

Following the radiocollaring efforts in April 2002, 4 of the adults and 1 short 2-year-old died, apparently as a result of the capture operation. Mortalities in several other caribou capture operations also occurred in Alaska at the same time. Investigation into the mortalities was inconclusive but deaths were likely the result of either capture myopathy, narcotic recycling, or kidney failure from low blood oxygen levels, and not infection or trauma. However, there is no obvious reason why these caribou died at such a high rate in some herds and not in others, or why the mortality rate was so high in 2002 and so low in other years (P Valkenburg, ADF&G, personal communication). Between 17 July 2002 and 24 September 2002, 2 more yearlings died due to unknown causes. Active collars remain on only 2 adults and 1 yearling.

Wolf Mountain Herd. A general migration pattern for the Wolf Mountain Herd was hypothesized based on tracks seen during surveys in the early 1980s. The herd calved on the south facing slopes of the Kokrines Hills south of Wolf Mountain, spent most of the summer in the surrounding alpine habitat nearer Wolf Mountain, then in October moved northward toward Lost Lake on the Melozitna River. Radiocollared caribou confirmed these patterns and also identified specific sites. In May 1995 the radiocollared caribou were located in the headwaters of Hot Springs Creek. In May 1996 they were located on the north side of Wolf Mountain. In October 1994 approximately 500 caribou were seen in the Hot Springs Creek area during collaring activities. The herd was on the north side of Wolf Mountain in the west fork of Wolf Creek in October 1995. And in October 1996 the herd was on the lower part of the Melozitna River, approximately 10–35 miles southwest of Wolf Mountain. With only 1 collar remaining from the 2002 efforts, no new information relating to herd distribution was obtained.

Following the radiocollaring efforts in April 2002, 7 of the adults died, apparently as a result of the capture operation. The previously described investigation of deaths in the Galena Mountain Herd included these animals as well. Two additional adults died apparently sometime prior to 18 May but it was not clear whether those mortalities were capture related. Only 1 active collar remains in the Wolf Mountain Herd on a 2-year-old caribou.

Ray Mountains Herd. Prior to October 1994 there were no radiocollared caribou in the Ray Mountains, and movements of the herd were not well known. Robinson (1988) found them north of the Ray Mountains and in the upper Tozitna River drainage. Based on the trails found, he suspected this herd made seasonal migrations between the 2 areas. During late October 1991 several hundred caribou were seen along the Dalton Highway near Old Man. Near Sithylemenkat Lake small groups of male caribou (10–20) were regularly seen earlier in the year during March, and during this time 200 caribou were seen in the Kanuti Lake area. We do not know if these caribou were from the Ray Mountains Herd or WACH.

Since radiocollaring began in October 1994, relocations during winter were primarily on the northern slopes of the Ray Mountains and during calving season on the southern slopes of the Ray Mountains in the upper Tozitna River drainages. Summer range is in the alpine areas of the Ray Mountains, frequently in the Spooky Valley area around Mount Henry Eakins and occasionally in the alpine areas south of the upper Tozitna River (Jandt 1998).

Following the radiocollaring operations of 29 March 2002, 4 short yearlings and 1 short 2-year-old apparently died from capture-related causes. The previously described investigation included these animals. Twelve collars from that operation remain active in the Ray Mountain Herd.

Body Weights and Genetics

In October 1995, female calves from the Galena Mountain Herd were among the heaviest in Alaska (Valkenburg et al. 1993). Wolf Mountain and Ray Mountains calves were also heavy.

In contrast, caribou calves caught in the Ray Mountains on 29 March 2002 were relatively light, indicating that body condition had declined considerably since 1994. Whether that

decline in condition is due to a short-term (summer weather) event or is a density-dependent decline in condition is unknown.

Analysis of mitochondrial DNA by Cronin et al. (1995) indicated that none of the samples from Galena Mountain Herd, Wolf Mountain Herd, or Ray Mountains Herd caribou contained any unique reindeer genes. Allele frequencies were similar to other Alaskan caribou and were not consistent with any known allele frequencies for reindeer. The Galena Mountain/Wolf Mountain samples also contained a rare allele not previously reported for reindeer or caribou in Alaska. The significance of this rare allele is unknown.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
Unit 20F, north of the Yukon River.		
RESIDENT HUNTERS: 1 caribou.	10 Aug–31 Mar	
NONRESIDENT HUNTERS: 1 caribou.	(General hunt only)	10 Aug–30 Sep
Units 21B, 21C, and that portion of Unit 21D north of the Yukon River and east of the Koyukuk River and Unit 21E.		
1 caribou; however, 2 additional caribou may be taken during a winter season to be announced.	10 Aug–30 Sep (Winter season to be announced)	10 Aug–30 Sep
Unit 24, that portion south of the south bank of the Kanuti River, upstream from and including that portion of the Kanuti Kilolitna River drainage, bounded by the southeast bank of the Kodosin Nolitna Creek, then downstream along the east bank of the Kanuti Kilolitna River to its confluence with the Kanuti River.		
1 caribou.	10 Aug–31 Mar	10 Aug–30 Sep
Unit 25D, that portion drained by the west fork of the Dall River,		

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
west of the 150°W long.		
1 bull.	10 Aug–30 Sep	10 Aug–30 Sep

The Western or Central Arctic caribou herds seasonally occupy areas in Units 24 and 21D north of the Yukon River and west of the trans-Alaska pipeline. Seasons and bag limits in that area reflect harvest recommendations for those herds.

Alaska Board of Game Actions and Emergency Orders. In March 1991 the Alaska Board of Game gave ADF&G emergency order authority to open a portion of Unit 21D when WACH are present. A bag limit of 2 caribou was established. This action allowed hunters the opportunity to take caribou while protecting the smaller Galena Mountain Herd that may be intermixed with the WACH. This special winter season is not opened unless the Galena Mountain Herd constitutes 10% or less of the total number of caribou north of the Yukon River and east of the Koyukuk River in Unit 21D. It was not opened during RY98–RY02.

The Board of Game adopted several changes in regulations for these herds at their March 2000 meeting. The primary changes were to allow for the harvest of any caribou and to make the regulations for the Ray Mountains Herd consistent in Units 21C, 20F and 24. The regulations also changed the boundaries for the hunt areas of the Ray Mountains Herd in Unit 24, moving it further south, and including all of Unit 20F north of the Yukon River. There were no emergency orders issued during this reporting period.

Hunter Harvest. During the RY00 and RY01 hunting seasons, only 5 bulls and 2 cow caribou were reported taken. Two cows and 3 bulls were harvested in the Ray Mountains Herd and 2 bulls were harvested in the Galena Mountain Herd (Table 5).

Hunter access to the Ray Mountains Herd is limited to lengthy snowmachine trips during the open season in winter or to a few ridge-top landing areas. The Galena Mountain Herd is most accessible for hunting when it crosses the Galena–Huslia winter trail during winter. However, that area is closed during winter to prevent overharvest. The Wolf Mountain Herd is almost never accessible for hunting because of the scarcity of aircraft landing areas. Several years ago a guide using horses was able to access a limited part of the Wolf Mountain Herd's range and occasionally took caribou from this herd. Moose hunters on the Melozitna River incidentally took Wolf Mountain caribou, but only very rarely. Success of hunters in all 3 herds was limited, and most hunters were not local residents (Table 6).

The total reported harvest continues to average <10 caribou per year. Each year 1 or 2 caribou are taken but not reported along the Yukon River near Ruby, and 3–5 caribou are taken along the Yukon River in the Rampart–Tanana section (Osborne 1995). These caribou, usually bulls, are occasionally found on remaining snowfields near the river in August, or wandering to the river during September. In addition, 5–7 caribou are probably taken each year by hunters using snowmachines from Tanana (Osborne 1995).

Other Mortality

Judging from fall calf percentages (Tables 1–4), natural mortality of caribou calves continued to be high in all 3 herds. Predation was probably the main limiting factor, but no studies to determine mortality factors have been completed for these herds. Judging from adult abundance, total adult mortality was probably very low. Black bears were probably the primary calving ground predators on the Wolf and Galena Mountain herds. Grizzly bears are found throughout the calving ranges of all 3 herds and calf mortality studies in other areas indicate that they are important predators of caribou calves (Boertje et al. 1995). There is some concern that the recent high moose populations have supported higher levels of wolf and bear numbers, and that an increase of incidental predation on the Galena Mountain caribou may be causing a decline in that herd. Less than 100 caribou were seen on 2 different surveys of the Galena Mountain Herd in 1999 and 2001.

CONCLUSIONS AND RECOMMENDATIONS

The mountains between Galena and the upper Hodzana River on the north side of the Yukon River contain 2300–2750 caribou in 3 herds centered around 3 distinct calving areas, although the calving areas of the Galena and Wolf Mountain herds may overlap. Although open hunting seasons for caribou exist, few animals were harvested due to limited access. Poor survival, due to predation, is the primary factor restricting herd growth. Survey and inventory information for wolves and bears indicated predator numbers were increasing during RY96–RY99 (Stout 1999, 2000). Prior to RY99, habitat apparently did not restrict growth because lichen ranges were lush. Large body size and weight of calves and adults for the Ray Mountains Herd and Galena Mountain Herd previously indicated good nutrition (Osborne 1995). The recent decline in calf weights may be related to less high-quality summer range available for Ray Mountain Herd caribou than previously thought.

Although there was a decline in the Galena Mountain Herd, harvest was not responsible for the decline; therefore, the first management goal – to ensure harvest does not result in a population decline – was met. However, the second goal, to provide increased opportunity for people to participate in caribou hunting, was not achieved, and more restrictive harvest regulations should be implemented to protect the Galena Mountain Herd. All management objectives were met. Harvest of bulls and cows did not exceed desired levels for the 3 herds. Very little has changed with respect to management since the last reporting period.

To allow harvest from the WACH in Unit 21D east of the Koyukuk River and to protect the Galena Mountain and Wolf Mountain caribou herds, we need to maintain a restricted season when the WACH is not present. Maintaining radio collars in the Galena and Wolf Mountain Herds would help managers distinguish them from the WACH. In addition, radio collars would help managers obtain better population estimates. Other management work on these herds will remain a low priority because of insignificant harvest and relatively few animals.

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TABLE 1 Galena Mountain caribou composition counts, 1991–2001

Date	Bulls:100 cows	Calves:100 cows	Calves	Cows	Bulls	Total caribou observed
12/91						260
10/92	40	7	9	123	49	181
10/93	32	25	41	165	53	259
10/94	22	40	46	115	25	186
10/95	28	19	40	211	59	310
10/96	37	13	19	151	56	232
12/98[a]						313
12/99[a]						89
01/01[a]						67
06/01[a]						105

[a] Fixed-wing survey, no composition classifications.

TABLE 2 Wolf Mountain caribou composition counts, 1991–2002

Date	Cows	Calves (%)	Bulls	Total caribou observed
6/91	117	18 (12)	11	146
6/92				595
1993[a]				
5/94	337	121 (26)	16	474
1/95				194
10/95	192	51 (15)	103	346
10/96	167	37 (14)	62	266
5/97[b]				423
1/98[b]				163
7/02[c]		27 (5)		516

[a] No survey.

[b] US Bureau of Land Management survey; no composition classifications.

[c] Photocensus.

TABLE 3 Ray Mountains caribou fall composition counts and estimated population size, 1991–2001

Survey date	Bulls: 100 cows	Calves: 100 cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	Total bulls %	Composition sample size	Count or estimate of herd size
06/91		31						13[a]		446
06/91			19							303[b]
10/91[c]										140[d]
10/94[c]										652
10/94	37	19	12	64	4	8	11	24	629	629
01/95[c]										684
06/95[e]										1731
10/95	34	12	8	69	3	9	11	23	994	994
10/96	28	15	10	70	3	8	9	20	1387	1387
10/97	33	13	9	68	5	6	12	23	1114	1114
10/98	26	32	20	63	6	3	7	16	1756	1756
10/00[e]	38	19	12	64	10	6	9	24	1736	1800
09/01	30	15	11	68	10	5	5	21	1695	1800

[a] Includes 50 unclassified adults.
[b] Included 245 unclassified adults.
[c] No composition classifications.
[d] Caribou Mountain portion only.
[e] Photocensus.

TABLE 4 Galena Mountain caribou summer calving counts, 1991–2002

Date	Cows	Calves	(%)	Bulls	Total caribou observed
6/91	97	11	(8)	27	135
6/92	191	13	(5)	37	241
5/93	65	12	(13)	16	93
6/93	130	24	(13)	40	194
5/94	56	13	(12)	40	109
6/94	104	34	(18)	53	191
1995–2002[a]					

[a] No counts completed.

TABLE 5 Ray, Galena, and Wolf Mountain caribou reported harvest, regulatory years 1990–1991 through 2001–2002

Regulatory year	Herd					
	Ray Mountains		Galena Mountain		Wolf Mountain	
	Bulls	Cows	Bulls	Cows	Bulls	Cows
1990–1991	3	0	0	0	1	0
1991–1992	2	0	0	0	1	0
1992–1993	5	0	0	0	2	0
1993–1994	9	0	0	0	0	0
1994–1995	2	0	1	0	2	0
1995–1996	0	0	0	0	0	0
1996–1997	0	0	1	0	0	0
1997–1998	0	0	0	0	0	0
1998–1999	0	0	0	0	0	0
1999–2000	0	1	0	0	1	0
2000–2001	2	0	2	0	0	0
2001–2002	1	2	0	0	0	0

TABLE 6 Galena Mountain, Wolf Mountain and Ray Mountains caribou hunter residency and success, regulatory years 1990–1991 through 2001–2002

Regulatory year	Successful				Unsuccessful				Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Total	Local resident[a]	Nonlocal resident	Nonresident	Total	
1990–1991	0	4	0	4	3	23	3	29	33
1991–1992	0	3	0	3	2	28	0	30	33
1992–1993	0	5	2	7	1	7	2	10	17
1993–1994	1	6	1	8	0	15	2	17	25
1994–1995	0	3	2	5	2	18	0	20	25
1995–1996	0	0	0	0	2	10	0	12	12
1996–1997	0	1	0	1	1	11	1	13	14
1997–1998	0	0	0	0	1	5	2	8	8
1998–1999	0	0	0	0	4	0	2	6	6
1999–2000	0	1	1	2	0	4	2	6	8
2000–2001	3	1	0	4	3	13	2	18	22
2001–2002	1	2	0	3	0	20	8	28	31

[a] Residents of Units 20; 21B, C, and D; and 24.