Caribou
Management Report
of survey-inventory activities
1 July 1998–30 June 2000

Carole Healy, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation
December 2001

Please note that population and harvest data in this report are estimates and may be refined at a later date.

If this report is used in its entirety, please reference as: Alaska Department of Fish and Game. 2001. Caribou management report of survey-inventory activities 1 July 1998–30 June 2000. C. Healy, editor. Project 3.0. Juneau, Alaska.

If used in part, the reference would include the author's name, unit number, and page numbers. Authors' names can be found at the end of each unit section.

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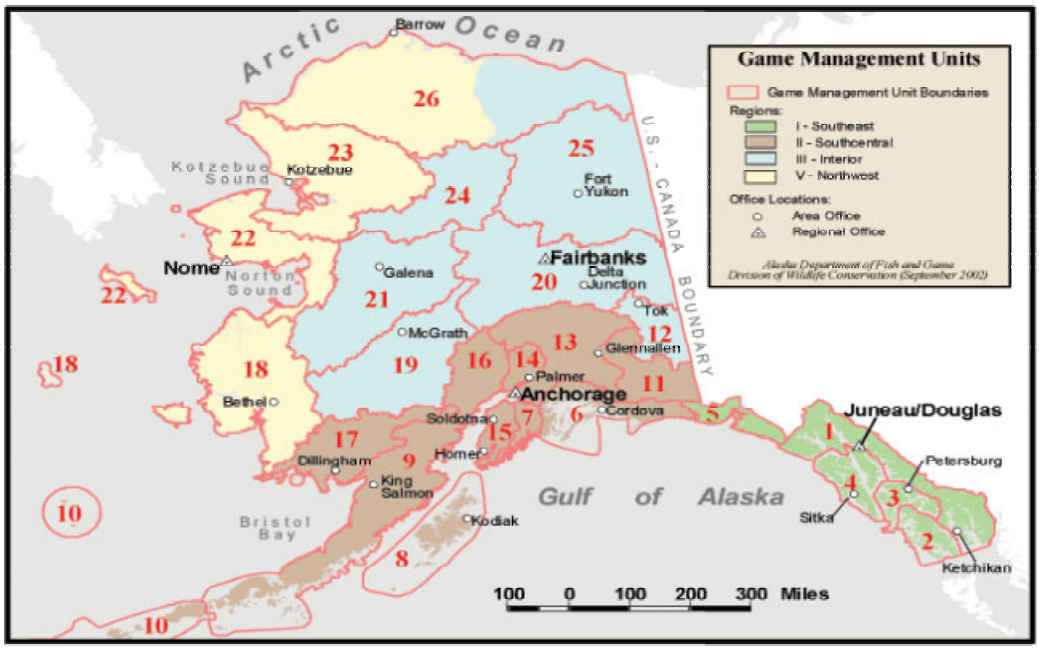
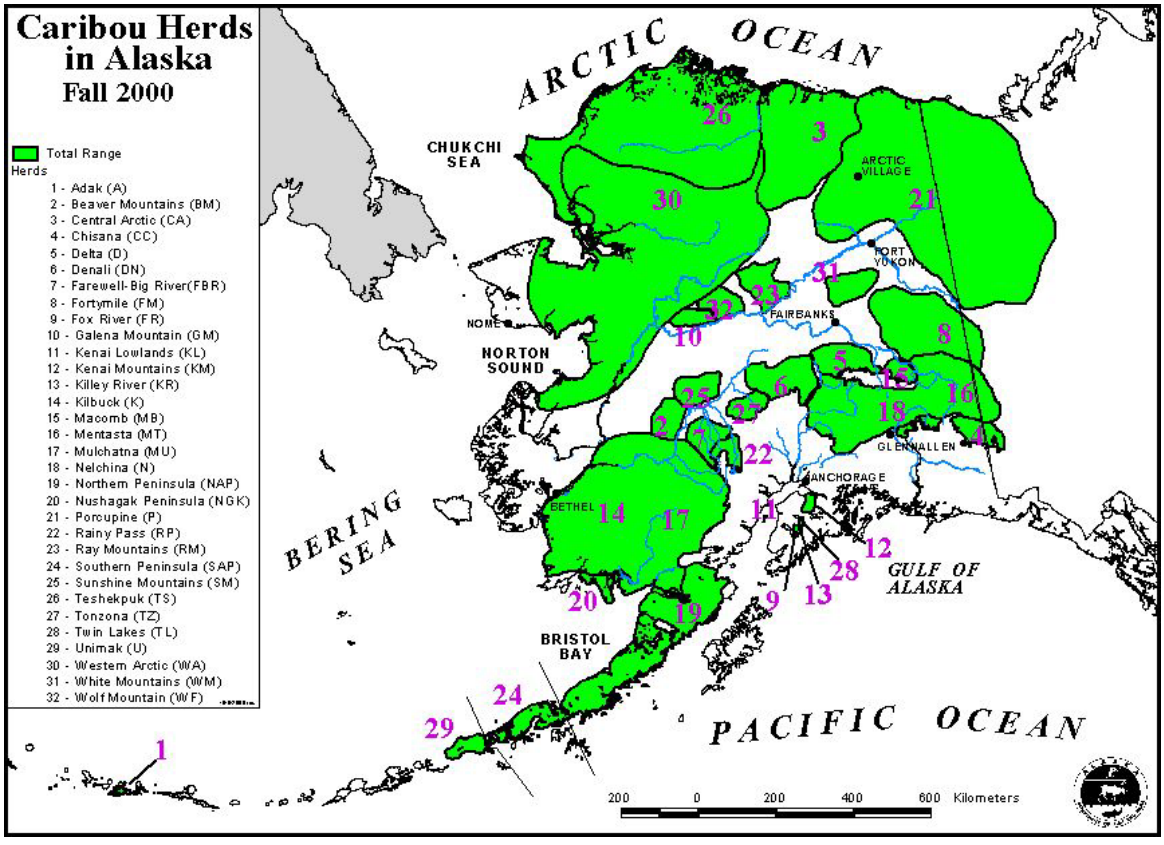
Alaska's Game Management Units



Caribou Herds in Alaska



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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

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

Historically, the Chisana caribou herd (CCH) has been small and nonmigratory. Skoog (1968) estimated the CCH was about 3000 animals in the early 1960s. 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.

Since 1988 the herd has steadily declined. Weather and predation have been the primary causes for the decline. Harvest by humans has had a minor effect on population fluctuations since the 1950s. 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. By fall 2000 the herd numbered about 425 caribou. Hunting will remain closed until the bull:cow ratio exceeds 30 bulls:100 cows for 2 years.

During the early 1900s the CCH was an important food source for residents of the Athabascan villages at Cross Creek and Cooper Creek and for gold seekers. Between 1913 and 1929, the Chisana Gold Rush occurred, and 8000–10,000 people lived in the area. 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).

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. Few Alaska residents fly into the area to hunt and

Native people now living at Northway and Tetlin rarely hunt in the CCH range. Use of the area by tourists is also 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 Renewable Resources (YDRR) in October 1987. Initially, 15 adult female caribou were radiocollared to monitor movements and to facilitate spring and fall censuses and composition surveys. Subsequently, between 1990 and 2000 47 adult females and 33 5-month-old female calves were radiocollared. Radiocollaring and herd monitoring costs are shared between ADF&G, NPS, and YDRR.

MANAGEMENT DIRECTION

A cooperative Chisana Caribou Management Plan is being developed to provide management direction that considers the different mandates and philosophies of ADF&G, NPS, and YDRR. In 1999 an informal Monitoring Plan was cooperatively developed outlining the monitoring duties for the 3 agencies. As of December 2000 the monitoring schedules were being followed.

Following are the current Chisana caribou management goals and objectives. I have recommended a revised objective pertaining to the management plan in the Conclusions and Recommendations section of this report.

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 2000.

METHODS

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 attempted to classify >90% of the herd.

We conducted surveys to estimate population size during late June 1992, 1993, 1995, 1997, and 1999. 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 were the primary components of the model.

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 during the report period 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. In 1994, 1995, and 2000 we captured 30, 20, and 28 adult cows, respectively, and collected blood to determine pregnancy using a serum progesterone assay testing technique. We also assessed body condition and tooth wear. During fall 1998, 1999, and 2000, we also radiocollared 3–9 female calves to monitor calf weight, size, and condition. During 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 during 1994 and 1995. We collected samples in spring 2000 but have not received the results from the lab.

Hunting seasons are based on a regulatory year (RY = 1 Jul through 30 Jun; e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). Beginning in RY93, we monitored the CCH harvest using information from registration permit reports. We implemented a registration permit hunt because the harvest quota was low and we needed the flexibility to require a short report period to prevent overharvest. Since RY94 the hunting season was technically open under registration permit, but no registration permits were issued because the population was declining and bull numbers were low.

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. Since 1988 the herd has declined by an average of 11.8% annually, and by fall 2000 it

numbered about 425 caribou (Table 1). The primary cause of the herd's decline was poor calf recruitment (0–14 calves/100 cows). Many of the small mountain herds in Interior and Southcentral Alaska and western Yukon experienced low calf survival during the 1990s. However, none was as low as the CCH. By 2000, after 11 years of poor recruitment, the herd was composed of an estimated 71% old-age (teeth worn to gum line) animals (ADF&G, unpublished data). It is now highly vulnerable to a rapid decline because the longevity of female caribou is not likely to exceed 14 years.

The genetic relationship of the CCH and other Yukon and Alaska caribou herds have been examined by DNA fingerprinting (Zittlau et al. 2000). Analyses showed that the CCH was distinct from all herds tested including the adjacent Kluane and Mentasta Herds. Future tests will be done to determine whether or not reduced bull numbers in the herd cause 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.

Population Composition

Since 1990 the calf:cow ratio in the CCH has been 0–14 ($\bar{x}$ = 5.9/100, s = 4.48) and as a result, the bull:cow ratio declined (Table 1). Modeling demonstrated that the herd's declining bull:cow ratio was primarily a function of low calf recruitment during the past 11 years. Bulls are aging and their mortality rate appears to be increasing. Unless calves are recruited, the bull:cow ratio will decline further.

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 on 31 May had little effect on the number of calves that were alive by 21 June (Table 2). Most calves were dead by 21 June.

Estimated numbers of calves on 31 May were low (<40:100) in 1993, 1996, 1998, 1999, and 2000. 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. Fall composition data demonstrated that pregnancy rate and the number of calves alive on 31 May had no influence on fall calf:cow ratios, indicating June calf mortality is the factor that most influences recruitment (Table 1).

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 along 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. Before 1991 in years of average snow, most of the herd remained on sedge-grass range primarily in Alaska and only used the eastern portion of its range 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 (USDA 1999) and the herd wintered in the spruce forest along the White River. During the past 5 years, the herd has primarily formed its postcalving aggregations from Flat Creek west to the Chisana Glacier.

The CCH does not have a core calving area, but instead spreads out across most of its range. Calving was limited to higher elevations (4800 and 6600 ft) in 1993 but occurred in spruce to alpine habitats (3400–6600 ft) during 1994–2000. In 1993 and 1994 we monitored calving behavior and found that parturient Chisana cows sequestered themselves and selected high elevation habitats that offered escape from predators, even though food is scarce there. During 1995 and 1996, more cows calved beneath the trees (30–38%) than in previous years (0–10%); however, they still calved apart. In 1997 and 1998–2000, 25% and <10% of the calving took place below tree line. The largest calving groups observed during 1993 and 1994, after a minimum of 10 days of monitoring, consisted of 3 and 4 cows with calves. Between 1996 and 2000, radiotracking surveys conducted 3–5 days after peak calving found only 5% of the calving cows were in a group >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

Board of Game Actions and Emergency Orders. During spring 1993 the Board of Game created a registration permit hunt for Chisana caribou. To ensure against an 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. Because of the current trend of the CCH, we decided on a harvest quota of zero and have issued no permits since RY94.

Human-induced Mortality. There has been no legal harvest of Chisana caribou in Alaska or Yukon since RY94 (Table 3). Reports from local residents indicated an illegal harvest in Alaska of 0–3 caribou annually. In the Yukon, First Nation band members can hunt Chisana caribou but have said they would stop until the herd recovers. However, between 1996 and 1999, 3–20 Chisana caribou were taken during the winter along the Alaska Highway in the Yukon. Because the herd is inaccessible most of the year in Alaska, illegal or incidental harvest is not a concern. During years that the herd winters along the Alaska Highway in the Yukon, harvest can affect herd population trend. Most of the harvest comprises cows, and in 1998 we estimated harvest to be 20 animals (4% of the herd). The regional biologist and protection officer in Haines Junction, Yukon are working to eliminate this harvest.

Other Mortality

During 1996–2000 the annual mortality rate for radiocollared adult females was 8–30%. Since 1994 causes of death have been determined for 17 radiocollared females; predators killed 16 and 1 died in an avalanche. Adult mortality rate is expected to increase due to the increasing age structure in the herd.

Based on percent cows in the herd and on annual herd pregnancy rates, we estimated 300–550 calves were born annually between 1994 and 2000. By 1 October, 83–95% of the calves died each year. Most calf mortality occurred between the end of May and 26 June. Predation was 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; Valkenburg et al. 1999).

Wolf predation was the primary cause of calf mortality in the nearby Aishihik Herd, which is a small mountain caribou herd with behavior similar to the CCH (Hayes et al., in press). Spence (1998) estimated that each wolf killed about 8 calves/summer and were the primary limiting factor to Aishihik Herd growth. There were at least 5 wolf packs (35–40 wolves) within the CCH's summer ranges, so it is likely wolves were the primary causes of calf mortality. Grizzly bears could also be important predators. Each year since 1993, we have witnessed grizzly bears and golden eagles killing calves and have observed wolves near cows with calves and postcalving aggregations. 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 are effective during the first few days of the calves' lives and are overall a minor predator. Based on incidental sightings, coyotes can be important predators when their numbers are high. Between 1990 and 1992 coyotes were abundant within the Chisana range. During those years, coyotes were observed killing calves. The coyote population in the Chisana area increased in 1998 coinciding with the snowshoe hare high. Coyote numbers are expected to decline during 2001 due to a decline in snowshoe hare numbers.

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 the Chisana Herd's 11-year decline, we were able to estimate overwinter calf mortality only twice due to the lack of an adequate calf sample. During winter 1990–1991, 64% of radiocollared female calves died between October 1990 and June 1991. Of the 9 collared caribou that died during this period, 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 directly be attributed to wolves based on the timing of death (midwinter). During winter 1999–2000, 2 of 8 (25%) radiocollared calves died, both due to wolf predation.

Preliminary data indicates calf survival during winter 2000–2001 will be high. As of 1 January 2001, (100%) 8 radiocollared calves were still alive. Survival data indicated that overwinter calf survival was similar to or better than that of adult cows during 1998–2000.

Summers were warm and slightly dry during 1989–1995, and winters 1991, 1992, and 1999 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 during 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 unfortunately 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, and 1997. Pregnancy rates were high but calf survival continued to be very low (4–5:100 cows), indicating that predation was the primary limiting factor. The CCH grew during the 1980s when climate conditions were favorable and predation levels 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. Even though calving cows sequester themselves during calving, during June most of the herd forms postcalving aggregations in traditional areas. This is the period most of the predation mortality occurs. Cows that have the greatest success in raising their calves to 5-months-old, do not join these groups but remain somewhat sequestered in less optimal forage range.

Considering the herd's age structure and the high rates of mortality, it is conceivable the CCH can become extinct. 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 only reason why these small herds existed or increased was defacto wolf control by land-and-shoot wolf hunters. 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 allow the herd to recover.

HABITAT

Assessment

Before the 1990s the most frequently used range of the CCH for both winter and summer was predominantly grass-sedge habitat with few lichens. During 1991, 1993–1996, and 2000 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, and 2000 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 most of the herd wintered along the White River. Lichen availability was low (22.6% lichen, 55.1% moss, and 11.3% 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 (18%) the CCH experienced during those years.

Summer range quality determines body size and body condition in the fall. 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 is adequate except during periods of unfavorable weather.

Enhancement

The entire range of the CCH is located in the Wrangell–St Elias National Park and Preserve or within Yukon, Canada. It is against NPS policy to conduct wildlife habitat improvement projects. Therefore, no habitat improvement projects are being considered. Habitat enhancement will depend on the near-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

The CCH declined by 78% since 1988 due primarily to poor calf recruitment and, since 1992, due to 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 2000. Predation was the cause of 96% of the mortality among radiocollared cows ≥5 months old in 1991 and 100% of the mortality in 1998 and 1999. Hunting during the herd's decline 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 illegal 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 probably contributed to higher overwinter adult mortality between 1994 and 1996. For the herd to stabilize, the calf recruitment rate must increase to 25 calves:100 cows while maintaining the cow and bull mortality rates at 12–15% and 21–25%, respectively. In order for calf survival to increase, pregnancy and natality rates must remain high and mortality caused by predators must decline.

The extremely low recruitment rates experienced by the CCH over the past 11 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 Yukon Department of Renewable Resources has allocated money to purchase radio collars and continue supporting the genetics study. The National Park Service 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.

The Alaska Department of Fish and Game, NPS, and YDRR are still developing a Chisana caribou management plan. We held an interagency meeting in Tok in July 1999 and discussed herd trend, management needs and options, and possible research and recovery efforts. A monitoring schedule was designed and implemented. The completed plan will recommend management and harvest strategies for the Chisana Herd that will meet the mandates of ADF&G and NPS. We were not able to meet the management objective of a completed management plan by January 2000. Rick Farnell (YDRR) and I are working on the management plan and expect to have it completed by January 2003.

Therefore I recommend the management objective be changed to:

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

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Table 1 Chisana caribou fall composition counts and estimated population size, 1987–2000

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

[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, 1989–1997

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

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

Table 3 Chisana caribou harvest and accidental death, regulatory years 1989–1999

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

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 (ADF&G 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. 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 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 of 30–50 caribou annually by the year 2002.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

- Increase the fall population to 600–800 caribou with a sustainable harvest of 30–50 caribou by the year 2002.

METHODS

We used a Robinson R-22 helicopter in late September or early October 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).

We radiocollared 4 four-month-old calves on 12 October 1999. These caribou were immobilized using 1 mg carfentanil citrate (Wildnil®, Wildlife Pharmaceuticals, Fort Collins, Colorado, USA)

and 65 mg of xylazine hydrochloride (AnaSed®, Lloyd Laboratories, Shenandoah, Iowa, USA). Caribou were weighed, measured, and subjectively rated for body condition.

Hunting was conducted by registration permit. Hunters were required to report hunt status, kill date and location, transportation mode and commercial services. Harvest data were summarized by regulatory year (RY = 1 Jul–30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During this reporting period, the MCH did not meet the herd size objective in RY98, but did meet the objective during RY99 and RY00.

RY98. We conducted a census on 30 September 1998 and counted 472 caribou. Survey conditions were poor, and caribou were widely scattered and difficult to see because most were below the snow line. Observers felt that an additional 50–100 caribou may have been missed. Therefore, we estimated herd size was 522–572 (Table 1).

RY99. We conducted a census on 15 October 1999 and counted 640 caribou (Table 1).

RY00. We conducted a census on 2 October 2000 and counted 605 caribou. However, an additional group of 45–50 caribou was located in timber and could not be counted accurately. Therefore, we estimated total herd size was 650 (Table 1).

Population Composition

RY98. Composition data was collected from 472 caribou during the 30 September 1998 MCH census. The bull:cow ratio of 50:100 was the highest recorded since at least 1982 (Table 1). The bull segment of the population consisted of 32% small bulls, 46% medium bulls, and 22% large bulls. The calf:cow ratio of 25:100 was higher than the 18:100 of the previous year.

RY99. Composition data was collected from 606 caribou during the MCH census on 15 October 1999. The bull:cow ratio of 57:100 was the highest since at least 1982, but similar to the 50:100 estimated in 1998 (Table 1). The bull segment of the population consisted of 49% small bulls, 21% medium bulls, and 30% large bulls. Calf survival to fall decreased slightly to 22 calves:100 cows.

RY00. Composition data was collected from 605 caribou during the 2 October 2000 MCH census. The bull:cow ratio was 45:100 with 43% small bulls, 29% medium bulls, and 29% large bulls. Calf survival to fall decreased to a relatively low 11 calves:100 cows (Table 1).

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

Richardson Highway, and the primary calving grounds are on the Macomb Plateau. The MCH also uses the lowlands of the Tanana River valley as winter range.

RY98. During the MCH fall 1998 census, several groups were located west of the Gerstle River, but most caribou were located on the Macomb Plateau and in the Berry Creek drainage. One mortality was located near Dot Lake.

RY99. During the MCH fall 1999 census, large groups of caribou were distributed in the Macomb Plateau area including the Berry Creek-Plateau Lake area, upper Bear Creek, and west of the Johnson River in the Sheep Creek drainage.

RY00. During the MCH fall 2000 census, caribou were aggregated primarily on the Macomb Plateau, in the Bear Creek, Berry Creek, and Dry Creek drainages.

For 5 years, as many as about 600 caribou from the Delta Herd have wintered in the Jarvis Creek/McCumber Creek drainages and the vicinity of Donnelly Dome in southwestern Unit 20D (P Valkenburg, ADF&G, personal communication). Most of these caribou migrate back to Unit 20A in April, however, some bulls may remain in Unit 20D until later in the year. During late summer 2000, a few small groups of caribou were consistently seen along the Richardson Highway in the vicinity of Donnelly Dome. Prior to the 2000 hunting season, I conducted a radiotracking flight to determine if these caribou were from the Macomb or Delta Herds. During the flight, I saw approximately 150 caribou in small, scattered groups, and 2 radiocollared Macomb caribou were located in the area. No Delta caribou were located, however, I did not listen for all Delta Herd radio frequencies. On a 27 September 2000 radiotracking flight, P Valkenburg (ADF&G, personal communication) listened for Delta caribou frequencies in Unit 20D but found none. Therefore, my conclusion is that no Delta caribou were in Unit 20D during the hunting season.

MORTALITY

Harvest

Season and Bag Limit.

RY98 — The RY98 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 to reduce incidental caribou harvest by moose hunters in the area and to make large, mature bulls more accessible to hunters. This was an attempt to make harvest more compensatory rather than additive.

RY99 — The RY99 hunting season was canceled (Table 2) because the RY98 harvest had exceeded the quota, and it was not clear whether the herd would be above or below the population goal in fall 1999. In retrospect, a registration hunt with a small harvest quota would have been possible.

RY00 — The RY00 hunting season was conducted as registration permit hunt RC835 (Table 2) from 10–20 September with a harvest quota of 25 bulls.

Board of Game Actions and Emergency Orders. During RY98, we issued an EO to close registration hunt RC835 on 16 September, in anticipation that the harvest quota would be met before the scheduled closing date of 20 September.

During RY00, we issued an EO to correct an error in the 2000–2001 hunting regulation book which listed no open season in Unit 12 for hunting the MCH during registration permit hunt RC835. The EO clarified that hunting in Unit 12 for RC835 was open during 10–20 September for that portion west of the Glenn Highway (Tok Cutoff) and south of the Alaska Highway, excluding the Tok River drainage.

Also during RY00 we issued an EO to close the hunting season for RC835 on 15 September because we expected the harvest quota would be met by that date.

Hunter Harvest.

During this reporting period, the RY98 harvest inadvertently met the harvest objective. The harvest objective was not met during RY99 or RY00.

Permit Hunts.

RY98 — Macomb caribou were hunted under registration permit hunt RC835 (Table 2). Permits were issued to 167 hunters (Table 2), and 114 (68%) hunters actually hunted (Table 3), killing 32 caribou (Table 4).

RY99 — The hunting season was cancelled and no hunt was conducted (Table 2).

RY00 — Registration permit hunt RC835 was held during the RY00 hunting season. Permits were issued to 274 hunters (Table 2) and 186 permittees (68%) actually hunted (Table 3), killing 22 caribou (Table 4).

The substantial increase in the number of registration permits issued during RY00, compared to the previous 2 seasons, was due to several factors. There is increasing interest in RC835 as a road-accessible hunt, and a number of caribou were seen along the Richardson Highway in southern Unit 20D prior to the hunting season, which peaked hunters' interest. Also, hunting for Nelchina and Fortymile caribou was significantly restricted during the RY00 hunting season, making the RC835 hunt more appealing to hunters.

Hunter Residency and Success.

RY98 — Most hunters (54%) were local residents of Unit 20D (Table 3). Local hunters had a 36% success rate compared to nonlocal hunters who had a 19% success rate. All hunters had a 28% success rate that was similar to the previous year (Table 3).

RY99 — The hunting season was cancelled, and no caribou were harvested (Table 3).

RY00 — Most hunters (54%) were local residents of Unit 20D (Table 3). Local hunters had a slightly lower success rate of 11%, than nonlocal hunters who had a 13% success rate. All hunters had a 12% success rate – substantially lower than the success rate during the last 2 years

the season was open. Success was lower during the RY00 hunting season because weather was very poor, making hunting difficult.

Harvest Chronology.

RY98 — On opening day, 10 September, 13 caribou were killed, equaling 52% of the 25 caribou harvest quota (Table 5). After the first 3 days of the season, 23 caribou had been reported killed and an EO was issued to close the season at 12:01 A.M. on 16 September. Seven caribou were killed after the season closed.

RY99 — The hunting season was cancelled, and no caribou were harvested (Table 5).

RY00 — Nine caribou were killed on opening day, 10 September, equaling 36% of the 25 caribou harvest quota (Table 5). Fifty percent of the quota had been taken by the third day of the season, and an EO was issued to close the season at 12:01 AM on 15 September. One caribou was killed after the season closed.

The MCH registration permit hunt resumed in RY97 after a 5-year hiatus, but in RY98 and RY99 the season was closed by EO. The year it was not closed by EO, RY97, was the first year it was open after the 5-year closure, and I believe hunters were not accustomed to the hunt, thus hunting pressure and rate of harvest was less than in the next two years.

Harvest Location.

RY98 — Most caribou (50%) were taken in the Jarvis Creek drainage, which is an increase from RY97 when 36% were taken there (Table 6). Nine caribou (28%) were taken within the Macomb Plateau Controlled Use Area (MPCUA).

RY99 — The hunting season was cancelled and no caribou were harvested (Table 6).

RY00 — Harvest increased substantially within the Jarvis Creek drainage with 82% of caribou taken there (Table 6). No caribou were taken within the MPCUA. Harvest has increased in the Jarvis Creek drainage for several reasons: 1) more caribou have been in the area during the fall hunting season than in previous years; 2) the area has unrestricted access from the Alaska and Richardson Highways, with numerous trails; and 3) weather and hunting conditions within the MPCUA were poor during fall 2000 because of early snowfall.

Transport Methods.

RY98 — The most commonly used modes of transportation for successful hunters were 3- or 4-wheelers, other off-road vehicles, and highway vehicles (Table 7).

RY99 — The hunting season was cancelled, and no caribou were harvested (Table 7).

RY00 — The most commonly used modes of transportation for successful hunters were 3- or 4-wheeler, other off-road vehicles, and highway vehicles (Table 7). No horses were used this year because of deep snow within the MPCUA, where most horses are used.

Other Mortality

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

HABITAT

Assessment and Enhancement

Mean weights of MCH calves have increased since the early 1990s, when they were chronically low throughout the Interior (Table 8). The relatively high mean calf weights during fall 1998 and 1999 indicate that the herd was not nutritionally stressed, but the traditional range is small and carrying capacity is unlikely to be greater than 1000 caribou.

CONCLUSIONS AND RECOMMENDATIONS

The MCH size objective of 600–800 was met during RY99 and RY00. The MCH was hunted 2 of 3 years during this reporting period, but the permit hunt harvest quota of 25 caribou each year was below the minimum harvest objective of 30 caribou. However, the harvest objective was unintentionally met during the RY98 hunting season when 32 caribou were killed. 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. Intensive management efforts will continue in the area in an attempt to meet established objectives.

Conducting the MCH hunt as a registration hunt with a small harvest quota is proving difficult and frustrating for hunters because the season has been closed by EO. Changes in hunt administration will be considered during the next reporting period. Options that will be explored are shortening the hunting season from its current 10 days to approximately 3–5 days and conducting the hunt every other year with a larger harvest quota.

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Table 1 Macomb caribou fall composition counts and estimated population size, 1982–2001

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
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	600[d]

[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 2000–2001

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	22	78	12 (100)	0 (0)	0 (0)	12
	1986–1987	100	62	26	74	10 (100)	0 (0)	0 (0)	10
570[b]	1986–1987	15	53	14	86	1 (100)	0 (0)	0 (0)	1
530[a]	1987–1988	150	53	76	24	53 (100)	0 (0)	0 (0)	53[c]
	1988–1989	150	57	55	45	36 (100)	0 (0)	0 (0)	36[d]
	1989–1990	150	47	55	45	44 (100)	0 (0)	0 (0)	44[d]
535[e]	1990–1991	351	42	21	79	42 (100)	0 (0)	0 (0)	42
	1991–1992	317	33	16	50	48 (96)	0 (0)	2 (4)	50
	1992–1993[f]	0							0
	1993–1994[f]	0							0
	1994–1995[f]	0							0
	1995–1996[f]	0							0
	1996–1997[f]	0							0
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]	0							0
	2000–2001[g]	274	31	8	60	22 (100)	0 (0)	0 (0)	22
Totals for all permit hunts	1985–1986	140	61	22	78	12 (100)	0 (0)	0 (0)	12
	1986–1987	115	61	24	76	11 (100)	0 (0)	0 (0)	11
	1987–1988	150	53	76	24	53 (100)	0 (0)	0 (0)	53[a]
	1988–1989	150	57	55	45	36 (100)	0 (0)	0 (0)	36[b]
	1989–1990	150	47	53	48	44 (100)	0 (0)	0 (0)	44[b]
	1990–1991	351	42	23	77	42 (100)	0 (0)	0 (0)	42
	1991–1992	317	33	16	50	48 (96)	0 (0)	2 (4)	50
	1992–1993[f]	0							0
	1993–1994[f]	0							0
	1994–1995[f]	0							0
	1995–1996[f]	0							0
	1996–1997[f]	0							0
	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

Hunt	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Harvest			Total harvest
						Bulls (%)	Cows (%)	Unk	
	1999–2000[f]	0							0
	2000–2001[g]	274	31	8	60	22 (100)	0 (0)	0 (0)	22

[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 2000–2001

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

[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 2000–2001

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

[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 2000–2001

Regulatory	September harvest date											
year	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

[a] Hunt cancelled.

Table 6 Macomb caribou harvest location during permit hunt RC835, regulatory years 1997–1998 through 2000–2001

Harvest location/drainage	Regulatory year			
	1997–1998	1998–1999	1999–2000[a]	2000–2001
Jarvis Creek	8	16		18
Little Gerstle River	3	2		2
Granite Mountains	0	1		0
Dry Creek	9	9		0
Berry/Bear Creek	0	0		0
Robertson River	0	3		0
Unknown	1	1		2

[a] Hunt cancelled.

Table 7 Macomb caribou harvest percent by transport method, regulatory years 1986–1987 through 2000–2001

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

[a] Includes permit hunt harvest.

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

[c] Hunt canceled.

Table 8 Macomb caribou female calf weights, 1988–1999

Date	$\bar{x}$ Weight (lb)	*n*
Spring 1988	116.8	4
Spring 1990	107.3	12
Fall 1994	118.8	10
Fall 1996	128.3	8
Fall 1998	132.8	12
Fall 1999	128.2	4

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

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

HERD: Nelchina Caribou Herd

GEOGRAPHIC DESCRIPTION: Nelchina Basin

BACKGROUND

The Nelchina caribou herd (NCH) contained 5,000–15,000 caribou in the late 1940. 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 has steadily declined since 1996.

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 2500 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. Beginning in 1990 Nelchina permits were only issued 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 10 years (1989–99) there have been nearly 38,000 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 3000–6000 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 techniques or a traditional census using hand-held cameras and direct field estimates made from 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 until fall. Extrapolated fall posthunt 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. Between 40 and 60 radiocollared cow caribou are maintained in the herd each year. Collars are also placed on female calves to obtain survival and parturition data for known age females. All radiocollared cows are followed every other day during the calving period to determine pregnancy rates and the mean calving date.

Female calves are collected 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 declined 17% from 35,552 caribou in 1998 to 29,601 in 2000 (Table 1). The estimated density was 0.7 caribou/km^2 in 2000 based on an approximate range of 44,200 km^2 (Lieb et al. 1988).

Population Composition

Herd productivity was low in 2000 with only 31 calves:100 cows observed during the spring postcalving survey (Table 1). This was the second consecutive year with below average productivity, 32 calves:100 cows were observed in 1999. These ratios are 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 and a reproductive pause in 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 is monitored by comparing changes in calf:cow ratios between summer and fall and has increased in recent years. The 1999 and 2000 fall ratios were 23 and 20 calves:100 cows, respectively, and were also among the lowest ever observed. Fall calf ratios historically ranged from 38 to 48 calves:100 cows.

The bull:cow ratio during the 2000 fall composition count was 25:100 and 30:100 in 1999. Fall bull ratios have been relatively stable the last 4 years. Bull:cow ratios during the 1980s when the herd was increasing were often in the range of 50–60 bulls:100 cows. This reduction in the bull:cow ratio was caused by increased bull harvests. Subsistence permittees select for large bulls. As more subsistence permits were issued, not only has the number of bulls declined, the age structure of the bull population has been skewed toward younger animals. 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.

Distribution and Movements

Calving takes place in the eastern Talkeetna Mountains from Fog Lakes southeast to the Little Nelchina River. The core calving area centers around 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 1999 and 2000 the rut occurred in the eastern portion of 13B from the Alphabet Hills to the Tangle Lakes. Caribou remained in Unit 13 until late October or early November when 90% of the herd migrated east into Units 12 and 20E. There has been little use of traditional wintering areas in Unit 13 since 1995, with the exception of 1999-00 when approximately 3000 caribou wintered around the Tangle Lakes. 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 1999-2000 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 1999-2000 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) during 1999–2000 were 10 August to 30 September and 21 October to 31 March. The federal bag limit was 2 caribou. The Unit 13 federal subsistence hunt was a registration hunt administered by the Bureau of Land Management; only residents of Units 11, 13, or 12 along the Nabesna Road were eligible, until 1998 when Unit 20 residents from Delta Junction also became eligible. A Unit 12 federal subsistence hunt (RC 512) was opened by emergency order when the NCH migrated through Tetlin during November 1999.

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 Nelchina 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 subsistence hunting was again by Tier II permit only. The 1998-99 Tier II hunt was for bulls only, and the season was closed on 20 November by emergency order. The State registration hunt in Tok was opened by emergency order for cows only between 3 and 7 November 1998. The 1999–2000 Tier II hunt for cows was closed by emergency order on 8 September and the bull hunt was closed on 20 September by EO after harvest quotas were met.

Hunter Harvest. The reported harvest in 1999–2000 for the combined state and federal hunts was 2418 caribou, down 27% from the 1998–99 take of 3306 (Table 2). Caribou harvests peaked in 1996 with a combined harvest of 5601 caribou

Illegal and unreported harvests of Nelchina caribou are an additional source of mortality. The estimated illegal and unreported take (Table 3) was reduced in 1998 because of the large decrease in hunting pressure after closure of the Tier I registration hunt. 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.

Wounding loss is probably quite high because caribou are a herd animal; a caribou is often shot near other caribou 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 other caribou shot until one eventually drops.

Permit Hunts. Nelchina caribou were harvested by 5 separate permit hunts. 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, and 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 1999-2000, 8000 permits were issued and hunters reported a harvest of 589 cows and 1422 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 because a decline in calf production coupled with the increase in harvests brought the size of the NCH to with in 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 (Table 2). Overall harvests under this hunt were not much higher than reported in the prior two seasons and were well below the expected kill. The observed impact this hunt had on the population dynamics of the NCH was to bring about only a slight reduction in herd size and productivity.

The Unit 13 federal hunt (RC513) is a registration hunt for residents of Units 13, 11, and 12 along the Nabesna Road and Delta Junction in Unit 20. The number of participants and the harvest have increased the last two years with harvests of 416 and 389 caribou in 1998 and 1999 respectively. The highest reported harvest under this hunt was 647 caribou that occurred in 1991 when this 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 not open to federal subsistence hunting. However, the potential for a high harvest under this hunt still exists because the fall caribou migration route between Paxson and Sourdough along the Richardson Highway is still on federal land that is 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 RC 460 registration hunt in Unit 12 is opened when the NCH migrates into Unit 12 but is not yet mixed with Mentasta Caribou Herd. 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. Harvests are low and have fluctuated between 155 and 361 bulls and, in one year, 380 cows (Table 2); however, the hunt is very popular and has the potential for a high harvest if allowed.

The Unit 12 federal hunt, Hunt 512, 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 administer this hunt at the Tetlin National Wildlife Refuge. The hunt has was held in 1998 and 1999 and the harvest was very low with only 11 and 38 bulls reported taken (Table 2).

The state DC590 drawing permit hunt 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 and bulls predominate in the harvest, but the overall take has been very low, varying from 7–22 animals during this reporting period (Table 2).

Hunter Residency and Success. Only Alaska residents are allowed to hunt Nelchina caribou in Units 13 and 12. Nonresident hunters are allowed to hunt the NCH only in 14B under a drawing permit hunt, but there were no successful nonresident applicants during this report period. Table 4 lists hunter residency for local (Unit 13) or nonlocal hunters and their success for the state Tier

II hunt only. Most of the Tier II permits were issued to non-local Alaska residents. Local hunters comprised 7% of the total Tier II hunters and took 4% of the total harvest. Both federal hunts are open only to residents of defined subsistence zones thus only 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 5 and 8 days hunting to get a caribou, while unsuccessful hunters averaged 6 to 10 days in the field. Federal subsistence hunters in GMU 13 reported approximately the same hunting effort.

Hunter success for all hunts declined from 43% in 1995–96 to 22% in 1999–2000. The decline in hunter success was primarily attributable to movement of the caribou during the fall season and closure of winter hunts after the decline in herd size. Another factor that affects hunter success in the Tier II hunt is the way permits are issued to the same high scoring individuals every year. Because of this, a Nelchina permit is not the valued prize it was under the old drawing system when an individual was fortunate to get drawn for a permit every 3 or 4 years.

Harvest Chronology. The early fall caribou season occurs in August and September and is the most popular time to hunt caribou. Sixty to 90 percent of the yearly 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, late fall and winter seasons have been important, with high harvests in those years when caribou remain in Unit 13. The winter season was closed in 1999-2000 because the entire harvest quota was taken during the fall hunt.

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 the availability of caribou during the winter hunt. Highway vehicles have been the most important transportation method in the federal subsistence hunt (RC513) and the Unit 12 state registration hunt (RC460), with 60–80% of successful hunters reporting their use. Aircraft were the most important transportation method in the Unit 14B drawing hunt, with 57–92% of successful hunters using aircraft to access the field.

OTHER MORTALITY

The mortality rate during 1999–2000 for radiocollared adult cows was estimated at 18%, up appreciably from the 5%–10% historical mortality rate. The high mortality rate may be attributable to increased predation because of high wolf numbers and greater prey vulnerability in deep snow conditions.

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 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. Since 1988 wolves have increased over most of the Nelchina caribou range, especially in Subunit 13A where 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 and numbers remain high. Increased wolf predation on caribou calves is supported by the observed decline in fall calf:cow ratios in recent years.

An important factor limiting winter predation on caribou by wolves in Unit 13 is the migratory pattern of the NCH. A large percentage of the caribou in the NCH leave Unit 13 in October and do not return from wintering areas in Units 12 and 20 until April, and thus are unavailable to Unit 13 wolves. Wolf predation on caribou when they winter out of the unit is documented by monitoring mortality rates on radiocollared caribou. Over winter mortality during 1999–2000 was high and contributed to the 18% yearly rate. Wolves were abundant in Units 12 and 20E and caribou were considered the major prey on the winter range (C. Gardner, pers. commun.). 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 above average in Units 13, 12, and 20E during the winter of 1999–2000. Deep snow conditions that restrict foraging and movement negatively impact prey vulnerability and future productivity.

HABITAT

Assessment

Between 1955 and 1962 the department 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 shifted from a diet of lichen to one 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 the Mulchatna Caribou Herds (Pitcher 1991). Since 1992, female calves

have been captured and radiocollared or collected to assess body condition and age specific productivity data. Fall and spring weights of female calves have ranged between 103 and 126 lbs. These represent the lightest and most variable weights for the interior herds (Valkenburg, ADF&G Files 1998). The lowest weights were recorded in 1996 when summer drought limited forage and resulted in a reduced level of nutrition and again in 2000 following a severe winter and cold spring. The NCH has the genetic potential to produce heavier cows provided adequate nutrition is available. Female calves from the Kenai that are 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.). Analysis of body condition since 1992 leads to the conclusion that the NCH is more nutritionally stressed than other interior herds due to overstocking of the range for a number of years.

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 calves. Since 1992, no two-year old cows have produced a calf. In years with conditions favorable to good forage production and availability, 33% of the three-year old cows had calves but during years with drought or deep snow conditions, no three-year old cows calved. Overall pregnancy rates the last two years have only been 45%–50%. Productivity data suggests that the NCH is experiencing nutritional stress typically found at higher stocking densities.

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 35–40,000 caribou on the range and monitor the results. Because this herd reduction only occurred in the last two years, more time is needed to fully evaluate the impact of herd reduction 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 caribou forage 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 capability for caribou.

In spite of the plan and the benefits of wild fire, recent wildfire starts in Unit 13 have not been allowed to burn, regardless of the suppression category of the land. In fact, Unit 13 has not had a large fire since 1950. Planning 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 GMU 13 has increased and may be disrupting normal caribou behavior patterns. I recommend we evaluate the potential impacts of ORV and snowmobile use in Unit 13 and develop a plan for future use of these vehicles. This should entail a joint planning process with landowners, other regulatory agencies, and the public.

CONCLUSIONS AND RECOMMENDATIONS

The fall 2000 NCH herd estimate of 29,601 caribou indicates the size of the herd has declined below the population management objective of 35,000–40,000 caribou. High human harvests were allowed in 1996 and 97 to bring the herd down from an estimated 50,000 animals. The initial observed decline in herd size was a result of the increased harvest of cows under the Tier I hunt. However, the Tier I hunt was canceled in 1998 before the largest declines in herd size and productivity occurred. Declines subsequent to cutbacks in the human harvest are attributed to both lower productivity and increased wolf predation. In order to stabilize the decline and allow the herd to increase back to within management guidelines, human harvest levels have been greatly reduced. Modeling of current population data suggests that if productivity and predation remains the same as in 1999–2000, the herd will continue to decline even if all hunting is stopped.

Calf production in the NCH was the lowest ever observed in the herd during this reporting period. Declines in herd productivity occur and are often attributed to lower pregnancy rates due to reduced forage production or availability because of severe winter conditions, summer droughts, or cold summers with late spring and early fall snow conditions. Cameron and Ver Hoeff (1994) found that when body condition of cows declined, caribou skipped a calving interval until body condition improved. 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, with large bulls comprising only 10% of the bulls. Heavy harvest on the bull segment during the fall seasons by subsistence hunters is the reason 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. 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, 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 the annual recruitment and bull:cow ratios as well as 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 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 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 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 harvest for 20 years when the NCH peaked in the 1960s and crashed in the 1970s averaged about 3,600 caribou a year (range 360–10,100). 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, 1995–2000

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
1995/96	34	38	22	64	20	5,086	39,172	50,281	49,808
1996/97	34	38	22	64	20	3,086	34,492	44,273	48,666
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

[a] Spring census.

Table 2 Nelchina caribou harvest data by permit hunt, 1995–2000

Hunt No. /Area	Regulatory year	Permits Issued	Percent did not hunt	Percent Successful Hunters	Percent Unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
TC566[a]	1995/96	12,000	20	47	53	2,633	(59)	1,802	(41)	22	4,457
	1996/97	9,980	31	27	73	1,722	(100)	0	(0)	6	1,728
	1997/98	10,000	27	31	69	2,078	(100)	2	(0)	17	2,097
	1998/99	10,020	53	58	18	2,454	(99)	14	(1)	6	2,474
	1999/00	8,000	30	65	40	1,422	(71)	589	(29)	6	2,017
RC567[b]	1996/97	36,601	62	32	68	726	(22)	2,519	(78)	10	3,255
	1997/98	25,376	71	30	70	438	(28)	1,151	(72)	12	1,601
RC513[c]	1995/96	1,659	22	20	80	117	(53)	105	(47)	5	227
	1996/97	1,639	29	21	79	167	(61)	108	(39)	2	277
	1997/98	1,618	22	10	90	105	(65)	58	(35)	1	164
	1998/99	2,427	30	12	46	230	(55)	183	(44)	3	416
	1999/00	2,651	N/A	N/A	N/A	207	(53)	181	(47)	1	389
RC460[d]	1995/96	1,086	12	27	73	243	(98)	3	(1)	1	247
	1996/97	2,044	12	21	79	347	(97)	11	(3)	3	361
	1997/98	632	14	29	71	150	(98)	3	(2)	2	155
	1998/99	920	10	43	47	16	(4)	380	(96)	1	397
	1999/00	No hunt									
RC512[e]	1993/94	34	44	58	42	11	(100)	--	--	--	11
	1994/95	97	35	38	62	24	(100)	--	--	--	24
	1995/96	No hunt									
	1996/97	No hunt									
	1997/98	No hunt									
	1998/99	47	34	23	43	11	(100)	--	--	--	11
	1999/00	208	40	18	42	38	(100)	--	--	--	38

Table 2 Continued

Hunt No.	Regulatory	Permits	Percent did not	Percent Successful	Percent Unsuccessful						Total

/Area	year	Issued	hunt	Hunters	hunters	Bulls	(%)	Cows	(%)	Unk.	Harvest
DC590[f]	1995/96	100	46	41	59	13	(59)	9	(41)	0	22
	1996/97	100	63	19	81	5	(71)	2	(29)	0	7
	1997/98	100	57	26	74	7	(70)	3	(30)	0	10
	1998/99	100	42	35	65	13	(68)	6	(32)	0	19
	1999/00	100	56	30	70	6	(50)	6	(50)	0	12
Totals for	1995/96	14,748	22	43	57	2,986	(61)	1,907	(39)	23	4,916
all permit	1996/97	50,349	52	29	71	2,944	(53)	2,639	(47)	18	5,601
hunts	1997/98	37,730	56	30	70	2,778	(70)	1,217	(30)	32	4,027
	1998/99	13,467	46	24	25	2,713	(82)	583	(18)	10	3,306
	1999/00	10,751	N/A	22	N/A	1,635	(68)	776	(32)	7	2,418

[a] Tier II subsistence drawing permit.
[b] Tier I subsistence registration permit.
[c] Subsistence registration for local residents, administered by BLM as federal hunt RC513 in 1990, and includes 20D residents in hunt 514.
[d] A winter registration hunt for residents of Alaska in GMU 12.
[e] Subsistence registration for Unit 12 residents, administered by Fish and Wildlife Service as Federal Hunt RC512.
[f] A drawing sport hunt.

Table 3 Nelchina caribou harvest and accidental death, 1995–2000

Regulatory	Reported						Estimated			Accidental	Grand
Year	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	death	total
1995/96	2,986	(61)	1,907	(39)	23	4,916	200	100	300	200	5,416
1996/97	2,944	(53)	2,639	(47)	18	5,601	500	300	800	200	6,601
1997/98	2,778	(70)	1,217	(30)	32	4,027	500	300	800	200	5,027
1998/99	2,713	(82)	583	(18)	10	3,306	200	100	300	200	3,806
1999/00	1,635	(68)	776	(12)	7	2,418	200	100	300	200	2,918

Table 4 Nelchina caribou Hunt TC566 annual hunter residency and success, 1995–2000

	Successful				Unsuccessful				
Regulatory	Local[a]	Nonlocal			Local[a]	Nonlocal			Total
year	resident	resident	Nonresident	Total	resident	resident	Nonresident	Total	hunters
1995/96	259	4,198	--	4,457	413	4,563	--	4,976	9,433
1996/97	110	1,618	--	1,728	348	4,313	--	4,662	6,390
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

[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, 1995–2000

	Harvest Periods														
	Weeks (fall)								Months (winter)						
Regulatory year	1	2	3	4	5	6	7	8	Oct.	Nov.	Dec.	Jan.	Feb	Mar.	n
1995/96	6	9	10	7	10	11	10	--	--	5	6	4	5	17	4,396
1996/97	6	12	12	9	9	13	16	15	3	2	1	1	1	1	1,673
1997/98	4	5	5	8	9	9	12	10	10	24	2	1	0	1	2,052
1998/99	6	7	9	10	9	16	13	11	11	8	--	--	--	--	2434
1999/00	6	16	16	12	23	15	12	--	--	--	--	--	--	--	2002

Table 6. Nelchina caribou Hunt TC566 harvest percent by transport method, 1995–2000.

	Percent of harvest									
Regulatory year	Airplane	Horse	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Airboat	Unk.	n
1995/96	6	1	10	31	19	8	23	0	1	4,457
1996/97	9	1	13	41	5	11	18	0	2	1,728
1997/98	9	1	10	28	22	9	19	0	1	2,097
1998/99	7	1	11	39	3	11	26	1	1	2,478
1999/00	8	1	17	41	0	15	15	1	1	2,017

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: 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 this area. Although documentation is poor, discussions with village elders and reports of early explorers (Hemming 1970) support the idea that caribou sporadically existed in far greater numbers and over a greater range during the 1800s than presently. I suspect the Mulchatna caribou herd once roamed throughout the Kuskokwim Basin, but as numbers dwindled, they retreated to the better range to the south (Whitman 1997). As the Mulchatna Herd continued to increase during the 1990s (the 1996 summer estimate was over 200,000 animals), it increased its winter range northward and began using portions of Unit 19.

In the Kuskokwim Mountains, which divide Unit 19 from Unit 21, small caribou bands have apparently existed 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. As in other areas where reindeer were herded, it was common for herders to occasionally lose them. Some people believe that the *Rangifer* herds in the Kuskokwim Mountains today are descendants of feral reindeer or reindeer/caribou hybrids. The only supporting evidence for this theory is the fact that the Beaver Mountains caribou herd calves much earlier than many caribou herds (early to mid-May), but this may be due to the great abundance of food in the area rather than the influence of reindeer genes.

Caribou herds in the Kuskokwim Mountains north of the Kuskokwim River were described in previous reports 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 Mountains and Sunshine Mountains. During the course of his 4-year study, no range overlap was documented. Radiocollared caribou from the Beaver Mountains ranged south almost to Horn Mountain. Caribou in that portion of the Kuskokwim Mountains (near Horn Mountain) were previously called the Kuskokwim Mountains Herd. Based on Pegau's work, there are only 2 groups of caribou in the Kuskokwim Mountains that warrant herd status: Beaver Mountains and Sunshine Mountains.

Herds presently recognized south of the Kuskokwim River include the Tonzona, Big River–Farewell (previously called Big River), Rainy Pass, and Mulchatna Herds. Radiocollaring 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) collared caribou in the Big River–Farewell Herd near Farewell in the early 1980s. During the first year of the study, the collared caribou remained in the Farewell area. However, some of these collared caribou eventually moved near the Swift River during 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 area and the drainages at the head of the South Fork Kuskokwim River and surrounding area are inhabited by resident caribou. These caribou constitute the Rainy Pass Herd. This herd is perhaps the least studied and least understood in the state. Major questions remain about herd size, discreteness, and interactions/relationship to Mulchatna Herd caribou.

Caribou occupying ranges south of the Kuskokwim River have been little used by Native hunters in recent times, except that residents of Nikolai and Telida have occasionally had opportunities to hunt Tonzona and Big River–Farewell caribou. Mulchatna caribou have increasingly been hunted along the Holitna and Hoholitna Rivers. Recent expansion into more northerly areas by the Mulchatna caribou herd has increased its availability to village hunters in all Kuskokwim River villages downstream from Nikolai, including hunters from major population centers of McGrath and Aniak. The Big River–Farewell, Tonzona, and Rainy Pass Herds have generally been harvested by hunters who fly into the area primarily for sheep, moose, and bison hunting. Harvest from the Beaver Mountains and Sunshine Mountains Herds has totaled less than 15 caribou per year since winter seasons were suspended.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

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 entered and tabulated harvest data annually. Harvest data were summarized by regulatory year (RY = 1 Jul–30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001) and do not include Mulchatna Herd animals taken in Unit 19.

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.

Caribou were fitted with radio collars in the Rainy Pass Herd during October 1999 and October 2000. Female 5-month-old calves were fitted with radiocollars. These caribou were captured using the helicopter darting technique as described in Valkenburg (1997). Radio collars were deployed to facilitate the composition counts and general monitoring. Composition counts were also conducted during the 1999 and 2000 October capture operations.

Starting in RY98 the harvest ticket reporting system was changed. Previous to 1998–1999 harvest tickets were issued to hunters, however the overlays were not processed and reminders were not sent to hunters. This resulted in lower reporting rates. Since 1998–1999, ADF&G's Information Management Section began to input the harvest ticket overlays and then send out reminders for hunters failing to report their harvests. While this is a positive step to gathering more precise caribou harvest data, there must be a precautionary note that the data with a higher reporting rate must be interpreted as such, and not necessarily perceived as increases in the actual harvests. It also must be considered that in the case of this area there appears to be a certain percentage of returned harvest tickets that are more difficult to code to specific location. Therefore, the more ambiguous to their location, the more difficulty there is discerning in which herd the harvest took place, especially in Unit 19C where there are 3 different herds.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

We did not complete any systematic population surveys during this reporting period. However, we did conduct a single aircraft search of the Beaver Mountains Herd's range during July 1999. Composition counts were conducted on the Rainy Pass caribou herd during October 1999 and 2000.

Population Size

The Beaver Mountains Herd has declined since the early 1960s. In 1963 Skoog (1963) estimated 3000 animals. In 1986, Pegau (1986) estimated 1600. In 1992 Whitman (1995) estimated 865 caribou were present, and in 1994 he felt that only 536 remained (Whitman 1997). During early summer 1995, Whitman counted only about 400 animals when the herd was concentrated on its

calving area. Boudreau searched the normal herd range in July 1999 and observed 129 caribou in a single group, no other caribou were observed.

The Sunshine Mountains caribou herd has also declined in recent years. Whitman estimated the population was 700 animals in 1994, but in 1995 he estimated only 500 animals. Based on Whitman's observations, the dynamics of this herd seem to mirror those of the Beaver Mountains Herd (and some other small, mountain herds like the Chisana and Mentasta), with predators probably having a major impact on calf survival (Jenkins 1996; Whitman 1997; Mech et al. 1998).

The Rainy Pass Herd probably numbers 2100–2600 caribou. 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 and were not counted at that time. Whitman (1997) estimated the Big River–Farewell Herd was 1000–2000 animals.

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 that inhabits the national park.

The Mulchatna Herd is 175,000 animals and has extended its range into the Kuskokwim drainage. The ranges of the Beaver Mountains, Sunshine Mountains, and Big River–Farewell Herds currently overlap with the dynamic winter range of the Mulchatna Herd.

Composition

Herd composition counts were conducted on the Rainy Pass caribou herd during October 1999 and October 2000 (Table 1). During the October 1999 survey a sample of 441 caribou were classified and a large part of the suspected winter range was searched for animals. 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 and only half of the area was searched that had been searched in 1999, because of weather. During this survey the calf:cow ratio was 12:100 and the bull:cow ratio was 115:100 (Table 1). The sample for the October 2000 composition counts appeared to have a skewed bull:cow ratio. The are 2 possible explanations for the skewed results. The first is classification error. This would account for the disproportionate number of small bulls observed, which drastically skewed the bull: cow ratio. The second explanation, however less plausible, is that because the sample size is small and the search area was limited a disproportionate number of males were found, thus skewing the results. A fall 2001 composition survey was planned to further evaluate the questionable results of the 2000 survey. The fall 2001 survey was not conducted so a fall 2002 was planned.

Distribution and Movements

Beaver Mountains. The Beaver Mountains Herd ranges from the Beaver Mountains in the north to as far south as Horn Mountain near Red Devil (Pegau 1986). Calving is in the Beaver Mountains, but postcalving groups are 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, but most occurs 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 caribou are predominately in the Sunshine Mountains, and some small groups were observed during summer 2001 in the Nixon Fork 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 the 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 approximately from the South Fork of the Kuskokwim River southwest to the Swift River. Summering areas are in the foothills on the north side of the Alaska Range. Wintering areas are located 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. Wintering areas are largely unknown.

MORTALITY

Harvest

Season and Bag Limit.

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 w/o 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
Unit 19C		
RESIDENT AND NONRESIDENT HUNTERS:	10 Aug–20 Sep	10 Aug–20 Sep

Unit/Bag limit	Resident open seasons	Nonresident open seasons
1 bull.		
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

Board of Game Actions and Emergency Orders. The Board of Game adopted a regulation at their March 2000 meeting to change the hunting season in Unit 19C. It was shortened from closing on 10 October to 20 September. This was proposed by the department and was based on information on low recruitment collected on the Rainy Pass Herd. Assuming the same situation in the 2 other herds in Unit 19C (Big River–Farewell, Tonzona), the proposal covered the entire subunit. This season change also aligns the season with the other small Interior Alaska caribou herd seasons.

The only actions resulting from the March 2002 Board of Game in regard to caribou was a regulation that creates a corridor 4 miles wide that extends along most of the waterways, except the Stony River, in Unit 19A and is closed to caribou hunting for all nonresidents. The other action was that the Aniak River was added into the Holitna/Hoholitna Management Area, which requires big game taken in Unit 19B by hunters accessing the area by airplane to have all meat be flown out of Unit 19B. These regulations were proposed and adopted to influence the moose hunting pressure in areas where local residents are currently hunting and to restrict floating from Unit 19B all the way into Unit 19A, which has been blamed for some meat spoilage observed in Aniak.

Hunter Harvest. The use of local caribou herds by hunters was stable in Unit 19. During RY90 through RY97, the average reported harvest of caribou was 142. Harvest declined between RY94 and RY95. These declines in harvest can be attributed to the Rainy Pass, Big River–Farewell, and Tonzona Herds (Table 2). Harvests have remained relatively stable since RY95. During this reporting period, the average reported harvest was 103 caribou (Table 3). During this reporting period, females composed <1% of the Unit 19 caribou harvest (Table 3).

Hunter Residency and Success. During RY98, migration patterns of the Mulchatna Herd enabled local hunters (Unit 19 residents) to increase their harvest of caribou. The Mulchatna Herd was the only herd readily accessible, and harvest from McGrath area herds by local hunters was low (Table 4). During RY89 through RY97, local hunters took <4% of the reported harvest of local caribou herds. During this reporting period, local hunters took <4% of the reported harvest of the local caribou herds. It should be stressed, however, that local users are less inclined to report their hunting activities than are nonlocal and nonresident hunters. During this reporting period, Alaskans who were not local residents harvested about 25%, and nonresidents of the state harvested the remaining 70% of harvested animals. Historically (RY89 through RY97) nonlocal Alaskans took 45% of the total harvest. Most harvest data came from hunters hunting the Big River–Farewell, Rainy Pass, and Tonzona Herds. Primarily guided and nonlocal hunters used these herds.

Harvest Chronology. Most caribou that were not part of the Mulchatna Herd were taken during August and September. During this reporting period, about 29% of the harvest was during August, 63% was in September, and 3% was during 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 small Kuskokwim herds. During this reporting period 74% of caribou hunters used aircraft, 15% of the hunters used 3- or 4-wheelers, <4% used horses, 3% used boats, <4% of caribou hunters used snowmachines, and zero percent of caribou hunters used highway vehicles (Table 6).

Other Mortality

No specific data were collected concerning natural mortality rates or factors during this reporting period. However, I suspect wolf predation is relatively high within most of the McGrath area herds. The low percentage of calves (<1%) and the early calving dates found during survey flights in the Beaver Mountains indicate the Beaver Mountains Herd is highly productive but suffers from high neonatal mortality. The Sunshine Mountains Herd probably also suffers 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 based on snow-depth data collected in McGrath by the National Weather Service. Since RY94 the winter snow conditions have been average based on these same data.

HABITAT

Biologists have not investigated caribou range conditions in Units 19 and 21 in recent years, but range is probably not limiting. Lichens seem abundant on winter ranges, and these areas supported 4–5 times as many caribou during the 1960s. Body size of adults was also relatively

large when radio collars were deployed in the 1980s. Early calving is another indicator that body condition is good.

CONCLUSIONS AND RECOMMENDATIONS

We are currently meeting our management objectives for all of the caribou herds in the McGrath Area. The objective for the Big River–Farewell Herd is to provide for a harvest of up to 100 bull caribou. The average reported harvest during this reporting period was 47. The objective for the Rainy Pass Herd is to provide for a harvest of up to 75 bull caribou. The average reported harvest during this reporting period was 26. The objective for the Sunshine and Beaver Mountains Herds is to provide for a combined harvest of up to 25 caribou. The average reported harvest during this reporting period was 4 caribou. The objective for the Tonzona Herd is to provide for a harvest of up to 50 caribou. The average reported harvest during this reporting period was 12.

All the herds in the McGrath area are small in number. These small herds exhibit special challenges in trying to develop a cost-effective and efficient survey–inventory program. Progress to implement some changes to enhance the program were implemented during this reporting period and future plans are being to developed to enable better monitoring of the herds. Hopefully research projects directed at caribou management applications will develop better and more efficient techniques for better management.

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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 1999–2000

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

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

Table 3 McGrath[a] area caribou harvest by sex, regulatory years 1989–1990 through 1999–2000

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

[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 1999–2000

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

[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 1999–2000

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

[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 1999–2000

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

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

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-1990s, the department recognized a small group of caribou in the Yanert drainage as a separate herd. The growing Delta Herd eventually swamped 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), Valkenburg et al. (1996), and Valkenburg et al. (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 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.

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 Board of Game suspended hunting in 1992 in response to declining numbers, and the herd remained closed to hunting through the 1995–1996 regulatory year.

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 6000–8000 caribou.
- Sustain an annual harvest of 300–500 caribou.

METHODS

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. The herd was counted on 27 June 1999 using 4 radiotelemetry-equipped aircraft, including the Beaver and on 24 June 2000 using 5 aircraft (4 radiotelemetry equipped). In 2000, because the aggregation consisted of relative small groups of caribou that could be either counted or photographed effectively with a 35-mm camera, the DeHavilland Beaver and camera were not used. Caribou in photographs were counted with an 8X magnifying glass.

Population Composition

We conducted composition surveys using an R-22 helicopter and Bellanca Scout or Piper Super Cub aircraft. Biologists in the fixed-wing aircraft located the radiocollared caribou. Observers in

the R-22 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. We classified 1519 caribou on 1 October 1998, 674 caribou on 2 October 1999 and 1010 caribou on 3–4 October, all under adequate conditions. During 2000, several hundred Nelchina and Delta 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 2000, 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.

We monitored harvest characteristics through permit reports and summarized harvest data by regulatory year (RY = 1 Jul through 30 Jun, e.g., RY00 = 1 Jul 2000 through 30 Jun 2001).

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. 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 crude 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 (Table 1). Survey data indicated the herd increased slightly in 1994 and 1995, but subsequent data indicated a stable or declining trend. The minimum herd size declined from 4646 caribou in 1995 to 3227 caribou in 2000, and 2900 caribou in 2001.

During the 2000 census, caribou were widely distributed between 63°16' (East Fork of the Susitna River) and 63°58' (upper west fork of Mystic Creek) north latitude and 146°14' (Trident Glacier) and 148°18' (upper Moody Creek) west longitude, although the majority of caribou were located in upper west fork of Mystic Creek and upper Wood River drainages (Cody, Pass, Grizzly, Young and Big Grizzly creeks). This wide dispersion probably contributed to the relative high proportion (7/75) of the radiocollared caribou found alone during the census. While nearly 10% of the radiocollared caribou were located alone, only 1 single uncollared caribou was observed. Although this type of incongruity could result in an underestimate of the population, modeling the population with current productivity and survival estimates yielded a population estimate comparable to the census results.

During the 2001 census, caribou groups were widely scattered and census results were adjusted upward from the count of 2390 to 2965 caribou because only 54 of 67 active radio collars were found (Table 1).

Population Composition

Bull:100 cow ratios have varied considerably since 1990, ranging from 24 to 46, 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.

Calf:100 cow ratios, generally, have been declining since 1994 and, in 2000 and 2001, were the lowest observed since 1993 (11 calves:100 cows, Table 1). Calf mortality studies conducted during 1995–1997 indicate this is 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 River and the Little Delta River in southeastern Unit 20A (Davis et al. 1991). However, as the Delta 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, typically the herd is distributed among the northern foothills from the Delta River to the Nenana River. However, during the fall and early winter of 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

Board of Game Actions and Emergency Orders. In response to a proposal at the March 1996 meeting, the Board of Game 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–RY00 in response to proposals to increase the number of permits. No emergency orders were issued during this reporting period.

Permit Hunts. Since RY98, when we first issued 100 permits for DC827, both the numbers of hunters and success rates have declined (Table 2). In addition, the success rate in RY00 (35%) was the lowest recorded since the hunt began in RY96. The lower hunter success rate observed in RY00 may have been a function of the herd being widely dispersed and a large portion of the herd being distributed across the eastern portion of their range during the hunting season. 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 RY98–RY00 (Table 3). However, the success rate of nonresidents was higher than the other groups ($\bar{x}$ = 81%). Success rates of local residents and nonlocal residents were similar (56% for local vs. 45% for nonlocal residents).

Harvest Chronology. No clear trends are apparent in harvest chronology during RY96–RY00 (Table 4). During RY96 harvest was fairly evenly distributed, with slightly fewer caribou taken in late August. During RY97 the highest harvest of caribou occurred at the end of the season, whereas in RY98 the highest harvest was at the beginning of the season. During RY99 the highest harvest occurred in late August, while in RY00 the highest harvest was in early September. High harvests during these particular harvest periods had not occurred since this permit hunt began in RY96. We hypothesize that variations in harvest chronology within and among years are probably related to variations in weather and caribou distribution.

Transport Methods. During RY96–RY00, on average, the most common mode of transportation used by successful hunters was 3- or 4-wheelers followed by aircraft, ORVs, highway vehicles, horse 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 inches, Sep $\bar{x}$ = 0.95 inches; National Weather Service) during August (2.59 inches) and September (1.28 inches), 2000 and water levels in local rivers and creeks were correspondingly high, which may explain this apparent anomaly.

Other Mortality

Research staff conducted calf mortality studies during 1995–1997, and wolves, grizzly bears, and eagles were primary predators of caribou in the subunit. 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 and the subunit was identified by the Board of Game as part of the intensive management program developed to reduce wolf numbers in order to rebuild the caribou population. 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 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. Wolf numbers are currently high due to the abundant moose population. The degree to which high wolf:caribou ratios will influence predation rates on caribou is unknown. While high wolf:caribou 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 6000–8000 and to sustain an annual harvest of 300–500 caribou. During intensive management deliberations in November 2000, the Board of Game adopted a population objective of 5000–7000 caribou and a harvest objective of 300–700 caribou for the Delta caribou herd. 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. The following management objectives for the next reporting period follow directions from the Board of Game and will be to:

- Reverse the decline of the herd and increase the midsummer population to 5000–7000 caribou.

- Sustain an annual harvest of 300–700 caribou.

However, even with favorable weather, meeting the management objectives will be unlikely without more effective management of predation.

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Table 1 Delta caribou fall composition counts and estimated population size, 1983–2001

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	47

[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 (%)	Successful hunters (%)	Bulls (%)	Cows (%)	Unk (%)	Harvest
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
	1999–2000	100	37 (37)	25 (40)	38 (60)	37 (97)	0 (0)	1 (3)	38
	2000–2001	100	31 (31)	45 (65)	24 (35)	24 (100)	0 (0)	0 (0)	24
	2001–2002[a]	100							32

[a] Preliminary data.

Table 3 Delta caribou annual hunter residency and success, permit hunt DC827, regulatory years 1996–1997 through 2000–2001

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

[a] Residents of Unit 20.

Table 4 Delta caribou annual harvest chronology percent by harvest periods, permit hunt DC827, regulatory years 1996–1997 through 2000–2001

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

Table 5 Delta caribou percent harvest by transport method, permit hunt DC827, regulatory years 1996–1997 through 2000–2001

Regulatory year	Percent harvest by transport method[a]							
	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	10	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

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

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. It has potential to be the most economically important herd in Interior Alaska and southern Yukon for consumptive and nonconsumptive uses. 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. Due to decreased herd size between 1966 and 1975, the FCH reduced its range size and changed its seasonal migration patterns. After 1967 the herd no longer crossed the Steese Highway, and by 1973 few animals moved into the Yukon each year. During the early 1970s to 1998, the herd's range size 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. The population growth leveled off due to high adult mortality, unusually poor pregnancy rate in 1993, and low to moderate calf survival during this period (Boertje and Gardner 2000). During 1996 and 1997 the herd increased by 4% and 10%, respectively, primarily 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, by Alaskan and Yukon mining camps and by 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.

During the 1990s, harvest was further restricted to ensure little impact on herd growth. Harvest regulations became increasingly complex due to a change in Alaska's subsistence law that initiated dual state and federal management. A spin-off from reduced quotas and complex regulations was increased competition between Alaska hunters for the limited quota. In 1994 residents of Tok and members of the Tr'ondëk Hwëch'in First Nation requested that the department, federal agencies, and Yukon Department of Renewable Resources (YDRR) work with the public to develop a cooperative management plan promoting herd growth and benefiting all users of the herd.

MANAGEMENT DIRECTION

Since the FCH decline in the early 1970s, many residents of Alaska and the Yukon have called for management programs designed to increase herd size. Optimism and support for herd recovery increased following annual growth of 7–10% during the 1980s. In 1990, representatives of the YDRR, Canadian Wildlife Service, and Alaska Department of Fish and Game (ADF&G) met in Whitehorse, Yukon to decide management direction for the FCH. All parties were in agreement that the primary goal should be reestablishing the herd in its traditional range. This goal was presented to the residents of the upper Tanana/Fortymile Rivers region and was strongly supported. The primary management tools were reduced harvest and, if necessary, predator management.

During development of this initial Fortymile caribou management program, we failed to foresee the effects of federal subsistence management and special interest politics on our programs. We realized our lack of foresight concerning federal subsistence management when we asked the Federal Subsistence Board (FSB) to close their hunting seasons during 1991 and 1992 because

the annual harvest quota was reached. They refused to do so because the quota did not include a cooperatively agreed upon allocation for federal subsistence users.

The conflict between ADF&G and federal agencies was caused by differing interpretations of Alaska National Interest Lands Conservation Act (ANILCA). The federal agencies decided that managing the FCH hunt by a harvest quota without preference for federally eligible subsistence users violated ANILCA. They decided this ANILCA violation prevented them from following ADF&G's harvest management direction and stopping their hunts before the scheduled closure. Between 1991 and 1995, because of the inability of the agencies to agree on a harvest management direction, the possibility of an overharvest increased. As a result, the public faced more complex regulations and the working relationship between ADF&G and the federal agencies was strained.

Lack of foresight regarding predator management and public response also affected the original plan. In 1992 the Alaska Board of Game (board) adopted a wolf control program designed to benefit the Fortymile Herd. However, prior to implementation, Governor Walter Hickel rescinded the program due to public pressures primarily outside of the herd's range. Because we had a great deal of support within the herd's range for our management programs, we were surprised by the amount of interest and effort exerted by special interest groups to stop us from implementing them. It was obvious to all that were involved in FCH management that a new management direction that included input from the federal agencies and more of the Alaskan public was necessary. However, once the wolf control program was stymied the department did not have a contingency FCH management plan and little was done to benefit herd recovery and reduce the complexities of dual state and federal management during 1993 and 1994.

During this period, many residents within the herd's range were unhappy with the ineffectiveness of dual management. In response, the Upper Tanana/Fortymile Advisory Committee, the Tr'ondëk Hwëch'in First Nation, and other public groups requested that ADF&G and the federal agencies 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.

Boertje and Gardner (1998a) found consistent evidence that wolf predation was the major factor limiting herd growth. The Team concluded that reducing wolf predation was essential to stimulate and hasten herd growth. 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 hopefully wolf predation on calves. The board, the FSB, and the Yukon Fish and Wildlife Management Board endorsed the plan and it guided their regulatory decisions during 1996 through 2000.

Following are management goals and objectives applied during regulatory years (RY) 1996–1997 through 2000–2001 (RY = 1 Jul through 30 Jun, e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). They were developed by the Team and the 5 advisory committees (Central, Delta, Eagle,

Fairbanks, and Upper Tanana/Fortymile) within the herd's range and were endorsed by the board. Population and harvest objectives have been revised by the advisory committees, the board, and the Team to guide herd management from RY01 through RY06. These objectives are included in the conclusions section of this report.

MANAGEMENT GOALS AND OBJECTIVES

- Restore the FCH to its traditional range in Alaska and the Yukon.
    - Provide conditions for the Fortymile Herd to grow at a moderate annual rate of 5–10% between June 1996 and June 2001.
        - Reduce annual harvest quota to 150 bulls.
        - Reduce calf mortality from wolf predation by reducing wolf numbers by 70–80% on the herd's summer range, excluding Yukon-Charley National Preserve, using a combination of public wolf trapping and nonlethal techniques including wolf fertility control and relocation.
    - Maintain an October bull:cow ratio of at least 35:100.
        - Maintain a bull only harvest at a level that will not cause a reduction in bull numbers.
- Minimize the impact of human activities on caribou habitat.
    - Work with land agencies, landowners, and developers to mitigate developments detrimental to caribou.
    - Maintain a near-natural fire regime.
- Provide for increased caribou hunting, viewing and other wildlife-related recreation in Alaska and Yukon.

METHODS

POPULATION CENSUS

We censused the FCH between late June and mid-July 1988–2000, excluding 1993. We used 3–5 spotter planes (Super Cub PA-18 or Bellanca Scout), 1 radiotracking airplane (Cessna 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.

We also evaluated population size and trend using population models developed by P Valkenburg and D Reed (ADF&G unpublished data, Fairbanks) and by R Boertje (Boertje and Gardner 1999).

FALL COMPOSITION SURVEYS

Each year we estimated herd sex and age composition between late September and mid-October. We used a Bellanca Scout to locate most of the herd by radiotracking collared animals. Since 1993 we have used a Robinson-22 helicopter to classify 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, FWS, and BLM.

SPRING COMPOSITION SURVEYS

We have not conducted spring composition surveys since 1993 because most of these data are collected during the calf mortality study. 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.

HERD AND RANGE CONDITION

During RY98–RY00 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 in 1991–2000. 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 relative proportion of lichen and moss in the herd's winter diet.

RADIOTELEMETRY DATA

We obtained herd distribution, movements and estimates of annual mortality by radiotracking 50–70 radiocollared adults. From 1994 to 2000 an additional 50–80 newborn calves were also collared. Calves were located daily during May and June, and at least once every month thereafter. Adults were located approximately once every month throughout the year. We retrieved radio collars of dead caribou as soon as possible after detection in an attempt to determine cause of death.

HARVEST

Harvest was monitored using in field hunter contacts and registration hunt reports. We analyzed data on harvest success, hunt area, hunter residence and effort, and transportation type. To ensure against an overharvest, successful hunters were required to report their kill within 3 days. Harvest data were summarized by regulatory year.

MANAGEMENT PLANNING

During RY98–RY00, the Team met 2 times/year to discuss the management plan's progress, and to develop and implement other programs that would further benefit Fortymile caribou herd recovery and management. The US Fish and Wildlife Service, BLM and ADF&G funded these meetings.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The herd grew 4% in 1996, 10% in 1997, 20% in 1998, 7% in 1999 and 5% in 2000. Annual increases in herd size were due to elevated herd pregnancy rates in 1996 and 1998 and to improved adult and calf survival rates (Boertje and Gardner 1998*b*, 1999). As of 27 June 2000, estimated size of the herd was 34,640 caribou (Table 1). Optimal environmental conditions occurred during this period except during 2000. Improved nutritional status between 1995 and 1999 was indicated by elevated pregnancy rates, higher newborn weights, higher autumn calf weights and earlier calving. Predation rates were reduced during this period. During 1997, calf mortality rates declined significantly and adult survival has been elevated since 1995. Possible factors may be that during 1995 and 1996 the wolf population was reduced on the herd's wintering grounds by elevated wolf harvest rates. It was also reduced within the herd's summer range (this range was also used extensively by the herd during winters 1997 and 1998) by public wolf trapping and by ADF&G's nonlethal wolf control program. In winter 2000, snow depths were substantially above normal and spring temperatures were cooler causing a later vegetative green-up. As a result the median calving date was later and calf weights were lower indicating overall herd condition was reduced. In 2000, mortality rates were higher and herd growth declined to 2–5%.

Population Composition

During 1996 through 1999 the average fall percent calves in the herd (21%) was the highest since the late 1950s. 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 following a year of unfavorable climatic conditions (Table 1). Due to low harvests over the past 20 years, the bull:cow ratio was comparable to lightly harvested herds and has remained stable. Estimated ratios in late June counts were more variable, probably because June counts are more difficult to do accurately (Table 2).

Since 1995 the herd's age structure has changed comprising a greater percentage of young animals. This is due to increased productivity and calf survival. Since 1994 the estimated number of calves produced in May has increased by 62% (8090 calves produced in 1994 compared to 13,120 calves produced in 2000). The percentage of small bulls in the herd reflects this increase in production and recruitment. During 1996–2000 the percentage of small bulls was estimated at 49.2% compared to 42.7% during 1990–1995.

Distribution and Movements

In 1999 the FCH summered between the upper Salcha River, Mount Harper and Glacier Mountain. During August most of the herd ranged in the Charley River, upper Salcha River and Birch Creek drainages. During September the herd moved east and resided within the Salcha, Goodpaster, Charley rivers and Slate Creek drainages. During the rut most of the herd was in the Middle Fork, Goodpaster, and Charley river drainages.

In an apparent response to deep snows in early November 1999, about 10,000 Fortymile caribou moved into Yukon, Canada but only remained for about 3 weeks. This group moved back west along the Yukon River throughout December but became widely scattered thereafter. It was primarily in small groups in the West, Mosquito, Middle, and North Forks of the Fortymile River and in the Upper Eisenmenger, Goodpaster, and Salcha Rivers and Birch Creek.

During late April and early May 2000, the Fortymile Herd moved back to its calving grounds. Calving peak was 23 May. The primary calving grounds were Copper Creek, Charley River, Crescent Creek, Beverly Creek, Salcha River, and Caribou Creek. By early June most of the herd moved south onto Mosquito Mountain and Mount Harper. In mid-June most of the herd was on Mount Harper, in the Three-finger fork of the Charley River, and in the Slate Creek drainage. The herd ranged primarily between the Charley River to upper Birch Creek during August to mid-September.

Beginning in mid-September 2000, most of the herd traveled southeast and most of the rut occurred in the upper Middle Fork, Goodpaster, and Salcha river drainages. After the rut the herd spread out across its range with the largest concentrations in the Chena River, Birch Creek, North Ladue River, and Sixtymile river drainages. Snow depth was below average and did not impede movements or range use.

Generally, annual herd movements were comparable within the two-year report period, except the drainages where most of the calving occurred changed in both years, and during three weeks in both 1999 and 2000 when a segment of the herd moved into Yukon, Canada. We do not know all the environmental factors impacting the herd's choice of primary calving areas, though in years with deep snow in May much of the early calving occurs in the trees. The herd has begun to show greater use of the Birch Creek drainages during late summer and early fall. This distribution pattern increases the herd's vulnerability to hunters along the Steese Highway and its associated trails. Also, by using a greater proportion of its traditional range during the year, the herd is in contact with more wolf packs that have not been reduced by control activities. We observed higher wolf predation by nontreated packs during the past 2 years.

MORTALITY

Harvest

Season and Bag Limit. See Table 3 for specific bag limits and seasons for state and federal hunts.

Board of Game Actions and Emergency Orders. During the life of the FCH planning process (1996-2001) there were significant policy and regulatory changes affecting state and federal hunting seasons and quotas, as well as wolf management. During the 1996 spring meeting, the

board adopted a policy recommended by the Team to reduce harvest to 150 bull caribou until autumn 2001. To ensure against an overharvest, the board gave ADF&G authority to: 1) close the Chicken Trail to caribou hunters using motorized vehicles; 2) limit locales and times registration permits were issued; 3) require a short report period by successful hunters; and 4) enact area, road and temporary season closures if the herd became too vulnerable to harvest.

During 1996 through 1998, FCH harvest was allocated between 4 registration permit hunts (RC863, RC865, RC866 and RC867). RC863 was open between 10 August and 20 September in Units 20B and 20D and had an annual harvest quota of 15 bulls. Residents and nonresidents could participate. This hunt was closed by emergency order on 31 August 1996, 5 September 1997, 27 August 1998, 23 August 1999, and 18 August 2000. RC865 was open between 10 August and 30 September in Units 20E and 25C and had an annual harvest quota of 85 bulls. Only Alaska residents could participate in this hunt. RC865 was closed by emergency order on 29 September 1996, 30 September 1997, and 21 August (Unit 25C), and 1 September 1998 (Unit 20E). To ensure a more equitable season in both Units 25C and 20E, in spring 1999 the board allocated 35 bulls to Unit 25C under RC866 and 50 bulls to Unit 20E under RC865. RC866 was closed on 12 August in 1999 and 2000 and RC865 was closed on 20 September 1999 and 5 September 2000. RC867 had both a federal season (15 Nov–28 Feb) and a state season (1 Dec–28 Feb) open in Units 20E and 25C with a combined quota of at least 50 bulls. RC867's quota included any bulls not harvested during the fall season. Only Alaska residents could participate. RC867 was closed by emergency order on 26 December 1996, 2 January 1998, 3 December 1998, 2 December 1999, and 1 December 2000.

In spring 1996 the FSB made the following 2 important decisions in support of the Fortymile Caribou Plan: 1) it adopted the harvest quota of 150 bull caribou for the herd, which meant that both state and federal seasons would close once the quota was reached, and 2) it agreed both state and federal hunts would be managed using a joint state/federal registration permit that would be administered by the state. Those 2 decisions were instrumental in limiting harvest to the plan's recommended level. For the first time since dual management began, FCH seasons and bag limits were consistent under state and federal regulations and, compared with past years, regulations were much easier for hunters to understand (Table 3).

During its spring 1997 meeting, the board adopted a regulation allowing ADF&G to conduct nonlethal wolf control between fall 1997 and spring 2001 to benefit the FCH. The program also had to be approved by Governor Tony Knowles following the results of the National Academy of Sciences' review of wolf control. Governor Knowles allowed us to proceed in November 1997.

In spring 2000 the board reviewed and endorsed the Fortymile Caribou Herd Harvest Plan (Harvest Plan), 2001–2006. 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. Harvest quotas will be set annually based on herd trend but are expected to reach over 2000 caribou within 5 years. Following the plan's recommendations, the board passed regulations 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 will ensure hunting opportunity across the herd's range during both the autumn and winter seasons while maintaining adequate protection against overharvest. These regulatory changes were effective autumn 2001.

These regulatory changes are expected to attract thousands of hunters to the Fortymile range. The board was concerned about the possible effects on local moose populations due to excessive incidental take by caribou hunters. Based on the historic movement patterns of the Fortymile Herd, the greatest danger for excessive incidental take of moose would occur in Unit 20E. In response the board created a joint caribou/moose registration permit for most of Unit 20E that requires the hunter to choose either caribou or moose to hunt. This will not affect most subsistence hunters because traditionally moose and caribou are hunted in different areas and at different times in Unit 20E. This regulation would not preclude any hunter from completing 1 hunt for 1 species, turning in that permit, and then hunting the other species. The intent of the registration permit requirement is to stop the incidental take of moose and not limit caribou hunting opportunity.

The FSB has been asked to review and endorse the Harvest Plan during their May 2001 meeting. Their decision will be important because in the future proposals may be submitted to increase the federal subsistence take of the FCH to numbers above Harvest Plan recommendations. If the FSB decides not to endorse the Harvest Plan and adopts more liberal proposals, the state hunt will have to be further restricted, more complex regulations will be enacted, and once again FCH hunters will suffer under dual management.

In March 2001 the Eastern Interior Regional Council developed a Fortymile caribou harvest proposal to be passed onto the FSB for their decision during their May 2001 meeting. This proposal adopts the harvest quota recommended in the Harvest Plan and, if adopted, will allow the joint state/federal harvest permit to be used. To meet the intent of ANILCA and to benefit federal eligible subsistence hunters, the council proposed a federal season of 1 November–28 February and a combined state/federal winter quota. However, at least 50 caribou in the quota would be allocated to the federal season.

The board set herd (50,000–100,000 caribou) and harvest objectives (1000–15,000 caribou) for the FCH using criteria required by the Intensive Management Law. Intensive management may be implemented if harvest is reduced and the population and harvest objectives are not met because the population is depleted or has reduced productivity.

Hunter Harvest. During RY96 through RY00, the annual Fortymile caribou harvest quota has been 150 bulls. Through the use of registration permits and emergency orders, harvest was limited to 146–155 caribou including illegal kills (Tables 4 and 5). Hunters deserve much of the credit for maintaining annual harvests near the desired quota. In support of the management plan, many hunters voluntarily stopped hunting the FCH. During the 5 years of reduced harvest, hunter participation rate declined by 55% compared to the previous 5 years when the quotas ranged from 395–450 bulls. Hunters who did participate became more knowledgeable about identifying caribou, thereby reducing illegal kill.

Even with hunter assistance there are steps that need to be taken by the managing agencies if harvest is to be maintained at the desired quota. In the case of the FCH, 500–900 hunters participated annually in hunts that had quotas of 15–85 bulls. At times there were thousands of caribou accessible to harvest. The following management steps worked for us to maintain harvest at the desired levels and to offer the maximum amount of hunting opportunity.

- Intensively monitor the herd and rapidly close areas if the herd becomes vulnerable to overharvest.
- Maintain close working relationships with air taxi operators, outfitters, and guides to better track how many hunters are in the prime hunting areas.
- Issue permits from a minimum number of offices/vendors, with close contact among offices/vendors to track number of permits issued in relation to herd vulnerability.
- Require successful hunters to report within a short period of time after making their kill.
- Enact access restrictions in areas that are historically heavily hunted.
- Work closely with Alaska Fish and Wildlife Protection to maintain a presence in the field.
- Maintain a number of communication avenues to keep hunters informed on hunt status and to give them credit for their efforts.
- Develop criteria to estimate actual harvest based on number of hunters in the field and the number of caribou in the area, and use this estimate to initiate the emergency closure process.

Illegal Harvest. Since RY92 the number of illegally harvested cow caribou (found or reported) was 3–21 (2–9% of the harvest). Determining the sex of caribou can be difficult, especially if the hunter does not know all of the distinguishing characteristics or does not take the time to look for them. A continuing program to help hunters become better at identifying caribou is necessary in areas where harvest is restricted by sex of the animal or by antler confirmation. In the ADF&G Tok office, we informed hunters by photographs, pamphlets, and video as they registered for the hunt. The other important component to reducing illegal kill is the presence in the field by protection officers and department personnel. Hunters have told us our presence increases their awareness of the importance of making sure of their decision to shoot. These efforts have proved to be effective based on the reduction of illegal kills since we enacted these programs. However, even with these programs I am doubtful that illegal harvest will ever decline below 3–10% because of the annual influx of hunters with little or no caribou hunting experience and because there are hunters willing to take a chance on questionable animals in order to kill a caribou during a hunt.

Harvest Plan. The Yukon territorial government, the First Nations, and the Yukon public are developing a Yukon Fortymile caribou harvest plan. They expect to have an interim harvest plan agreement between the Yukon and Tr'ondëk Hwëch'in governments ready for the 2001 hunting

season. As soon as the interim plan is in place it is the Yukon government's intent to begin the process to develop a comprehensive FCH management plan that will include a long-term plan for harvest. There has been agreement between the Yukon and the board that the initial harvest allocation would be 65% to Alaska and 35% to the Yukon.

Hunter Residency and Success. During RY98–RY00, 532–880 people annually participated in FCH hunts (Table 6). The range of hunters who annually participate in each registration permit hunt were: RC863, 50–72 hunters; RC865, 284–589 hunters; RC866 116–255, and RC867, 114–242. Success rates by hunt were 15–36% for RC863, 10–25% for RC 865, 26-32% for RC 866 and 15–31% for RC867. Residency and harvest success information for all hunts combined is included in Table 6.

The intent of the Fortymile Caribou Management Plan was to reduce harvest to the minimum subsistence levels during RY96–RY00. Hunts RC865 and RC867 were structured to offer adequate opportunity for those who have the longest history hunting FCH or have the greatest subsistence needs. Before the reduced harvest, 26% of the participants were subsistence hunters who took 21% of the harvest. During the reduced harvest quota, 37% of the participants were subsistence hunters who took 37% of the harvest. The harvest reduction was successful in providing for subsistence needs and met the plan's intent.

Nonresidents could participate in hunt RC863. The hunt area is remote and is primarily accessed by air. Nonresidents composed 14–28% of the hunters and took 44–100% of the harvest. Air taxi operators flew in all of the nonresidents. Most of the resident hunters accessed the hunt area from the Steese Highway but were not successful because there are no trails to the areas where the herd ranged.

Harvest Chronology. During FY99 and FY00, >90% of the FCH was in the upper Salcha River and Birch Creek drainages during the first 7–10 days of the fall season (Table 7). About 20% of the herd was accessible to hunters along trails adjacent to the Steese Highway (Unit 25C). As a result, the quota was taken within 2 days.

The effects of the low quotas make it difficult to assess harvest chronology. Since the reduced quota was enacted in RY96, the season has gone to term in only 1 of the 17 possible hunts. Knowing the possibility of an early closure, hunters were out during opening week or as soon as there were reports the herd was available. When the Fortymile seasons have gone to term, we used harvest chronology to track herd accessibility to either the Taylor or Steese Highways.

Since RY91 during winter there were caribou available in Units 20E and 25C throughout the season. However, during RY98–RY00 a greater percentage of the herd was available on opening day; consequently, the winter quota was reached quickly (1–3 days). Prior to the reduced quota, the season ran 3-4 weeks and timing during the winter season was affected by temperature, holidays, and available daylight. Another factor that has caused the winter hunt to close early is the policy of the federal government to manage their hunts by area and not by herd. In the case of the federal Fortymile hunt during November, most of the caribou available on federal land along the first 50 miles of the Taylor Highway were Nelchina caribou herd animals. The BLM chose to continue their hunt in this area even though there was no open season for Nelchina caribou in Unit 20E. Caribou harvested during this hunt counted toward the FCH quota.

Transport Methods. Transportation types used by successful hunters in each of the 4 registration permit hunts differ. During RY98–RY00 successful hunters in RC863 used airplanes 60–100% of the time. This hunt area is remote with no trails and cannot be reached by ground transportation (Table 8).

During RY98–RY00 the 2 most common transportation types used by successful hunters in RC865 were airplanes and 4-wheelers. The hunt area is accessible using the Taylor Highway and is interspersed with trails and suitable landing areas. Herd distribution dictates the most efficient transportation type. In RY98–RY00 the herd remained in the central portion of its range for most of the season and was accessible primarily by aircraft, resulting in fewer animals harvested along trails and highways. RC866 takes place along the Steese Highway in Unit 25C. During RY99 and RY00, much of the herd was accessible using trails originating from the Steese Highway. Hunters using 4-wheelers took 73 and 76% of the fall harvest. RC867 is a winter hunt and hunters access the herd using snowmachines and highway vehicles along the Taylor and Steese Highways.

Other Mortality

Boertje and Gardner (1998*a*, 1998*b*, 1999) described in detail the factors limiting the FCH. In summary, wolf and grizzly bear predation were the most important sources of mortality. Wolves were the most important predator. Prior to nonlethal wolf control activities, wolves killed 2000–3000 calves and 1000–2300 older caribou annually. Herd nutritional status was good based on pregnancy rates and calf weights. Antibody screening of blood samples collected since 1980 indicated there were no known infectious diseases affecting population dynamics of the FCH. Winter range is in excellent shape and can support elevated caribou numbers, both in regard to lichen availability on current range and to the availability of vast expanses of winter range formerly used by the herd.

The Team used this information to develop management recommendations designed to restore the herd's use of traditional range. The Team recommended nonlethal wolf control methods that were adopted by the board. These methods included relocation of all subordinate wolves from the herd's summer range and fertility control of the dominate pairs. All nonlethal control activities are conducted outside Yukon-Charley National Preserve and do not violate NPS policies or mandates.

As of 1 December 2000, 85 subordinate wolves 11 months and older were relocated from the herd's summer range. Through a combination of trapping and relocation, 1–2 dominant wolves were left in 15 pack territories. During the same period, we sterilized 35 dominant wolves. Nine of these have died (4 from trapping and 5 were killed by other wolves). Of the 15 packs we fertility controlled, all have gone through 1–3 breeding seasons and no pups were produced, and the fertility-controlled wolves have maintained their territory. As a result, wolf numbers were reduced by 80% within a portion of the herd's summer range excluding Yukon-Charley Rivers National Preserve.

Depending on herd movements during the year, the number of wolf packs preying on the FCH was 26–40 (Boertje and Gardner 2000). Also, grizzly bear numbers have not been reduced by department-conducted control activities or by hunter harvest. As a result, annual wolf and grizzly

bear predation rates on calf and on adult caribou remain similar to pretreatment years. Most of the wolf predation has occurred within the territories of untreated packs. One of the major limiting factors to reducing early wolf-caused calf mortality is the inability to reduce wolf numbers in Yukon-Charley Rivers National Preserve, which is part of the herd's calving range. Preliminary results indicate the program has caused an overall reduction in wolf predation rates during the calving period compared to pretreatment years, which has allowed more calves to survive to 5 months. Also when compared to adjacent herds in Interior Alaska and central Yukon, Canada, the Fortymile Herd has had lower calf and adult mortality rates during the past 2 years. It is the only Interior herd that has increased during the past 2 years.

We will continue controlling wolf numbers within the 15 wolf territories through June 2001. Once these wolves are released from control activities, the effects of the program will continue until the fertility-controlled wolves no longer control the territories and wolf numbers begin to increase. We will continue to test the effectiveness of the nonlethal wolf control program through 2003 and report the results in future research and management reports.

HABITAT

Assessment

Range condition was evaluated by determining the percent lichen fragments in relation to the percent moss in Fortymile caribou fecal samples. 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%). Fecal samples from overgrazed winter ranges contain a relatively high proportion of mosses (30–60%) (Boertje 1984).

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. The herd is beginning to expand its range as it increases in size. It moved farther to the west near the Steese Highway during the fall and utilized winter range in the Yukon during the past 2 winters. Still, more than 70% of the historic Fortymile range has not been used for over 30 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.

Except in 1993, nutritional stress has not been detected (Boertje and Gardner 1996). In 1993 low pregnancy rates (66%, n = 47) probably occurred because many adult cows did not gain sufficient fat to ovulate in 1992. This may have happened because of a short growing season or severe weather and deep snow before the rut. Also, high adult mortality during 1989–1992 may have been related in part to stress from adverse weather. Overall, 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). Also, indices to nutritional status improved when the herd began to increase.

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 we burned 58,000 acres of spruce forest in the eastern portion of the herd's range in Alaska. In 1999 we burned 31,000 acres of spruce forest 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 within 10–20 years.

One of the goals of the Fortymile Caribou Management Plan is to ensure adequate range for the herd during and after recovery. Team members from both Alaska and Yukon are working with landowners, land managing agencies, and developers to work toward this goal. The Team has produced a document entitled "Habitat Management Needs Assessment for the Fortymile Caribou Herd" that identifies the ranges the herd uses during the year and discusses how these ranges are important. This document has been sent to landowners and managers, industry, and the military to be used in their land use decisions.

Current habitat/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. The calving period is important because the adult cows are in poor physical condition due to lactation, and disturbance will add to their energy demands. This period is critical to the survival and development of calves, and disturbance may increase their vulnerability to predators if they are periodically displaced. Free movements of the large groups that form during the postcalving period are critical. During both these periods, to minimize the effects of mining exploration and low flying military aircraft, we developed a website that displayed the areas the herd was using. The website was updated when the herd changed distribution. This was usually every 1–2 days. 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 during summers 1999 and 2000.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The Fortymile Caribou Herd Management Plan is nearing completion but 2 of the plan's objectives need to be continued – habitat protection and a public awareness program. Protecting caribou habitat and informing the public about herd status and consumptive and nonconsumptive use opportunities are essential components of the Team's goal restore the Fortymile Herd to its traditional range, and promote healthy wildlife populations for their intrinsic value. Habitat protection is being addressed through land use plans and agreements made with the mining industry and the military. The public awareness plan needs agency support. The Team, prior to sunsetting, sent letters to state, federal, and territorial government agencies requesting their support in developing and implementing such a plan.

The timing for a public awareness plan is optimal. The nonlethal wolf control program, voluntary reduction in hunter harvest, and the mining industries' efforts to limit impacts has cast a spotlight on the herd. The FCH is increasing and once again beginning to use portions of its traditional range. People's interest in the herd is increasing. A cooperative state–federal program enhancing the viewing, education, and hunting opportunities of the Fortymile Herd would benefit Alaska. Even though the Team has ended, several members are working to find funding and hopefully, within the next few years a Fortymile Caribou Public Awareness Plan will be developed.

Currently, the only program designed to keep the public informed about FCH management is a newsletter produced by Division of Wildlife Conservation called "The Comeback Trail." This newsletter is sent to 4500 Alaskan and Yukon residents and is produced once or twice annually. This publication does not reach most of the schools in Alaska nor does it go to many of the special interest groups that would be interested in uses of the FCH other than hunting.

CONCLUSIONS AND RECOMMENDATIONS

The FCH increased through the 1980s at an annual rate of 5–10%. Between 1990 and 1995, it was essentially stable. The rate of increase improved to 14% between 1996 and 1999 due to optimal environmental conditions and reduced predation. The herd continued to grow during 2000 following a severe winter, but the growth rate declined to 5%. The FCH was the only Interior caribou herd in Alaska and Yukon, Canada to increase during 2000. The FCH has the potential to continue to increase. Current range conditions are excellent, and >70% of its traditional range is available. The nutritional condition of the herd is good to excellent, and the incidence of disease is minimal.

We implemented nonlethal wolf control in combination with public trapping in November 1997. The goal of reducing wolf numbers is being achieved within a portion of the herd's summer range. As of 10 April 1999, we completed treatment of 15 wolf pack territories. During the first 3 years of the program, we fertility controlled 35 dominant wolves and relocated 85 subordinate wolves. In combination with public trapping we reduced the wolf population in these 15 territories by 80%. Preliminary results indicate that wolf predation has declined on the calving grounds, but the annual wolf predation rate has remained comparable to pretreatment levels due to predation by nontreated packs throughout the year.

Harvest was not a limiting factor to herd growth even before the harvest quota was reduced to 150 bulls in RY96. Since RY73 hunters have harvested <2% of the Fortymile caribou population in all but 3 years. During RY96–RY00, harvest was <1%. Weather and predation, not harvest, were the primary factors limiting herd growth. Hunters contributed to the herd recovery effort by supporting reduced harvest. During the life of the plan, hunters have verified their support by voluntarily foregoing their opportunity to participate in the hunts. During the past 5 years hunter participation has declined by 55%.

State and federal harvest regulations are now consistent, making them easier to understand and greatly reducing the chance for overharvest.

A coalition of the Upper Tanana/Fortymile, Fairbanks, Delta, Eagle, and Central advisory committees developed a harvest plan that was endorsed by the board in spring 2000. The goal of the Harvest Plan was to manage harvest to allow continued herd growth at moderate levels. The board passed regulations that will guide Fortymile caribou harvest for the next 5 years following the recommendations of the Harvest Plan. The Harvest Plan will be presented to the FSB for their endorsement in spring 2001. It is the hope of the advisory committees, the Team, and the state, federal, and territorial managing agencies that the FSB will structure the federal subsistence harvest following the recommendations outlined in the Harvest Plan to ensure herd growth and to minimize the effects of dual management on the subsistence hunter. The Eastern

Interior Regional Advisory Council has taken the first step in this process by developing a proposal for the FSB that does follow the intent of the Harvest Plan and satisfies ANILCA.

The Fortymile Caribou Herd Management Plan was fully implemented during RY98–RY00. Reduced harvest quota and nonlethal wolf control will end following June 2001. The Team has met with principal landowners, developers, and land managing agencies to plan strategies that protect critical habitat, and meet the needs of landowners and developers. The Team developed a document entitled "Habitat Management Needs Assessment for the Fortymile Caribou Herd" to be used by landowners and agencies, industry, and the military to plan their land-use activities around the needs of the herd. The Division of Wildlife Conservation developed a website that illustrates caribou distribution during calving and postcalving that is used by the mining industry and military to plan their activities to minimize impacts on the herd.

The Team initiated a program to develop a Fortymile caribou public awareness plan.

Following are recommended objectives and activities for the next reporting period that reflect the herd and harvest objectives set by the board and the board-endorsed Fortymile Caribou Herd Harvest Plan, 2001–2006.

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.

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.
- Provide for increased caribou hunting, viewing, and other wildlife-related recreation in Alaska and Yukon.

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Table 1 Fortymile caribou fall composition counts and population size, 1986–2001

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

[a] Herd estimates were the result of the summer censuses.

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 1994–2000.

Table 3 Fortymile Caribou seasons and bag limits, regulatory years 1987–1988 through 2000–2001

	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]

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
1991–1992	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
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

[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 2000–2001

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]	1989–1990	681	28			148	98	0	246[c]	
Registration permit	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[gh]	1173	28	17	83	142	7	1	150	150 bull quota
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	
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	

Hunt	Regulatory year	Permits issued	% Did not hunt	% Successful hunters	% Unsuccessful hunters	Harvest			Total reported harvest[a]	Notes
						Bulls	Cows	Unk		
	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	410	965 hunter reports
	1989–1990			37	63	32	98	0	424	1264 hunter reports
	1990–1991			21	79	295	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[h]	1173	28	17	83	142	2	1	145	150 bull quota

[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 2000–2001

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	417	50	467
1993–1994	326	0	0	326	0	10	336	10	346
1994–1995	309	0	0	309	0	12	321	7	328
1995–1996	200	0	0	200	0	20	220	5	225
1996–1997	138	0	0	138	0	7	145	1	146
1997–1998	143	0	0	143	0	8	151	0	151
1998–1999	151	0	0	151	0	4	155	0	155
1999–2000	142	0	3	145	0	10	155	0	155
2000–2001[d]	142	0	1	143	0	7	150	0	150

[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 2000–2001

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] Resident	Nonlocal resident	Nonresident	Total (%)	
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

[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.

Table 7 Fortymile caribou autumn harvest by month/day, regulatory years 1988–1989 through 2000–2001

Regulatory year	Harvest by month/day								
	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	*n*
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

[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 2000–2001

Regulatory year	Harvest percent by transport method									
	Airplane	Horse	Boat	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

[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 1998
To: 30 June 2000

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

Caribou in Units 21D and 24 are in 3 distinct herds located north of the Yukon River in the Kokrines Hills and Ray Mountains. They are the Galena Mountain, Wolf Mountain, and Ray Mountains Herds, named for a mountain peak or mountains where the herds calve.

Each herd has a distinct calving area. The western group of approximately 250–500 animals typically calves east of Galena Mountain and winters west of the mountain. Galena Mountain is a local name given the 3274 ft unnamed mountain northeast of Galena. The middle group calves on Wolf Mountain and winters to the north and east in the Melozitna and Little Melozitna River drainages, overlapping with the Galena Mountain Herd. The Wolf Mountain Herd contains approximately 600–850 animals. The easternmost group (Ray Mountains Herd) calves primarily on the south side of the Ray Mountains and around Kilo Hot Spring, and winters on the north side in the Kanuti-Kilolitna drainage. With approximately 1800 animals, this is the largest of the 3 herds.

The Galena and Wolf Mountain Herds are difficult to survey or census during fall and winter because they travel in small groups in dense black spruce forest where sightability is poor. The Ray Mountains Herd is also difficult to survey because fog, clouds, and winds often limit survey opportunities in fall.

The origin of these herds is unknown, but some residents believe these animals are feral reindeer from a commercial reindeer operation in the Kokrines Hills. The commercial reindeer operation in that area ended around 1935, and there is no evidence of reindeer physical characteristics or reindeer genes in the herds. The mid-May calving dates of all 3 herds also indicate the animals are caribou. 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.

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 people to participate in 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

The methods outlined in this report reflect efforts to accomplish the activities and management objectives established in the previous reporting period.

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. 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.

For the Ray Mountains Herd, we conducted annual composition counts with either a fixed-wing aircraft (Super Cub or Scout) or a Robinson (R-22 or R-44) helicopter in October 1994–2001 (Eagan 1993). Surveys of the Galena or Wolf Mountain Herds were flown during regulatory years (RY) 1998–1999 and 1999–2000 (RY = 1 Jul–30 Jun, e.g., RY98 = 1 Jul 1998 through 30 Jun 1999) using fixed-wing aircraft that did not allow for sex or age classification. We monitored hunting mortality from caribou harvest reports and interviews with local residents. Information obtained from the reports and interviews was used to determine total harvest, harvest location,

hunter residency and success, harvest chronology and transportation used. Harvest data were summarized by regulatory year.

We radiocollared 17 caribou (15 short yearling females and 2 short 2-year-old females) on 29 March 2002, but 4 died from capture-related causes. As of 1 May 2002 there were 13 active radiocollars.

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 300–500 caribou during RY98–RY00. The highest number of caribou seen was 313 in December 1998 (Table 1). The population was probably stable because of relatively moderate winters and extensive habitat. Although radiocollaring caribou was expected to help locate caribou aggregations, use of the collars did not increase the number of caribou found. The use of radio collars did demonstrate that caribou occupy dense black spruce habitat during the rut, where sightability is low. Continuation of surveys or censuses during summer or postcalving aggregations may provide the best estimates of population size for this herd.

Wolf Mountain Herd. The first fall composition survey of the Wolf Mountain Herd was conducted in October 1995 (Table 2). The highest count during June surveys was 595 caribou in 1992. Based on these counts, Osborne (1995) estimated the population of the Wolf Mountain Herd was 600–850 caribou, which was higher than previous estimates. That higher estimate of the population probably reflected improved survey methods rather than population growth. The population was probably stable during RY98–RY00.

Ray Mountains Herd. The Ray Mountains Herd was first thoroughly surveyed by ADF&G and BLM in fall 1983 and periodically surveyed by BLM for 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 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.

Population Composition

Because counts of the 3 herds were conducted with fixed-wing or helicopter aircraft, not all counts yielded composition data (Tables 1–4). Helicopters were used beginning with the 1992 fall surveys and provided the first accurate composition data on these herds. Comparison of composition data to previous years is inconclusive due to limited data. Only caribou in the Ray Mountains were classified during the report period. Ray Mountains caribou had calf:cow ratios of 13:100 in 1997, 32:100 in 1998 and 19:100 in 2000.

Calf:cow ratios of the three herds are similar to other Interior herds, with means and ranges of 20:100 (12–32:100) for the Ray Mountains Herd, 25:100 (15–36:100) for the Wolf Mountain

Herd, and 21:100 (7–40:100) for the Galena Mountain Herd. 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).

Distribution and Movements

Galena Mountain Herd. Galena Mountain caribou usually migrate toward alpine areas east of Galena Mountain in April. They are found on the alpine slopes of the southern Kokrines Hills during 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 migrate from alpine areas across Galena Mountain toward the Holtnakatna Hills and around Hozatka Lake where they winter. 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 Western Arctic Herd 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.

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 slopes of Wolf Mountain, spent most of the summer in the surrounding alpine habitat, then in October moved northward toward Lost Lakes on the Melozitna River. Radiocollared caribou confirmed these patterns but 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.

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 Western Arctic Herd.

Since radiocollaring began in October 1994, radiolocations during winter were primarily on the northern slopes of the Ray Mountains and during calving season were 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).

Body Weights and Genetics

During October, female calves from the Galena Mountain Herd were among the heaviest in Alaska (Valkenburg et al. 1993). Weights of Wolf Mountain and Ray Mountains calves were also heavy.

In contrast, caribou calves captured in the Ray Mountains on 29 March 2002 were relatively light, indicating that body condition had declined considerably since 1994. It is unknown whether that decline in condition is due to a short-term (summer weather) event or is a density-dependent decline. 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.		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		

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
southeast bank of the Kodisin-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, 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.

Board of Game Actions and Emergency Orders. In March 1991 the Alaska Board of Game gave us 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–RY00.

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 RY98 and RY99 hunting seasons, only 1 bull and 1 cow caribou were reported taken. One cow was harvested in the Ray Mountains Herd and 1 bull was harvested in the Wolf Mountain Herd (Table 5).

Hunter access to the Ray Mountains Herd during the open season in winter is limited to lengthy snowmachine trips. The Galena Mountain Herd is most accessible for hunting when it crosses the Galena-Huslia winter trail during winter. However, the season there was closed during winter to limit the potential for a serious 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 averages <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 snowbeds near the river in August, or wandering to the river during September. In addition, 5–7 caribou are probably taken 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. Black bears are probably still the primary calving-ground predators on the Wolf and Galena Mountain Herds. Grizzly bears are found throughout the calving ranges of all 3 herds. Predation was probably the main limiting factor, but no studies to determine mortality factors have been completed for these herds. Total adult mortality was probably very low. There was 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 2000.

CONCLUSIONS AND RECOMMENDATIONS

The mountains between Galena and the upper Hodzana River on the north side of the Yukon River contain 2700–3150 caribou in 3 herds centered around 3 main calving areas. Although open hunting seasons for caribou exist, few are taken due to limited access. Predation is probably the primary factor restricting herd growth. Survey and inventory information for wolves and bears indicate the number of predators were increasing during RY96–RY99 (Stout 1999, 2000). Alternatively, habitat is apparently not restricting growth because lichen ranges are lush. The early calving date and large body size and weight of calves and adults for the Ray Mountains Herd previously indicated good nutrition (Osborne 1995). The recent decline in calf weights may indicate that there is less high-quality summer range available for Ray Mountains caribou than previously thought. The large body size and heavy weight of calves and adults in the Galena Mountain Herd also indicate that these caribou continue to be in excellent nutritional condition (Osborne 1995).

Both management goals for the report period were apparently met. Because all 3 herds seem to be stable or increasing, it is implicit that the limited harvest had no negative effect on the population. The second goal was also achieved at least to the extent there were no population declines that would require more restrictive harvest regulations. 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.

Finally, changes in Unit 24 caribou regulations were accomplished in 2000. Seasons for the Ray Mountains Herd in Unit 24 were modified to be consistent with the Unit 20F seasons. Because of the sustained growth of the Ray Mountains Herd over the last 10 years and the low harvest, the regulations were changed to allow an either-sex bag limit for the fall hunting season. This measure addressed the second goal of increasing harvest opportunity.

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Table 1 Galena Mountain caribou fall 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]						65

[a] Fixed-wing survey, no composition classifications.

Table 2 Wolf Mountain caribou composition counts, 1991–2000

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
1999[a]				
2000[a]				

[a] No surveys.
[b] US Bureau of Land Management survey; no composition classifications.

Table 3 Ray Mountains caribou fall composition counts and estimated population size, 1991–2000

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
6/91		31						13[a]		446
6/91			19							303[b]
10/91[c]										140[d]
10/94[c]										652
10/94	37	19	12	64	4	8	11	24	629	629
1/95[c]										684
6/95[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	1736

[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, 1991–2000

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 through 2000[a]					

[a] No counts completed during 1995–2000.

Table 5 Ray, Galena, and Wolf Mountain caribou reported harvest, regulatory years 1990–1991 through 2000–2001

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

Table 6 Galena Mountain, Wolf Mountain and Ray Mountains caribou hunter residency and success, regulatory years 1990–1991 through 2000–2001

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

[a] Residents of Units 20; 21B, C, and D; and 24.

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CARIBOU MANAGEMENT REPORT

From: 1 July 1998
To: 30 June 2000

LOCATION

GAME MANAGEMENT UNIT: Western half of Unit 25C and small portions of northern Unit 20B and eastern Unit 20F (3090 mi^2)

HERD: White Mountains

GEOGRAPHIC DESCRIPTION: White Mountains area north of Fairbanks

BACKGROUND

As recently as 1960, 30,000 Fortymile caribou herd (FCH) crossed the Steese Highway to calve and summer in the White Mountains (Jones 1961). As the FCH declined throughout the 1960s, they abandoned the traditional White Mountains calving area and remained southeast of the Steese Highway. However, in the late 1970s, public reports and incidental observations by biologists confirmed the year-round presence of caribou in the White Mountains, implying a small resident herd had existed for many years (Valkenburg 1988).

When the White Mountains caribou herd was first discovered in the late 1970s, it numbered 100–200 caribou (Valkenburg, ADF&G, personal communication). By the time of the first Alaska Department of Fish and Game (ADF&G) annual management report (Valkenburg 1988), Bureau of Land Management (BLM) estimated its size at around 1000. However, the basis for this estimate is unknown. In a photocensus on 6 July 1992, J Herriges (BLM) counted 832 caribou but extrapolated the estimate to 1200, based on missing radios and a rough estimate of herd composition. In retrospect, it seems most likely the herd grew from about 150 in 1978 to around 900 in 1992 ($\lambda = 1.14$).

The White Mountains National Recreation Area encompasses most of the White Mountains caribou herd's range and is managed by the BLM. The recreation area was created by the Alaska National Interest Lands Conservation Act in 1980. In 1982 BLM and ADF&G initiated a cooperative project to determine the identity and distribution of caribou in the White Mountains. Caribou radiocollared during that project provided information on movements and distribution of the herd. The herd also provides a low-density comparison population for the long-term Delta Herd research project.

Public use of the White Mountains is increasing, especially during late winter. The Bureau of Land Management continues to improve access and increase recreational opportunities through development of roads and trails and cabins. Despite this increased access, annual reported

harvests have been low. In 1990, 2 drawing permit hunts (DC877 and DC878) were established to give people the opportunity to hunt caribou during winter. DC877 allowed motorized-access hunting, while DC878 was nonmotorized access only. Although 100 permits were issued for the first 3 seasons (50 per hunt), success was low (6 caribou). The number of permits available was increased to 250 (125 per hunt) during regulatory years (RY) 1993–1994 (RY = 1 Jul through 30 Jun; e.g., RY99 = 1 Jul 1999 through 30 Jun 2000). However, the increase did not produce an increase in harvest, and participation dropped until there were more permits available than applicants. During the March 1998 Board of Game meeting, drawing permit hunts DC877 and DC878 were changed to registration hunts RC877 and RC878 with an unlimited number of permits available. Regulations were further liberalized at the March 2000 Board of Game meeting. The fall general season bag limit was changed to 1 caribou (previously 1 bull), RC877 and RC878 were combined to create RC879 which has season dates of 1 November through 31 March and no motorized restrictions, but the area open to hunting for White Mountain caribou was reduced.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Ensure that increased recreational use and mining development do not adversely affect the White Mountains Herd.
- Provide the greatest sustained opportunity for hunting caribou.
- Provide an opportunity to view and photograph caribou.

MANAGEMENT OBJECTIVES

- Maintain a fall bull:cow ratio of 30 bulls:100 cows.
- Develop a creative strategy to increase winter hunting opportunities, while minimizing potential for overharvest.
- Maintain a reported harvest of <75 caribou, including no more than 30 cows during the winter drawing hunts.
- Maintain at least 20 radiocollared caribou in the herd to adequately measure herd dynamics.

METHODS

We flew fall sex and age composition surveys on 30 and 29 September during 1999, 2000, and 2001, respectively. After radiocollared animals were located from a fixed-wing aircraft, a Robinson R-22 helicopter was flown to that location and an observer classified individuals into sex and age categories. The R-22 crew also classified groups of caribou that were located without the assistance of the fixed-wing aircraft. The 5 classification categories are: cow, calf, small bull (yearling or small 2-year-old—cow-like antlers), medium bull (older than yearling, but not a mature breeder, antlers larger than a mature cow, but not at their full potential), and large bull (mature, heavily antlered male).

On 7 July 2000 ADF&G and BLM cooperated to conduct an aerial count (supplemented with 35-mm photographs of 1 large group) of the White Mountains Herd from fixed-wing aircraft. Groups of caribou were located by radiotracking collared animals and by systematic searches throughout the known range.

We estimated harvest by using data from returned harvest tickets and registration permit report cards. For RY98 and RY99, caribou harvested north of the Steese Highway were considered White Mountains animals; caribou harvested south of the Steese Highway were considered FCH. To separate the White Mountains Herd from the Ray Mountains Herd's harvest in Unit 20F, caribou killed south of the Yukon River were considered White Mountains animals. For RY00 the border for delineating the White Mountains caribou and Fortymile caribou was moved west to Preacher and American Creeks for White Mountains caribou and east of these drainages for Fortymile caribou. Harvest data were summarized by regulatory year.

On 26 September 2001 we collared 9 female caribou calves, bringing the total number of active radio collars to approximately 17 at the beginning of winter 2001–2002.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

On 7 July 2000 we (ADF&G and BLM) conducted an aerial count of the White Mountains Herd. The total count of 687 caribou was well below the expected population of ≥1200.

Population Composition

Fall calf:cow and bull:cow ratios in the White Mountains Herd have been variable (Table 1). However, calf:cow ratios were high enough (>25 calves:100 cows) to allow the herd to grow in most years except for 2000, 1998, and 1991–1994. The bull:cow ratio remained relatively high. Variation in bull:cow ratios (23–62:100) for the White Mountains Herd probably reflected unrepresentative sampling because bulls were segregated after the rut (i.e., in 1991 and 1995). Early surveys (i.e., 29 Sep–6 Oct) yielded higher bull:cow ratios than later surveys. Differences in composition between years may also be attributed to the behavior of these caribou, because they are usually in small, scattered groups and are often in timbered areas. It is easy to miss groups that could affect the overall composition estimates.

Distribution and Movements

Radiocollared White Mountains caribou are located infrequently, so data concerning their movements are minimal. Limited data indicate the herd calves primarily in the higher elevation parts of the White Mountains east of Beaver Creek, including the Nome, Fossil, Cache, and Preacher Creek drainages. Some scattered calving occurs west of Beaver Creek (Durtsche and Hobgood 1990). Postcalving aggregations occur from mid-June to late July and are located east to Mount Prindle (Fig 1). In August or September most caribou cross Beaver Creek and winter in upper Hess and Victoria Creeks and the upper Tolovana River drainages. However, some White Mountains caribou winter in the Preacher Creek drainage west of Circle.

MORTALITY

Harvest

Season and Bag Limit. The general hunting season was 10 August–20 September throughout the herd's range (Units 20B, 20F south of the Yukon River, and 25C), with a bag limit of 1 bull from RY87 thru RY99. The bag limit for this season was liberalized to 1 caribou during RY00, but the area open to hunting was reduced in Unit 25C to west of Preacher and American Creeks.

Winter registration permit hunts were open for caribou hunting north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway (Units 20B, 20F south of the Yukon River, and 25C). During the RY98 and RY99 seasons, hunt RC877 was open 1–28 February and hunt RC878 was open 1–31 March, with motorized restrictions during RC878. The winter registration hunt was modified for RY00 and the hunt number was changed to RC879. Modifications included a 1 November–31 March season, no motorized restrictions and a reduction in the area open to hunting in Unit 25C. The bag limit for all winter hunts was 1 caribou.

Board of Game Actions and Emergency Orders. At the March 2000 Board of Game meeting the board approved our proposal to change the general season bag limit to 1 caribou, replaced RC877 and RC878 with a new registration hunt (RC879) having new season dates of 1 November–31 March with no motorized restrictions, and adjusted the border that delineates White Mountains and Fortymile caribou hunting in Unit 25C. Prior to this action, the border between White Mountains caribou and Fortymile caribou hunting was the Steese Highway. The new border is the east bank of Preacher and American Creeks. The White Mountains caribou herd is hunted west of the border and the FCH is hunted east of the border.

Hunts RC877 and RC878 were closed by emergency order on 16 February 2000. The emergency order was issued due to the presence of a large number of FCH animals near the Steese Highway. The adjustments to the borders for hunting the White Mountains caribou and FCH should prevent closures of this type in the future.

Hunter Harvest. Fall harvest during general season hunts was relatively low. The reported WMCH fall harvest averaged 18 (range 10–26) during RY95–RY99 (Table 2).

Permit Hunts. Participation was poor and harvests were low for drawing permit hunts DC877 and DC878. From RY90 through RY97, the total reported harvest was 10 caribou (Table 3). The low harvest occurred despite the availability of 1150 permits. The overall success rate was 5% (10 of 185) for those who reported hunting. During RY98 and RY99, 140 of the 193 individuals who obtained registration permits for RC877 and RC878 reported that they actually hunted, and 14 caribou were harvested (10% success rate). Data for RC879 (RY00) are preliminary, but to date we have issued over 300 permits and the reported harvest is 9 caribou (6 cows and 3 bulls).

To estimate a harvest quota for the winter hunt, we used a computer population model designed by P Valkenburg and D Reed (ADF&G). The model indicated the White Mountains Herd could sustain a total fall and winter harvest of 40 bulls and 25 cows.

Hunter Residency and Success. During RY98, 69% (9 of 13) of successful hunters during the general season were Alaskan residents. Of those, 89% (8 of 9) were residents of Unit 20. During the RY99 general season, 85% (22 of 26) of successful hunters were Alaskan residents. Of those, 77% (17 of 22) were residents of Unit 20. The overall success rate during the general season for RY98 was 16% (13 of 81) and 22% (26 of 118) for RY99 (Table 4).

Harvest Chronology. Since RY90 (when the winter seasons were opened) 88–100% of the harvest has occurred during the general season (10 Aug–20 Sep).

Transport Methods. The most common method of transportation used by successful hunters during general seasons during RY98 and RY99 were 3- or 4-wheelers, which accounted for 69% (9 of 13) and 65% (17 of 26) of the respective transportation use (Table 5). Because of limited participation and low harvests, transportation methods for the winter hunts have little meaning. When motorized access is allowed, the vast majority of the harvest is by snowmachine.

Winter travel in the White Mountains can be difficult for hunters, but extension of developed trails and cabins provided by BLM is making winter access easier. However, access trails have not been well developed in caribou wintering areas, and most caribou winter in dense spruce forest, making hunting difficult.

CONCLUSIONS AND RECOMMENDATIONS

Harvests were low because of remoteness and inaccessibility, so we met our objective of harvesting <75 total caribou and fewer than 30 cows. Increased hunter effort and harvest during fall may occur because there are limited opportunities to hunt Interior caribou, and BLM has improved access in this area. However, if the FCH increases as expected, increased hunting pressure on the White Mountains Herd may be minimal.

The protection of key seasonal ranges from mining and recreational development should be considered during any land-use planning. Key ranges include known and historic calving areas, summer ranges, wintering areas, and movement corridors.

We met our objective to maintain a fall bull:cow ratio of 30 bulls:100 cows. During RY98 and RY99, fall ratios were 62 and 54 bulls:100 cows, respectively.

Our count of 687 caribou in July 2000 was below the expected population size of ≥1200 caribou. There were several possible explanations for the lower than expected count. The herd was scattered, and caribou may have been missed in the timber or in areas where the search effort was not adequate. The expected population was based on a 1992 population estimate and subsequent composition data. Errors in these estimates could have resulted in an inaccurate projected population. It is also possible that 687 caribou is an accurate estimate for this population. We only heard 16 of 20 radiocollared animals we expected to be active during the census.

Population data for the White Mountains Herd are limited to annual composition counts with an occasional census. To obtain a better understanding of population dynamics for the White Mountains Herd we need to allocate more funds for data collection. Relatively low hunter

participation and success, and the limited potential of this herd have made these activities a low priority compared to other Interior caribou herds.

The management goal that stated "Allow continued growth and natural regulation of the White Mountains caribou herd" was eliminated because it is inconsistent with current management practices for this herd.

By working closely with BLM, we monitored increases in recreational uses and development. We should continue attending meetings on development of BLM lands. This cooperation will help effect better management strategies for managing the White Mountains caribou herd.

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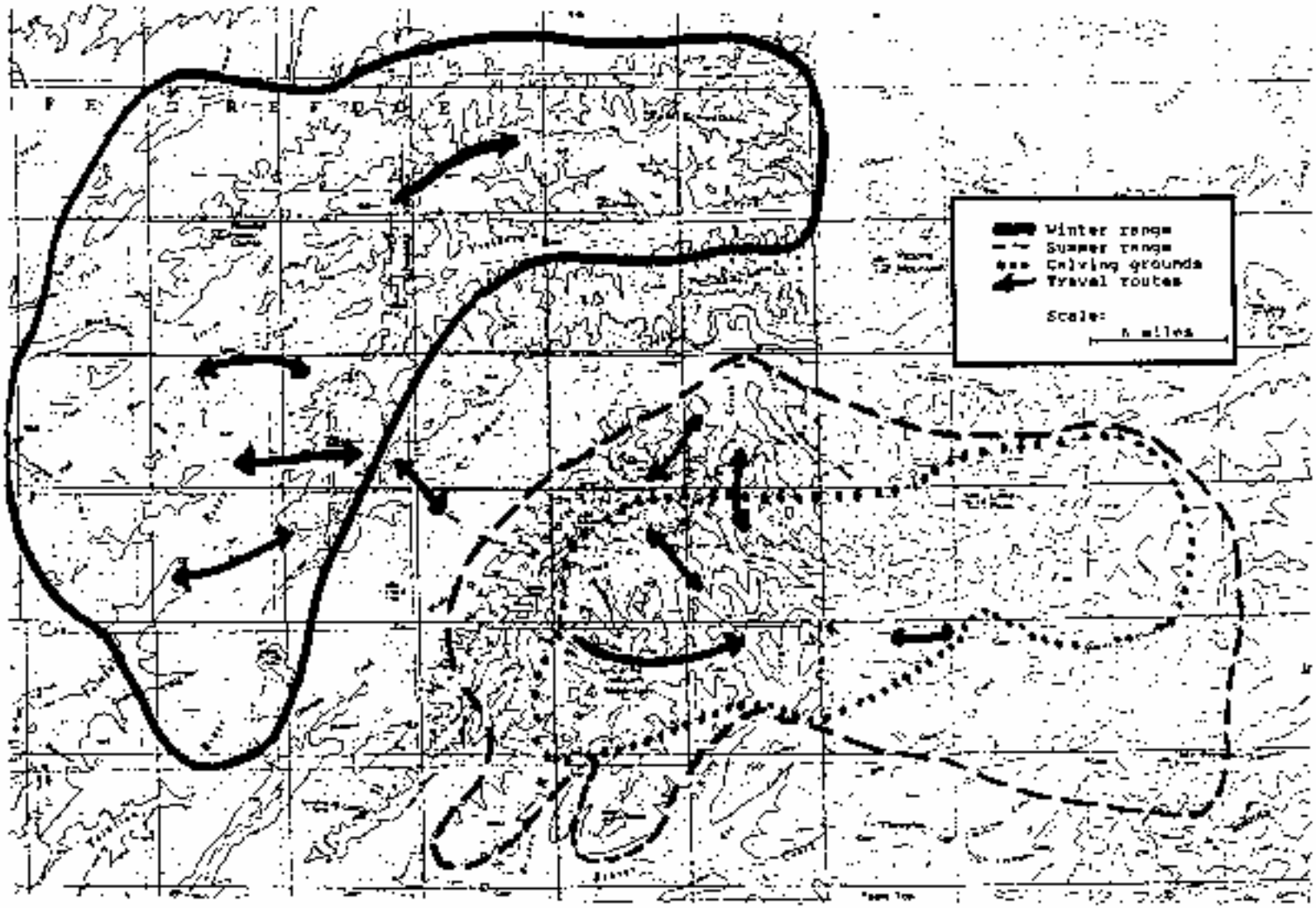

Figure 1 White Mountains caribou herd approximate range (based on Durtsche and Hobgood 1990; Hobgood, personal communication).

Table 1 White Mountains caribou herd fall composition counts and estimated population size, 1983–2001

Date	Bulls:100 Cows	Calves:100 Cows	% Calves	% Cows	% Small bulls	% Medium bulls	% Large bulls	% Total bulls	Composition sample size	Estimate of herd size
9/29/83	44	31	18	57	26	29	44	25	135	
10/85	36	31	18	60	0	0	0	22	65	
9/29/88	43	33	19	57	51	16	33	24	211	
10/06/89	50	36	19	54	46	33	22	27	744	750–1000
10/11/91	23	24	16	68	44	35	21	15	312	
10/29/91[a]			15						324	761[b]–1000
10/13/92	39	23	14	62	52	18	30	24	247	832[b]–1000
9/27/93	48	22	13	59	34	23	43	28	497	
10/04/94	39	25	15	61	34	24	42	24	418	
10/16–17/95	36	31	19	60	44	27	29	22	418	
10/2/96	44	54	27	50	60	20	20	22	513	
10/2/97	34	38	22	58	50	19	31	20	341	
10/2/98	50	18	11	60	42	37	21	30	759	
9/30/99	62	39	20	47	33	40	26	31	644	
9/29/00	54	13	8	60	40	40	20	32	399	687–800
9/25/01	57	26	14	55	46	36	19	31	441	700–800

[a] Fixed-wing aircraft.
[b] Actual count of herd size.

Table 2 White Mountains caribou harvest, regulatory years 1987–1988 through 2000–2001

Regulatory year	General season harvest			
	M	F	Unk	Total
1987–1988	6	0	0	6
1988–1989	12	0	0	12
1989–1990	14	0	0	14
1990–1991	17	0	1	18
1991–1992	19	0	0	19
1992–1993	15	0	0	15
1993–1994	21	0	0	21
1994–1995	18	0	0	18
1995–1996	10	0	0	10
1996–1997	17	0	0	17
1997–1998	25	0	0	25
1998–1999	13	0	0	13
1999–2000	26	0	0	26
2000–2001[a]	23	15	1	39

[a] Preliminary data.

Table 3 White Mountains caribou herd harvest by permit hunt, regulatory years 1990–1991 through 1997–1998

Hunt number	Regulatory year	Permits available	Applicants	Permits issued	Harvest			Hunted unsuccessful	Did not hunt	Did not report
					Cow	Bull	Total			
DC877 & DC878	1990–1991	100	229	89	1	2	3	18	66	2
	1991–1992	100	409	100	0	0	0	12	88[b]	
	1992–1993	100	537	100	2	1	3	19	76	2
	1993–1994	150	615	150	0	0	0	26	120	4
	1994–1995	150	295	149	2	1	3	26	116	5
	1995–1996	150	354	137	0	0	0	37	98	1
	1996–1997	150	135	106	0	0	0	17	86	3
	1997–1998	250	90	67	0	1	1	20	46	0
RC877 & RC878[a]	1998–1999			74	1	0	1	49	25	0
	1999–2000			119	10	3	13	91	28	0
RC879[c]	2000–2001				3	6	9			

[a] Registration hunt with an unlimited number of permits available.

[b] Includes those that did not report.

[c] Preliminary data.

Table 4 White Mountains caribou herd hunter residency and success during fall general seasons, regulatory years 1985–1986 through 1999–2000

Regulatory year	Successful				Unsuccessful		Total hunters
	Resident	Nonresident	Total	%	Total	%	
1985–1986			12	20	48	80	60
1986–1987			2	33	4	67	6
1987–1988			6	12	43	88	49
1988–1989			13	17	64	83	77
1989–1990	12	2	14	23	46	77	60
1990–1991	15	3	18	18	80	82	98
1991–1992	18	1	19	12	143	88	162
1992–1993	12	3	15	13	99	87	114
1993–1994	19	2	21	18	99	82	120
1994–1995	18	0	18	12	135	88	153
1995–1996	7	3	10	8	116	92	126
1996–1997	13	4	17	17	84	83	101
1997–1998	17	8	25	16	130	84	155
1998–1999	9	4	13	16	68	84	81
1999–2000	22	4	26	22	92	78	118

Table 5 White Mountains caribou herd harvest by transport method during fall general seasons, regulatory years 1988–1989 through 1999–2000[a]

Regulatory year	Harvest by transport method								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Other/Unk	*n*
1988–1989	4	0	0	4	0	2	2	0	12
1989–1990	0	0	0	4	0	4	4	2	14
1990–1991	1	0	1	10	0	1	4	1	18
1991–1992	3	1	0	8	0	4	3	0	19
1992–1993	2	0	0	4	0	2	5	1	14
1993–1994	4	0	0	11	0	0	5	1	21
1994–1995	0		1	13	0	1	3	0	18
1995–1996	4	0	0	4	0	0	2	0	10
1996–1997	1	0	0	12	0	1	3	0	17
1997–1998	5	0	1	14	0	2	1	2	25
1998–1999	1	0	1	9	0	1	1	0	13
1999–2000	2	0	2	17	1	2	1	1	26

[a] Excludes winter permit hunts.