Caribou
Management Report
of survey-inventory activities
1 July 2004–30 June 2006

Patricia Harper, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

Photo by Jim Dau, ADF&G

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-3 and W-33-4
2007

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

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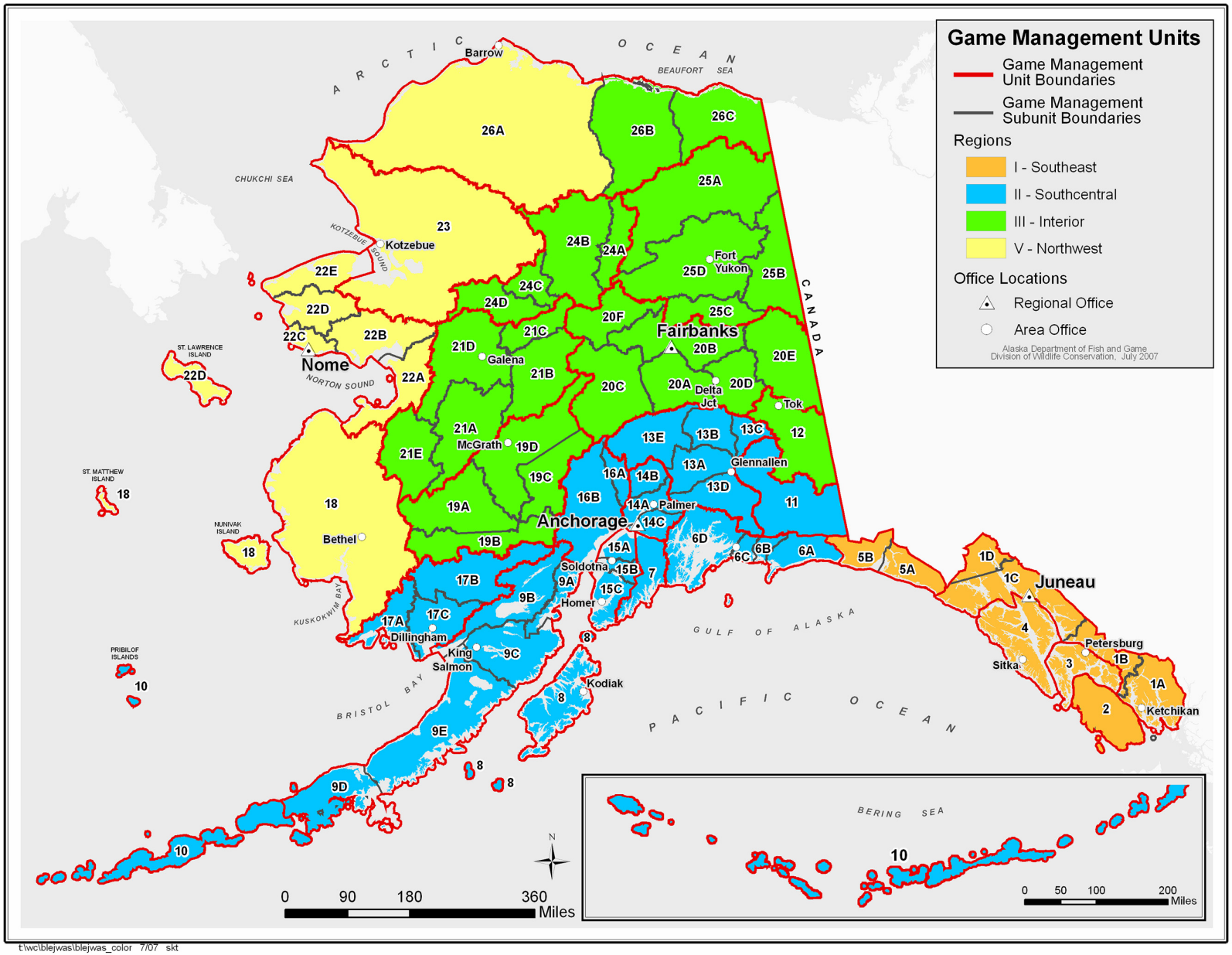
CARIBOU MANAGEMENT REPORT

TABLE OF CONTENTS

From: 1 July 2004
To: 30 June 2006



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WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006

LOCATION

GAME MANAGEMENT UNITS: 7 and 15 (8397 mi^2)

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

GEOGRAPHIC DESCRIPTION: Kenai Peninsula

BACKGROUND

Historical reports say caribou were abundant on the Kenai Peninsula before a series of large fires in the late 1800s, including a massive fire in 1883 (Sherwood 1974). This large-scale disturbance may have destroyed much of the lichen forage used by caribou and, due to long regeneration times for this important winter forage, may have influenced their population decline. Allen (1901) reported that the Andrew Stone expedition of 1900 collected caribou from the Kenai Peninsula for the American Museum of Natural History and reported that caribou were very scarce and soon would be exterminated by hunters who sold antlers of moose and caribou "at good prices for shipment to San Francisco." It is likely that large-scale fire coupled with unregulated hunting caused caribou to be extirpated from the Kenai Peninsula by the early 20^{th} century. Currently there are four recognized herds on the peninsula, which were recently established through reintroduction efforts. Reintroductions in 1965 and 1966 established the Kenai Mountain (KM) and Kenai Lowlands (KL) herds. Additional reintroductions in 1985 and 1986 established the Killey River (KR) and Fox River (FR) herds.

The KM herd in Unit 7 currently numbers more than 300 animals and ranges over 1400 km^2 in the drainages of Chickaloon River, Big Indian Creek, and Resurrection Creek. The herd grew to over 200 animals seven years after the 1965 reintroduction and numbered more than 400 by the mid 1980s. The population declined twice after it exceeded 400 animals. The herd has been hunted annually since 1972. From 1972 to 1976, the department issued an unlimited number of registration permits, and the season was closed by emergency order when the harvest exceeded sustainable limits. In 1977, a limited drawing permit system was implemented and remains in place. Past fluctuations in population size suggest the carrying capacity for this herd is 300-400 caribou due to limited winter range.

The KL herd summers in Subunit 15A north of the Kenai airport to the Swanson River and in the extreme western portion of 15B. The population winters on the lower Moose River to the outlet of Skilak Lake and in the area around Browns Lake. Its range encompasses around 1200 km^2 in and

around the communities of Soldotna, Kenai, and Sterling. This herd has shown the slowest growth compared to the other Kenai herds. Numbers slowly increased to more than 100 caribou 20 years after the reintroduction in 1966. The herd presently numbers about 120–135 individuals. Growth in this population has been limited by predation rather than by habitat. Free-ranging domestic dogs and coyotes kill calves in summer and wolves prey on all age classes during winter. In addition to natural mortality, highway vehicles typically kill several caribou annually. Hunts were held in 1981, 1989, 1990, 1991, and 1992, but no permits have been issued since.

The KR herd inhabits over 600 km^2 including the upper drainages of Funny and Killey Rivers and north to the Skilak River in Subunit 15B. For management purposes, the KR herd now includes the group of caribou formally identified as the Twin Lakes caribou herd, which occupies the area drained by Benjamin Creek. The KR herd now numbers around 300 individuals. This herd grew steadily to more than 700 animals until 2001, when avalanches in subsequent winters killed almost 200 caribou. Due to the nature of the habitat, avalanches may be a significant limiting factor for KR caribou and caribou may compete with an abundant population of Dall sheep for winter range. The KR herd has been hunted since 1994.

The FR herd has the smallest range of all Kenai herds at about 120 km^2 south of the Tustumena Glacier between upper Fox River and Truuli Creek in Subunit 15C. The FR herd peaked in 1998 at nearly 100 caribou and now appears to be much lower and could possibly no longer be a viable herd. Very limited hunting occurred on his herd from 1995–2003.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Kenai Mountains caribou— to maintain a posthunt population of 300–400 animals.

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

Killey River and Fox River caribou— to maintain viable caribou populations throughout suitable habitat and to provide for opportunities to hunt these herds when deemed sustainable.

METHODS

When funds were avialable, we flew aerial surveys in fixed winged aircraft to determine the number, distribution, and composition of caribou herds. The department collected harvest data through a mandatory reporting requirement of the drawing permit hunts.

POPULATION STATUS AND TREND

Population Size and Composition

Kenai Mountains Caribou. The herd currently numbers around 325 animals (Table 1). No composition counts have been conducted during the reporting period.

Kenai Lowlands Caribou. The current population size is about 120–135 caribou; 19-28% calves were tallied during the last three surveys (Table 2).

Killey River Caribou. No surveys have been conducted during the reporting period but the population likely numbers around 300 animals (Table 3).

Fox River Caribou. No surveys were conducted during the reporting period but a flight in 2004 counted 27 caribou on an icefield south of Truli Creek. The population likely numbers under 50 animals and may be dispersing westward (Table 4).

MORTALITY

Harvest

Season and Bag Limits.

Kenai Mountains Caribou—The season for resident and nonresident hunters in Unit 7 north of the Sterling Highway and west of the Seward Highway has been 10 August–31 December since 1999. The bag limit was one caribou by drawing permit (DC001) with 250 permits issued each year since 1996 (Table 5).

Kenai Lowlands Caribou—The season has been closed since 1993.

Killey River Caribou—The season for resident and nonresident hunters in Subunits 15B south and west of Killey River in the Kenai National Wildlife Refuge was 19 August–20 September. Since 2004, the bag limit has been one bull by drawing permit (DC608) with 25 permits issued (Table 6).

Fox River Caribou—The season has been closed since 2004 (Table 7).

Board of Game Actions and Emergency Orders

There were no Board of Game actions regarding Kenai Peninsula caribou during this report period.

Hunter Residency and Success

Residency and success rates for the KM, KR, and FR caribou hunts are show in Tables 8–10.

Harvest Chronology

Harvest Chronology for the KM, KR, and FR caribou hunts are show in Tables 11–13.

Transport Methods

Transport methods for the KM, KR, and FR caribou hunts are show in Tables 14–16. Caribou in these populations are well off the road system and in areas with restricted access methods. Therefore, access to the hunting grounds requires long hikes, horseback trips, or via float plane on limited lakes.

HABITAT

Habitat has been assessed indirectly through measurements of 10-month-old calf weights. The KM caribou had calf weights decreasing each year from 1996 through 2002, but were still generally above the weights of Nelchina calves (Bruce Dale pers. comm.). It is not known if the decline in weights was due to decreasing summer or winter forage quality, a series of deep snow winters, or other factors. Winter range is limited to wind-swept ridges and restricts the expansion of this herd. The KR caribou calf weights decreased in the late 1990s but were still heavier than KM caribou. The notable decrease in caribou numbers from avalanches may reduce any density-dependent effects in the short-term. Mean adult female weights on the KL herd (130 kg) were significantly greater than KM caribou (108 kg) measured in April of 1991 ($t = 4.7$, $P < 0.01$). High body weights and high calf counts directly after parturition indicate the KL caribou are not limited by range. More intensive collaring of FR caribou could reveal whether animals are dispersing into other available range south of the Fox River, west toward Seward, or if their growth is limited by other factors. Caribou have been recently reported east of the Harding ice field near Seward, which may be dispersing FR individuals. Although caribou inhabited the Seward area more than 100 years ago (Porter 1893), it is unknown if the small number of dispersing caribou is enough to establish a population. The current small number of FR caribou puts the population at risk of extirpation.

Department and Kenai National Wildlife Refuge biologists conducted preliminary habitat assessments for the Killey and Fox River herds before reintroduction in the mid 1980s. These results, published in the Kenai Peninsula Caribou Management Plan (1994), indicated the KR caribou winter range (516 km^2) should sustain a herd of 400–500 caribou, and the FR caribou winter range (85 km^2) could sustain approximately 80 animals. Calf recruitment for these herds has been moderately low, and habitat may now be limiting the growth of the Killey River, Fox River and Kenai Mountains herds.

CONCLUSIONS AND RECOMMENDATIONS

Caribou studies on the Kenai have been conducted through cooperative efforts of the Alaska Department of Fish & Game, Kenai National Wildlife Refuge, and the U.S. Forest Service. Each herd has unique limiting factors impacting its growth. Future monitoring and research is greatly limited by a decline in funding. Basic monitoring and research would include traditional counts and collaring efforts, assessing seasonal movements and dispersal into new range using Global Positioning System (GPS) collars, monitoring calf condition in the spring and fall as an index of winter and summer habitat quality, and assessing predation pressure by monitoring adult and calf survival.

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TABLE 1 Kenai Mountains caribou composition counts and estimated population size, 2001–2005

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls	Medium bulls	Large bulls	Total bulls	Composition sample size	Estimate[a] of herd size
2001–02	--	--	--	--	--	--	--	353	375
2002–03	No surveys conducted								300
2003–04	No surveys conducted								300
2004–05	--	--	--	--	--	--	--	295	325
2005–06	No surveys conducted								325

[a] Estimated herd size postseason.

TABLE 2 Kenai Lowlands caribou composition counts and estimated population size, 2001–2005

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls	Medium bulls	Large bulls	Total bulls	Composition sample size	Estimate[a] of herd size
2001–02	--	--	11 (11)	--	--	11	--	98	135
2002–03	No surveys conducted								135
2003–04[b]	--	--	25 (28)	--	--	--	--	88	135
2004–05	--	--	16 (19)	--	--	--	11	83	135
2005–06	--	--	23 (23)	--	--	--	--	100	135

[a] Estimated herd size in June.
[b] After the survey we received a reliable report accounting for 44 additional animals.

TABLE 3 Killey River caribou composition counts and estimated population size, 2001–2005

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls	Medium bulls	Large bulls	Total bulls	Composition sample size	Estimate[a] of herd size
2001–02[b]	--	--	--	--	--	--	--	710	750
2002–03[c]	--	--	14(4)	--	--	--	--	347	400
2003–04[d]	No surveys conducted								300
2004–05	No surveys conducted								300
2005–06	No surveys conducted								300

[a] Estimated fall herd size.
[b] A minimum of 143 caribou died in an avalanche during the winter of 2001–02.
[c] A minimum of 25 caribou died in an avalanche during the winter of 2002–03.
[d] A minimum of 23 caribou died in an avalanche which likely occurred during the winter of 2003–04.

TABLE 4 Fox River caribou fall composition counts and estimated population size, 2001–2005

Regulatory year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls	Medium bulls	Large bulls	Total bulls	Composition sample size	Estimate of herd size
2001–02	--	--	--	--	--	--	--	66	66
2002–03	--	--	--	--	--	--	--	47	50
2003–04	No surveys conducted								40
2004–05	--	--	--	--	--	--	--	27	35
2005–06	No surveys conducted								30

TABLE 5 Kenai Mountains caribou harvest (DC001), 2001–2005

Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Bulls	Cows (%)	Unk.	Total harvest
2001–02	250	64	21	13	6 (32)	0	19
2002–03	250	51	15	11	8 (42)	0	19
2003–04	250	50	18	14	7 (33)	1	22
2004–05	250	56	16	10	7 (41)	0	17
2005–06	250	60	21	16	5 (24)	0	21

TABLE 6 Killey River caribou harvest (DC608), 2001–2005

Regulatory Year	Permits issued	Percent did not hunt	Percent successful hunters	Bulls	Cows (%)	Unk.	Total harvest
2001–02 [a]	25	52	48	10	4 (29)	0	14
2002–03 [a]	75	52	58	17	4 (19)	0	21
2003–04 [a]	75	57	50	10	6 (38)	0	16
2004–05 [b]	25	52	92	11	0 (0)	0	11
2005–06 [b]	25	60	30	3	0 (0)	0	3

[a] Each permit had a bag limit of 3 caribou of which only 1 could be a bull.
[b] Each permit had a bag limit of 1 bull.

TABLE 7 Fox River caribou harvest (DC618), 2001–2005

Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Bulls	Cows (%)	Unk.	Total harvest
2001–02	10	60	20	1	0	0	1
2002–03	10	60	25	1	0	0	1
2003–04	10	70	33	0	1 (100)	0	1
2004–05	No open season						0
2005–06	No open season						0

TABLE 8 Kenai Mountains caribou, hunter residency and success (DC001), 2001–2005

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
2001–02	1	14	4	19 (21)	2	68	0	70 (79)	89
2002–03	3	15	1	19 (15)	8	96	2	106 (85)	125
2003–04	0	22	0	22 (18)	5	96	1	102 (82)	124
2004–05	1	13	3	17 (16)	2	87	3	92 (84)	109
2005–06	2	17	1	20 (20)	3	75	0	78 (80)	98

[a] Local resident resides in Unit 7.

TABLE 9 Killey River caribou, hunter residency and success (DC608), 2001–2005

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
2001–02[b]	8	5	1	14 (39)	14	5	3	22 (61)	36
2002–03[b]	7	8	1	16 (44)	12	8	0	20 (56)	36
2003–04[b]	7	4	1	12 (36)	11	8	2	21 (64)	33
2004–05	7	3	1	11 (92)	0	1	0	1 (8)	12
2005–06	2	1	0	3 (30)	2	5	0	7 (70)	10

[a] Local resident resides in Unit 7 or 15.
[b] The bag limit was 3 caribou of which only 1 could be a bull. Some successful hunters took more than 1 caribou.

TABLE 10 Fox River caribou, hunter residency and success (DC618), 2001–2005

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
2001–02	1	0	0	1(25)	0	3	0	3(75)	4
2002–03	1	0	0	1(25)	3	0	0	3(75)	4
2003–04	1	0	0	1(33)	0	2	0	2(67)	3
2004–05	No hunt held								
2005–06	No hunt held								

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

TABLE 11 Kenai Mountains caribou, harvest chronology (DC001), 2001–2005

Regulatory year	Harvest periods 8/10–8/31	9/01–9/30	10/01–10/31	11/01–12/31	n
2001–02	9	10	0	0	19
2002–03	16	3	0	0	19
2003–04	12	4	4	2	22
2004–05	7	7	3	0	17
2005–06	11	7	2	1	21

TABLE 12 Killey River caribou, harvest chronology (DC608), 2001–2005

Regulatory year	Harvest periods 8/10–8/15	8/16–8/31	9/1–9/15	9/16–9/30	Unk.	n
2001–02	3	2	4	4	1	14
2002–03	1	3	14	2	1	21
2003–04	2	6	5	3	0	16
2004–05	2	2	6	1	0	11
2005–06	2	1	0	0	0	3

TABLE 13 Fox River caribou, harvest chronology (DC618), 2001–2005

Regulatory year	Harvest periods 8/10–8/15	8/16–8/31	9/1–9/15	9/16–9/30	n
2001–02	1	0	0	0	1
2002–03	0	0	1	0	1
2003–04	0	1	0	0	1
2004–05	No hunt held				
2005–06	No hunt held				

TABLE 14 Kenai Mountains caribou, harvest (DC001) by transport method, 2001–2005

Regulatory year	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV[a]	Highway vehicle	Unknown	n
2001–02	4	2	0	0	0	1	8	4	19
2002–03	2	5	0	0	0	0	12	0	19
2003–04	2	4	0	0	0	0	12	4	22
2004–05	1	5	0	0	0	0	10	1	17
2005–06	0	2	0	0	0	0	17	2	21

[a] ORV includes mountain bike.

TABLE 15 Killey River caribou, harvest (DC608) by transport method, 2001–2005

	Percent of harvest								
Regulatory year	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
2001–02	0	8	5	0	0	0	0	1	14
2002–03	6	8	7	0	0	0	0	0	21
2003–04	1	13	1	0	0	0	0	1	16
2004–05	2	6	2	0	0	0	0	1	11
2005–06	1	1	0	0	1	0	0	0	3

TABLE 16 Fox River caribou, harvest (DC618) by transport method, 2001–2005

Regulatory year	Percent of harvest								n
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
2001–02	0	0	1	0	0	0	0	0	1
2002–03	0	0	1	0	0	0	0	0	1
2003–04	0	0	1	0	0	0	0	0	1
2004–05	No hunt held								
2005–06	No hunt held								

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CARIBOU MANAGEMENT REPORT

From: July 1, 2004
To: June 30, 2006

LOCATION

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

HERD: Mulchatna

GEOGRAPHIC DESCRIPTION: Drainages into northern Bristol Bay and Kuskokwim River

BACKGROUND

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

Caribou numbers in the Mulchatna River area began to increase again in the early 1930s (Alaska Game Commission Reports, 1925–39), then began declining in the late 1930s (Skoog 1968); however, no substantive information was collected between 1940 and 1950 to support this theory.

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

Aerial surveys of the MCH range were first conducted in 1949, when the population was estimated at 1000 caribou (ADF&G files 1974). The population increased to approximately 5000 by 1965 (Skoog 1968). In 1966 and 1972 relatively small migrations across the Kvichak River were recorded; however, no major movements of this herd were observed until the mid 1990s. An estimated 6030 caribou were observed during a survey in June 1973. In June 1974 a major effort was made to accurately census this herd. That census yielded 13,079 caribou, providing a basis for an October estimate in 1974 of 14,231 caribou.

We used photocensuses to monitor the herd as it declined through the 1970s. Seasons and bag limits were reduced continuously during that decade. Locating caribou during surveys was a problem, and biologists often underestimated the herd size. Twenty radio transmitters were attached to MCH caribou in 1981, providing assistance in finding postcalving aggregations. During a photocensus in June 1981, 18,599 caribou were counted, providing an extrapolated estimate of 20,618 caribou. Photocensus estimates of the MCH since then have been used to document population size. The aerial photocensus in July 2006 provided a minimum estimate of 45,000 caribou in the MCH.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

Additional objectives include:

- Manage the MCH for maximum opportunity to hunt caribou.

METHODS

We conducted a photocensus of the MCH during the postcalving aggregation period in late June or early July in most years from 1980 to 1992. From 1993 through 2003 the censuses were scheduled on alternate years. Since then, censuses were planned for each year, with the realization a successful census would likely occur about two out of three years. The last photo-census was conducted just after this reporting period, in July 2006, though flights preliminary to the photocensus occurred in June. Alaska Department of Fish and Game (ADF&G) coordinates censuses out of the Dillingham area office in cooperation with staff from the Bethel, McGrath, Palmer and Fairbanks ADF&G offices and personnel from Togiak National Wildlife Refuge (TNWR), Yukon Delta National Wildlife Refuge (YDNWR) and Lake Clark National Park and Preserve (LCNPP), with additional funding provided by the Bureau of Land Management (BLM). Biologists, using fixed-wing aircraft, radiotrack and survey the herd's range, estimate the number of caribou observed and photograph discrete groups. Since 1994 we have photographed large aggregations with an aerial mapping camera mounted in a DeHavilland Beaver (DH-2) aircraft flown by ADF&G staff. We estimate herd size by adding: 1) the number of caribou counted in photographs; 2) the number of caribou observed but not photographed; and, 3) the estimated number of caribou represented by radiocollared caribou not located during the census.

We conducted aerial surveys to estimate the sex and age composition of the herd with a Cessna 185 and Robinson R-44 helicopter each October. Groups of caribou are located by radiotracking with the Cessna. Then the helicopter is used to herd small groups while the number of caribou in each of the following classifications is tallied: calves, cows, small bulls, medium bulls, and large bulls. Classification of bulls is subjective and based on antler and body size.

We captured and radiocollared MCH caribou in most years from 1980 to 1992. Beginning in 1992, collaring programs were scheduled for alternating years, occurring in even years. Beginning in 1997, capture and radiocollaring efforts occurred when funding was available. Caribou are captured using a helicopter and drug-filled darts fired from a CO_2-powered pistol. These are usually cooperative efforts between ADF&G, TNWR and YDNWR.

In March 2005, fourteen 10-month-old female calves, one 22-month-old female, and five adult females were radiocollared in game management unit (GMU) 17A near Pungokepuk Lake. Five more 10-month-old female calves and five adult females were radiocollared between the Nushagak and Kvichak rivers. All the adult cows were collared with satellite collars. In April 2006, nine 10-month-old female calves and one adult female were radiocollared in GMU 17A near Pungokepuk Lake. Seventeen more 10-month old females, one 22-month old female, and two adult female cows were radiocollared southeast of Portage Creek. Again, all the adult females were collared with satellite collars.

Beginning in May 2000, intensive radiotracking surveys during calving were flown to determine the proportion of adult females calving. A fixed-winged aircraft was used to find calving concentrations and locate individual radiocollared adult females. Daily flights to relocate these individuals occurred until we could determine whether the individual collared cows were accompanied by a calf or had hard antlers. Presence of hard antlers prior to calving is generally considered evidence the adult cow is pregnant. These flights continued until all collared cows were observed or until so late in the calving period that absence of a calf could possibly be attributed to predation or other loss.

We conducted periodic radiotracking flights throughout this reporting period to continue the demographics study begun in 1981. Supplemental funding from the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (FWS), and LCNPP contributed to these flights. Staff from BLM and FWS enter radiotracking data from these flights into a statewide interagency geographic information system (GIS) database.

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Between 1981 and 1996, the MCH increased at an average annual rate of 17%. From 1992 to 1994, the annual rate of increase appeared to be 28%, but this was probably an artifact of more precise survey techniques. The dramatic growth of the herd is attributed to a succession of mild winters, movements onto previously unused range, relatively low predation rates and an estimated annual harvest rate of less than 5% of the population since the late 1970s. From 1996 though 1999 no herd size information was available. The summer 1999 photocensus indicated the herd had declined from the peak, which probably occurred in 1996 or 1997. Subsequent photocensuses indicate the herd has continued to decline.

Population Size

We conducted a photocensus of the MCH just after the end of this reporting period on 11 July 2006. Based on results of that survey, the population estimate for the MCH was 45,000 (Table 1). The MCH has declined, as indicated by the summer 2006 estimate, but at the same time caribou distribution during the summer and fall has become more widespread. Some caribou were observed through the summers in Units 17A and 18; however, surveys indicated these were mostly bulls. This population figure includes an estimate of the number of caribou not found with the main postcalving aggregations.

Population Composition

We conducted sex and age composition surveys in the middle Nushagak River drainage (GMU 17B&C) on 12 October 2004, and in the Eek and Kanektok River drainages (GMU 18) on 30 October 2004. In 2005, composition surveys were conducted in the middle and upper Nushagak River drainages (Units 17B&C) on 10 October, and in the Kisaralik and Kwethluk River drainages (Unit 18) on 13 October.

During the fall 2004 surveys, only 12.2 bulls:100 cows were observed in the sample of 1805 caribou in Unit 17, and 26.9 bulls:100 cows were counted in the sample of 2803 caribou in Units 18. The caribou located in Unit 17 generally were subject to heavier hunting pressure in the fall than the caribou in Unit 18, which probably contributed to the disparity in the bull:cow ratio between the survey areas. Because of the great deal of mixing of the herd throughout the rest of the year, composition data for the 2004 survey were pooled for an overall bull:cow ratio of 21.0 bulls:100 cows (Table 2).

During the fall 2005 surveys, only 9.2 bulls:100 cows were observed in the sample of 2586 caribou in Unit 17, and 18.6 bulls:100 cows were counted in the sample of 2625 caribou in Unit 18. Composition data for the 2005 surveys were pooled for an overall bull:cow ratio of 13.9 bulls:100 cows (Table 2).

The fall calf:cow ratio observed on 10 October 2004 in Unit 17 was 23.6 calves:100 cows and in Unit 18 on 30 October it was 17.5 calves:100 cows. Pooled counts for both areas gave a calf:cow ratio of 20.0 calves:100 cows in fall 2004 (Table 2). The fall calf:cow ratio observed on 10 October 2005 in Unit 17 was 22.7 calves:100 cows; on 13 October in Unit 18 it was 13.5 calves:100 cows. Pooled counts from both areas gave a calf:cow ratio of 18.1 calves:100 cows for the Mulchatna herd in fall 2005 (Table 2).

Productivity Surveys

Productivity surveys were flown in May 2005 and 2006. A total of 30 radiocollared female caribou of calf-bearing age were located in May 2005: four 2-year-olds (collared as 10-month-old calves in spring 2004); five 3-year-olds (collared as 10-month-old calves in spring 2003); eight 4-year-olds (collared as 10-month-old calves in spring 2002); and thirteen 5 years old or older. Of the 30 caribou, 19 were accompanied by calves or had hard antlers. None of the 2-year-old and only two of the 3-year-old females were accompanied by calves or had hard antlers. Six of the eight 4-year-olds and eleven of the thirteen cows 5 years or older were accompanied by calves or had hard antlers.

A total of 24 radiocollared female caribou of calf-bearing age were located in May 2006: seven 2-year-olds (collared as 10-month-old calves in spring 2005); three 4-year-olds (collared as calves in spring 2003); and fourteen 5 years old or older. Of the 24 caribou, 14 were accompanied by calves or had hard antlers. None of the 2-year-old females were accompanied by calves or had hard antlers. Two of the three 4-year-olds and twelve of the fourteen cows 5 years old or older were accompanied by calves or had hard antlers. During both years of this reporting period, productivity from the younger age class females has been poor.

Distribution and Movements

The MCH continued to increase its range even after its apparent population peak in 1996. To follow the movements of the herd, we had 73 caribou with active radio collars in June 2006. These included collars deployed in the range used by the Kilbuck caribou herd when large numbers of Mulchatna caribou were in that area.

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

The MCH did not move into the above-described traditional wintering areas en masse during this reporting period, but scattered throughout their range and beyond into areas previously used little. During fall 2004 and again in fall 2005, large numbers of Mulchatna caribou traveled through northwestern Unit 17 and southwestern Unit 19B, into the Kuskokwim Mountains, and eventually into Unit 18 south of the Kuskokwim River. During the winter of 2004–05, a large part of the herd wintered in Unit 18, south of the Kuskokwim River, with another large part of the herd in the middle Mulchatna drainage. Several thousand caribou also wintered in the Togiak River valley in GMU 17A. Movement into these wintering areas probably has decreased pressure on the forage supply in the formerly used wintering areas. Winter distribution during 2005–06 was about the same as the previous winter, with large numbers moving into snow-free areas near the lower Kvichak River in March 2006.

Calving Areas. There has been considerable change in the area used by the MCH for calving in recent years. Taylor (1988) noted the main calving area for the MCH included the upper reaches

of the Mulchatna River and the Bonanza Hills. Small groups also were observed in the Jack Rabbit and Koktuli Hills, Mosquito River and Kilbuck Mountains. In 1992 only 10,000–15,000 adult female caribou were found along the upper Mulchatna River and fewer than 1000 were in the Bonanza Hills. During that year, the Mosquito River drainages contained about 20,000 calving females, and an estimated 20,000 adult females were located near Harris Creek, north of the village of Koliganek. In 1994 most of the MCH females started using the area between the upper Nushagak River and upper Tikchik Lakes for calving. In May 1996, 1997 and 1998, most of the cows from the MCH calved in the drainages of the King Salmon River and Klutuspak Creek of the upper Nushagak River. In May 1999 the drainages of the King Salmon River and Klutuspak Creek were still covered with snow, and the caribou continued to move south to the edge of the snow, between Klutuspak Creek and the Nuyakuk River, where many of them calved. Calving during the spring of 2000, 2001, and 2002 occurred in two distinct areas: the lower Nushagak River and the headwaters of the South Fork of the Hoholitna River. In May 2003 calving also occurred in two distinct areas, with a large part of the herd between Kemuk Mountain and the Nushagak River and another large part of the herd in the northeastern Nushagak Hills and the South Fork of the Hoholitna River. Calving in May 2004 was very different from what had been observed in the past. Calving caribou were spread through a vast area from just outside of Dillingham, north to the confluence of the Holitna and Hoholitna rivers. There were no large aggregations of calving caribou, but rather caribou scattered throughout that area. In addition, numerous cow caribou with young calves were observed scattered through southern Unit 18 in late May and early June. Calving in May 2005 and 2006 was similar to previous years, in that a large part of the herd calved between Kemuk Mountain and the Nushagak River, with most of the rest of the caribou calving to the north between the Stoney River and Hoholitna River. The greatest concentration of these northern animals in 2005 was in the Stink River drainage, an area included within the GMU 19A predator control program.

Seasonal Movements. The MCH generally does not move en masse as a distinct herd, nor do individuals move to predictable places at predictable times. However, during recent years the herd basically splits, with part of the herd moving to the eastern side of its range during the fall and the rest of the herd traveling to the western side of its range during the fall; caribou then winter in these respective areas. In late winter/early spring the caribou travel back to the middle and northern part of the herd's range for calving. After calving, most of the caribou move into the Nushagak and Mulchatna River drainages for the postcalving aggregations, after which the caribou disperse and become widely scattered throughout their range. In the fall, the caribou again begin forming into large groups and move either west and/or east to the areas where they will spend the winter.

Postcalving aggregations during summer 2004 were again scattered, with large groups of caribou south of the Muklung Hills, east of the upper Tikchik Lakes, and on the south side of the Stuyahok Hills. By late July, the caribou were moving from the aggregation areas used earlier in the month and they scattered throughout Units 9B,17B, and probably southern 19B. Large numbers of caribou were scattered throughout the Nushagak and Mulchatna drainages by late September, and some had moved westward into Unit 18. During fall 2004 and winter of 2004–05, many Mulchatna caribou were scattered throughout Unit 18 south of the Kuskokwim River, with an additional 10,000–20,000 moving around from the lower Mulchatna River drainage to the area between the lower Nushagak and Kvichak Rivers. For part of that winter, a group of

about 3000 caribou traveled southeast in Unit 9C to the Naknek, milled around in that area for a while, then moved northwest to the area between the Nushagak and Kvichak rivers.

In May 2005 the caribou returned from being scattered throughout their range to calve in the middle Nushagak River area and also the Stink River area south of the Stoney River (northwest of Lime Village). This was the farthest northwest that we have documented large numbers of Mulchatna caribou calving. Of note, the previous winter that part of Unit 19A was within the predator control area, and most of the wolves were removed from the Stink River (personal communicaton, Tobey Boudreau, ADF&G, McGrath).

Throughout June 2005, most of the herd moved into the upper Nushagak River and Mulchatna River area. By late June, large aggregations briefly formed in headwaters areas of the Koktuli and Stuyahok rivers, near the lower Mulchatna River, and in the headwaters area of the Holitna River, north of Nishlik Lake. By the first week of July, the caribou that had been north of Nishlik Lake were scattering westward into GMU 18. The caribou that had aggregated in the Mulchatna River scattered throughout the Nushagak and Mulchatna drainages. During fall 2005 and winter of 2005–06 Mulchatna caribou were again scattered throughout Unit 18 south of the Kuskokwim River, as well as the area between the lower Nushagak and Kvichak Rivers. By late April 2006, Mulchatna caribou started moving toward the general vicinities of calving areas used in May 2005. Postcalving aggregations during summer 2006 were again widely scattered, occurring in the upper Tikchik Lakes, west of Aniak Lake, the lower Mulchatna River area, and east of the lower Nushagak River. Though the aggregations were widely scattered, a photocensus was accomplished just after the end of this reporting period.

In the past, several large peripheral groups appeared to be independent from the main MCH. A group of about 1300 caribou resided between Portage Creek and Etolin Point until about 1999. Caribou in the Kilbuck Mountains (Seavoy 2001) and the upper Stuyahok and Koktuli River drainages (Van Daele and Boudreau 1992, Van Daele 1994) seemed distinct from the MCH until the mid 1990s. These subherds periodically intermingled with the main herd but remained within their traditional ranges. As the MCH grew in size and seasonally moved through the areas used by these groups, they eventually ceased to exist as discrete groups of caribou (Hinkes, et. al. 2005).

MORTALITY

Harvest

Season and Bag Limit

	Resident Open Season	Nonresident Open Season
Unit 9A and that portion of Unit 9C within the Alagnak River drainage.		
Resident Hunters: 1 caribou	1 Aug–31 Mar	
Nonresident Hunters: 1 bull		1 Aug–31 Mar

Season and Bag Limit (continued)

	Resident Open Season	Nonresident Open Season
Unit 9B.		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 July–30 Nov	1 Jul–15 April	
Nonresident Hunters: 1 caribou		1 Aug–15 April
Unit 17A, all drainages east of Right Hand Point.		
Resident Hunters: up to 5 caribou	Season may be announced	
Nonresident Hunters:		No open season
Remainder of Unit 17A		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Aug–30 Nov	1 Aug–31 Mar	
Nonresident Hunters:		No open season
Unit 17B, that portion within the Unit 17B Nonresident Closed Area.		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Aug–30 Nov	1 Aug–15 Apr	
Nonresident Hunters:		No open season
Remainder Unit 17B and a portion of 17C east of the Wood River and Wood River Lakes.		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Aug–30 Nov	1 Aug–15 Apr	
Nonresident Hunters: 1 caribou		1 Aug–15 Apr
Remainder of Unit 17C		
Resident Hunters: up to 5 caribou	Season may be announced	
Nonresident Hunters:		No open season
Unit 18		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Aug–30 Nov	1 Aug–15 Apr	

Season and Bag Limit (continued)

	Resident Open Season	Nonresident Open Season
Unit 18 (continued)		
Nonresident Hunters: 1 caribou		1 Sep–30 Sep
Unit 19A, within the Lime Village Management Area.		
Residents: 4 caribou total		
Bulls	1 Jul–30 Jun	
OR any caribou	10 Aug–31 Mar	
Nonresidents: 1 caribou		10 Aug–31 Mar
Remainder of Unit 19A and Unit 19B.		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Aug–30 Nov	1 Aug–15 Apr	
Nonresident Hunters: 1 caribou		1 Aug–15 Apr

Board of Game Actions and Emergency Orders. During its spring 2005 meeting, the Alaska Board of Game established the Unit 17B nonresident closed area along portions of the Nushagak and Mulchatna Rivers, and some drainages into them. Emergency Orders opening hunting for caribou in Unit 9C were issued during both winters 2004–05 and 2005–06.

Hunter Harvest. The reported harvest from the MCH was 2236 caribou during the 2004–05 hunting season and 2070 during 2005–06 (Table 3). These totals and the number of hunters reporting hunting Mulchatna caribou continue to decline from previous years. As opposed to previous years, males and females composed about equal parts of the reported harvest during the past two regulatory years (Table 3).

The unreported harvest has been estimated at an additional 1500 to 2500 caribou during recent years. This number should be viewed with some caution. Changes in distribution from year to year and snow cover adequate for winter travel can greatly affect the number of caribou killed. Reminder letters were sent to caribou hunters, however, caribou distribution during some winters has resulted in increased hunting effort by village residents of Unit 18, who might be less likely to use harvest cards. Most of the unreported harvest was attributed to local and other Alaska residents. Subsistence Division household surveys conducted in local villages from 1983 to 1989 indicated an estimated annual harvest of 1318 caribou (P. Coiley, ADF&G-Subsistence, Dillingham, personal communication). However, during that time hunting for caribou from some of those villages was from herds other than the Mulchatna. The number of caribou harvested by local residents undoubtedly has changed since the subsistence surveys because of changes in the size and range of the herd, as well as increases in the number of people living within the range of the herd. Unreported harvest by other Alaska residents is even more difficult to quantify.

From the early 1980s through 1999, the number of people reporting hunting for Mulchatna caribou increased steadily, yet reported harvest levels remained less than 5% of the total population. Harvests did not appear to be limiting herd growth or range expansion. In the mid to late 1990s, unpredictable caribou distribution led to hunting effort being spread more throughout the range of the herd than had traditionally occurred. As the size and range of the herd increased, commercial operators providing transportation to hunters expanded into areas previously not hunted, as well as based their hunts from additional communities located throughout the range of this herd. With the continued decline in size of the herd during recent years, a decline in the number of hunters traveling out to the Mulchatna herd area has been noted.

Hunter Residency and Success. Local Alaska residents (living within the range of the Mulchatna herd) made up 15% of the reporting hunters during the 2004–05 season and 27% of the hunters during 2005–06. Nonlocal Alaska residents accounted for 36% of the reporting hunters during the 2004–05 season and 33% during 2005–06. Nonresidents made up 49% of the reporting hunters during the 2004–05 season and 40% of the reporting hunters during 2005–06. Of the reporting hunters, 62% successfully harvested at least one caribou in 2004–05; in 2005–06, 56% were successful (Table 4).

Harvest Chronology. Most (66%) of the reported harvest in 2004–05 occurred during August and September, as did 47% in 2005–06. March was also an important month for harvesting caribou, accounting for 10% of the reported harvest in 2004–05, increasing to 23% in 2005–06; a large portion of any local unreported harvest probably also occurred in March. These data indicate an increase in the proportion of caribou taken during late winter as compared to the harvest chronology reported for previous years (Table 5).

Transport Methods. Aircraft were the most common means of hunter transportation reported during the 2004–05 (74%) and 2005–06 (55%) hunting seasons (Table 6). Boats and snowmachines were other important means of transportation and were the main transportation methods for local hunters; they are probably underreported in our harvest data.

Other Mortality

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

HABITAT

Assessment

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

Portions of the range are showing signs of heavy use. Extensive trailing is evident along travel routes. Some of the summer/fall range near the Tikchik Lakes and elsewhere is trampled and heavily grazed. Traditional winter range on the north and west sides of Iliamna Lake also shows signs of heavy use, even though few caribou are now present in that area through the winter. Many of the areas that the MCH started using in the mid 1990s had not been used by appreciable numbers of caribou for more than 100 years, or reindeer for 50 years. While these areas appear to have vast quantities of essentially virgin lichen communities, whether those areas will continue to be used by many caribou remains to be seen.

CONCLUSIONS AND RECOMMENDATIONS

The minimum postcalving population estimates increased from 18,599 in 1981 to 200,000 in 1996 and declined to 45,000 by summer 2006. Distribution of this herd continued to be widespread throughout this period. Fall composition counts in recent years have varied, but present proportions of calves and bulls are generally less than during the period of rapid herd growth.

The total reported harvest and the number of hunters afield steadily increased until the late 1990s; since then, both have declined. Despite efforts to increase harvest information, reported hunting effort during this reporting period indicates harvests remain at less than 5% of the herd. However, a better assessment of unreported harvest will be important if the herd continues to decline substantially. The MCH is an important source of meat and recreation for hunters throughout southcentral and southwest Alaska. Establishment of the five caribou bag limit, coupled with the reputation for large antler and body sizes, made this herd popular with hunters. However, as the herd continues to decline, adjustments to the bag limit are warranted.

During the past 25 years, the MCH has made dramatic changes in its range. In the early 1980s, the herd spent most of the year east of the Mulchatna River between the Bonanza Hills and Iliamna Lake. Its range now encompasses more than 60,000 square miles, and large portions of the herd pioneered winter and summer ranges in what was considered good to excellent caribou habitat. There is evidence of overuse of habitat in some portions of the range. Whether areas previously underused will prove to be important to the herd remains to be seen.

The tremendous growth rate of this herd continued to at least 1996, then the population declined. Possible signs of stress in this herd include an outbreak of foot rot in 1998 and low calf:cow ratios in fall 1999 (Woolington 2001). Caribou in the adjacent NAPCH had a high incidence of lungworms in 1995 and 1996. Six of 10 calves examined in October 2000 showed evidence of bacterial pneumonia, and 1 of 6 fecal samples from the calves revealed lungworm larvae (Woolington 2003). The degree to which disease and parasitism might be affecting herd dynamics is unknown; however, we should continue to monitor the herd closely to watch for indications of what might contribute to continued population decline.

The MCH continues to present new management challenges as its size and range change. Since the main portion of the herd is migratory and uses areas from the western slopes of the Alaska Range to the Kuskokwim River, it seasonally occupies ranges used by smaller resident caribou herds. These subherds, and new ones that establish themselves, may be the key to a quicker recovery from any future crash of the MCH. The MCH also overlaps with other established herds

as they move into the southern fringes of the Western Arctic caribou herd range and the northern portion of the NAPCH range. We should strive to recognize the impacts on these potentially unique demographic components when setting management objectives and proposing regulatory formulas.

Recommended management actions for the next few years include:

1. Conduct an annual photo census during postcalving aggregations.

2. Conduct annual October composition surveys in at least two distinct areas.

3. Conduct calving surveys in May of each year.

4. Monitor movements by locating radiocollared caribou periodically throughout the year.

5. Attempt to maintain at least 1 active radio collar per 2000 caribou.

6. Develop an improved method of collecting harvest data, including unreported harvest.

7. Continue to work with other land and resource management agencies and landowners.

8. Work with local advisory committees and the state and federal boards to coordinate hunting regulations for adjacent herds and develop contingency plans for managing the herd if the population declines to low levels.

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TABLE 1 Mulchatna caribou herd estimated population size, regulatory years 1991–2006

Regulatory Year	Date	Preliminary estimate[a]	Minimum Estimate[b]	Extrapolated estimate[c]
1991–1992	2 Jul 1991	60,851	--	90,000
1992–1993	7–8 Jul 1992	90,550	110,073	115,000
1993–1994	--	--	--	150,000
1994–1995	28–29 Jun 1994	150,000	168,351	180,000
1995–1996	--	--	--	190,000
1996–1997	28 Jun–3 Jul 1996	200,000	192,818	200,000
1997–1998	--	--	--	--
1998–1999	--	--	--	--
1999–2000	8 Jul 1999	160,000–180,000	147,012	175,000
2000–2001	--	--	--	--
2001–2002	--	--	--	--
2002–2003	30 Jun 2002	--	121,680	147,000
2003–2004	--	--	--	--
2004–2005	7 Jul 2004	--	77,303	85,000
2005-2006	--	--	--	--
2006-2007	11 July 2006	--	40,766	45,000

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

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

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

TABLE 2 Mulchatna caribou fall composition counts and estimated population size, regulatory years 1991–2005

Regulatory Year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small Bulls (% of Bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size[a]
1991–1992	---	---	---	---	---	---	---	---	---	90,000
1992–1993	---	---	---	---	---	---	---	---	---	115,000
1993–1994	42.1	44.1	23.7%	53.7%	---	---	---	22.6%	5907	150,000
1994–1995	---	---	---	---	---	---	---	---	---	180,000
1995–1996	---	---	---	---	---	---	---	---	---	190,000
1996–1997	42.4	34.4	19.5	56.6	49.8	28.5	21.7	24.0	1727	200,000
1997–1998	---	---	---	---	---	---	---	---	---	--
1998–1999	40.6	33.6	19.3	57.4	27.8	43.7	28.5	23.3	3086	--
1999–2000	30.3	14.1	9.8	69.3	59.9	26.3	13.8	21.0	4731	175,000
2000–2001	37.6	24.3	15.0	61.8	46.6	32.9	20.4	23.2	3894	--
2001–2002	25.2	19.9	13.7	68.9	31.7	50.1	18.3	17.7	5728	--
2002–2003	25.7	28.1	18.3	65.0	57.8	29.7	12.5	16.7	5734	147,000
2003–2004	17.4	25.6	17.9	69.9	36.2	45.3	18.5	12.2	7821	--
2004-2005	21.0	20.0	14.2	71.0	64.2	28.9	6.9	14.9	4608	--
2005-2006	13.9	18.1	13.7	75.8	55.3	33.3	11.5	10.6	5211	45,000

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

TABLE 3 Mulchatna caribou harvest and accidental death, regulatory years 1991– 2005

	Hunter Harvest								
Regulatory	Reported				Estimated				Total
Year	M (%)	F(%)	Unk.	Total[a]	Unreported	Illegal	Total	Accidental death	caribou
1991–1992	86%	13%	1.1%	1573	1700	--	1700	--	3273
1992–1993	74%	9%	17%	1602	1800	--	1800	--	3402
1993–1994	80%	20%	0.4%	2804	2000	--	2000	--	4804
1994–1995	78%	21%	0.7%	3301	2700	--	2700	--	6001
1995–1996	75%	24%	0.6%	4449	2800	--	2800	--	7249
1996–1997	78%	21%	1.0%	2366	2200	--	2200	--	4566
1997–1998	84%	15%	0.6%	2704	2400	--	2400	--	5104
1998–1999[b]	82%	17%	1.0%	4770	5000[c]	--	5000	--	9770
1999–2000	76%	23%	1.0%	4467	5000[c]	--	5000	--	9467
2000–2001	81%	19%	0.8%	4,096	5000[c]	--	5000	--	9096
2001–2002	72%	27%	0.4%	3830	2500[c]	--	2500	--	6330
2002–2003	74%	25%	0.5%	2537	2500[c]	--	2500	--	5037
2003–2004	64%	35%	0.9%	3182	2500[c]	--	2500	--	5682
2004-2005	55%	44%	0.7%	2236	2000 [c]	--	2000	--	4236
2005-2006	48%	51%	0.6%	2070	1500 [c]	--	1500	--	3570

[a] Includes only reported harvest from harvest cards.

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

[c] Includes minimum suspected unreported harvest from Unit 18; lack of snow during some winters probably prevents travel to wintering caribou.

TABLE 4 Mulchatna caribou annual hunter residency and success, regulatory years 1991–2005

Regulatory Year	Successful				Unsuccessful				Total hunters[b]
	Local resident[a]	Nonlocal resident	Nonresident	Total (%)	Local resident[a]	Nonlocal Resident	Nonresident	Total (%)	
1991–1992	89	562	599	85%	9	136	69	15%	1464
1992–1993	82	542	651	91%	12	82	26	9%	1395
1993–1994	47	718	725	85%	5	171	77	15%	2394
1994–1995	61	812	896	83%	11	227	124	17%	2954
1995–1996	52	1035	928	87%	15	188	86	13%	3127
1996–1997	56	647	824	85%	25	139	101	15%	1822
1997–1998	85	564	1277	84%	33	178	152	16%	2301
1998–1999	178	1130	1877	78%	142	320	414	22%	4131
1999–2000	174	1024	1697	72%	120	453	553	28%	4039
2000–2001	188	817	1713	68%	148	427	691	32%	3989
2001–2002	270	843	1377	74%	159	351	368	26%	3406
2002–2003	169	556	1028	63%	210	383	450	37%	2831
2003–2004	312	762	1111	71%	181	352	378	29%	3129
2004-2005	256	573	764	62%	133	357	501	38%	2634
2005-2006	400	435	444	56%	208	328	466	44%	2308

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

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

TABLE 5 Mulchatna caribou annual harvest chronology percent by month, regulatory years 1991– 2005

Regulatory Year	Harvest Periods										
	July	August	September	October	November	December	January	February	March	April	Total[b]
1991–1992		29%	43%	6%	0.4%	2%	1%	4%	12%	0%	1573
1992–1993		30%	54%	5%	1%	0.3%	0.2%	1%	8%	0%	1602
1993–1994		36%	50%	5%	0.4%	1%	1%	1%	5%	2%	2804
1994–1995		35%	50%	5%	0.4%	1%	1%	1%	5%	2%	3301
1995–1996		33%	50%	6%	1%	2%	1%	1%	5%	2%	4449
1996–1997		25%	52%	5%	1%	1%	1%	2%	11%	2%	2366
1997–1998		33%	53%	4%	0.3%	0.4%	1%	3%	4%	0.3%	2704
1998–1999		25%	55%	6%	0.6%	0.6%	2%	2%	7%	1%	4770
1999–2000	0.1%	24%	52%	5%	0.5%	1%	3%	5%	8%	2%	4467
2000–2001	0.2%	27%	55%	6%	0.3%	0.3%	2%	3%	4%	1%	4096
2001–2002	0.2%	23%	49%	3%	1%	2%	2%	4%	9%	5%	3830
2002–2003	0.2%	23%	55%	4%	0.6%	1%	3%	2%	6%	2%	2537
2003–2004	0.2%	19%	45%	4%	0.5%	4%	5%	5%	12%	2%	3182
2004-2005	0.2%	20%	46%	2%	1%	2%	2%	2%	10%	9%	2236
2005-2006	0%	15%	32%	2%	4%	2%	3%	6%	23%	6%	2070

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

[b] Includes unknown harvest date

TABLE 6 Mulchatna caribou harvest percent by transport method, regulatory years 1991–2005

Regulatory Year	Percent of reported harvest								Total caribou[a]
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	
1991–1992	81%	0.2%	9%	1%	9%	0.1%	0.2%	2%	1573
1992–1993	88%	0.2%	8%	3%	3%	0.1%	0.1%	0%	1602
1993–1994	86%	1%	10%	1%	2%	0.3%	1%	0%	2804
1994–1995	85%	0.2%	12%	1%	2%	0%	0.2%	0.2%	3301
1995–1996	88%	0.2%	9%	1%	2%	0.1%	0.1%	0%	4449
1996–1997	82%	0.4%	10%	2%	3%	0.3%	0.7%	1%	2366
1997–1998	86%	0.4%	8%	1%	2%	0.1%	0.2%	2%	2704
1998–1999	82%	0.1%	10%	2%	3%	0.1%	1%	1%	4770
1999–2000	85%	0.3%	6%	2%	5%	0.2%	0.7%	1%	4467
2000–2001	87%	0.2%	6%	1%	5%	0.1%	0.1%	0.6%	4096
2001–2002	79%	0.1%	7%	2%	11%	0.2%	0.2%	0.8%	3830
2002–2003	82%	0.2%	8%	3%	5%	0%	0%	0.2%	2537
2003–2004	73%	0%	6%	2%	19%	0.1%	0%	0.7%	3182
2004-2005	74%	0%	7%	1%	17%	0%	0%	0.9%	2336
2005-2006	55%	0.4%	6%	3%	33%	0.2%	0.3%	1%	2070

[a] Includes harvest by unknown transport method.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006

LOCATION

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

HERD: Northern Alaska Peninsula

GEOGRAPHIC DESCRIPTION: Alaska Peninsula

BACKGROUND

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

During the next several years, the noticeable depletion of lichens and movements across the Naknek River were evidence the traditional wintering area was overgrazed. In 1986 significant numbers of NAPCH animals began wintering between the Naknek River and Lake Iliamna, and there was reason to believe that excellent forage conditions in this region would sustain the NAPCH within the population objective of 15,000–20,000. However, up to 50,000 Mulchatna caribou also began using this area at about the same time, as the herds intermingled near Naknek and King Salmon. Given this change in winter distribution of both herds, and the increasing competition for winter forage, by the late 1980s it was decided that the NAPCH should be maintained at the lower end of the management objective (i.e., 15,000). During 1993–94, the record harvest of 1345 caribou and natural mortality estimated at >30% combined to reduce the NAPCH to 12,500 by June 1994. The herd continued to decline through 1999. In response to increasing concern, the Board of Game evaluated intensive management options for this population and concluded no viable solutions existed to alter the status of this herd. A Tier II hunting program was instituted the same year to manage human harvest. Since 1999, the herd has continued to decline, and indications of nutritional limitations are still evident.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

METHODS

Population Size

Fixed-winged aircraft were used to conduct radiotelemetry-aided aerial photocensuses on post-calving concentrations. Oblique 35mm photos of large groups were taken to allow accurate enumeration. Calf percentages were calculated from direct enumeration of caribou in close-up photos of larger herds. Results were weighted by herd size to estimate total productivity.

Population Composition

Sex and age composition surveys were conducted during the month of October between the Naknek River and Port Moller. Caribou were classified from a helicopter as calves, cows, small bulls, medium bulls, and large bulls.

Parturition Surveys

From late May through early June a helicopter was used to classify caribou on the calving grounds as parturient cow (with calf, hard antlers or distended udder), nonparturient cow, yearling, or bull (Whitten 1995). We also observed radiocollared females to document age-specific pregnancy rates.

Radiotelemetry Data

We scheduled capture operations in cooperation with the U.S. Fish and Wildlife Service (FWS) to maintain 25–30 functioning radio collars and to deploy satellite collars. In October 2005 satellite collars with VHF beacons were placed on 55 adult female caribou. During each capture we recorded standardized measurements and took blood samples when feasible. We periodically conducted radiotelemetry flights to monitor herd movement and survival rates of collared caribou.

Mortality

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Minimum counts from photocensuses during 1981–1993 ranged between 15,000 and 19,000 caribou. Annual variations in counts were caused by actual changes in herd size and/or sampling error (restricted coverage due to poor weather or errors in visual estimates). Because of concerns regarding winter range quality, in the late 1980s we decided to keep the herd at the lower end of the management objective. The herd began to decline below desired level in 1992. Despite a series of hunting restrictions implemented starting in 1994, which significantly reduced harvests, the herd continued to decline through 2006 (Table 1). Current vital rates suggest that the herd will continue to decline over the next few years.

Population size

The size of the NAPCH has been reported in two ways: the actual number of caribou counted during the postcalving photocensus, rounded to the nearest 100, and an estimated total herd size which included 1000 to 1500 "uncounted" caribou believed to be in fringe areas. Since 1995, staff of the Alaska Peninsula/Becharof Refuge has covered portions of the Aleutian Mountains and Pacific drainages. This area had not been counted since the early 1980s, so counts after 1995 represent a more complete "minimum count" than those obtained from photocensuses in previous years. Cooperative counts conducted during 1999–2002 resulted in estimates of 8600, 7200, 6300, and 6660, respectively (Table 1). Since 2003 weather conditions and funding have limited our ability to complete the population surveys. During 2005 the population size of the NAPCH was estimated at 2500 caribou based on observations during fall composition surveys.

Population Composition

During 1970–80 when the NAPCH was growing, the average fall ratio was 50 calves:100 cows (range = 45–56). The fall ratio averaged 39 calves:100 cows (range = 27–52) between 1981 and 1994 when the population was near management objectives. During the decline the ratio averaged 26 calves:100 cows (range = 18–38 between 1995 and 2002). Since 2002 fall calf ratios were the lowest ever recorded for this herd, with an average of 10 calves:100 cows (range = 7–14, Table 1).

From 1990 to 2004, the bull:cow ratio averaged 41:100 (range 34–49), but the ratio dropped to an average of 25 bulls:100 cows during 2005 and 2006 (Table 1) despite hunting closures. It is likely that poor calf recruitment since 2002 and the relatively short lifespan of bulls compared to cows have decreased the bull:cow ratio in this herd.

Distribution and Movements

Traditionally the NAPCH's primary calving grounds are in the Bering Sea flats between the Cinder and Bear rivers, and the herd wintered between the Ugashik and Naknek rivers. Beginning in 1986 many caribou wintered between the Naknek River and the Alagnak River. Since 2000, this extended wintering range appears to have become less important for the NAPCH. No radiocollared NAP caribou have wintered north of the Naknek River since the winter of 2000–01, with the exception of 1 in 2003–04. Since 2004 calving has been increasingly dispersed with decreased use of traditional calving grounds. A greater portion of the herd calves in mountainous terrain between the Meshik River and Katmai National Park.

MORTALITY

Harvest

Season and Bag Limits. Since the Tier II permit hunt was instituted in 1999 the bag limit has been 1 bull. The season has been 10 August–20 September and 15 November–28 February in 9C, excluding the Alagnak River drainage. In Unit 9E the season ran 10 August–20 September and 1 November–30 April. State and federal hunts were closed in 2005 due to concerns for the herd's status and have not been reopened.

Board of Game Actions and Emergency Orders. The Board of Game took no regulatory action regarding the NAPCH during this reporting period.

Hunter Harvest. The Board of Game authorized up to 1500 Tier II permits, and the Federal Subsistence Board authorized an additional 10%. The state issued 100 permits in 2004 and FWS issued 10 permits. No permits were issued in 2005. Harvests from state hunts during the 1999–2004 regulatory years are presented in Table 2.

Hunter Residency and Success. 69% of the people that reported hunting in 2004 were successful, and local hunters took 100% of the reported harvest (Table 3).

Harvest Chronology. September historically has been the most important month, especially for nonresidents, because of the combination of relatively good weather, the best chance to harvest a trophy bull, and relatively easy access by boat and aircraft. Under the Tier II permit hunt, harvests are more spread out, with early fall and late winter accounting for most of the harvest (Table 4). The subsistence harvest is primarily opportunistic, and chronology of harvests varies among villages depending on caribou availability.

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

Other Mortality

Telemetry flights to monitor survival rates were sporadic and preclude precise dating of natural mortalities or determining the cause of death. There appears to be a higher rate of natural mortality of adult females since the population reached peak size in 1984. From October 1980 through March 1984, the average annual mortality rate was approximately 7%. Annual mortality rate averaged 18% from 1985 to 1989 and averaged 25% from 1992 to 1998. Since 1998 annual adult mortality has remained high at an average of 21%.

We reported the results of the calf mortality study conducted during June 1998 in Sellers et al. 1998*a* and the results of the 2005–2006 calf mortality study in Butler et al. 2006 During the 1998 study 35% of radiocollared calves (n = 37) died during their first month of life. Predators, primarily brown bears (*Ursus arctos*), bald eagles (*Haliaeetus leucocephalus*), and wolves (*Canis lupus*) caused most of the mortality of calves <2 weeks old, but disease apparently was an important mortality factor in calves >3 weeks old. During the 2005–2006 study, 57% of the radio collared calves died during the first two weeks of life, primarily due to predation by wolves and brown bears. Calf mortality remained high between two weeks and two months of age (67% mortality) though the cause of the late calf mortality is unknown. Evidence that large predators were present at mortality sites was found, but scavenging could not be distinguished from predation due to the large time interval between calf mortality and site investigation (typically ≥1 month).

Habitat and Animal Condition

Little quantitative data are available to assess range conditions. Visual assessment of winter range condition based on the abundance of lichens in the early 1980s clearly noted a difference between the traditional range south of the Naknek River and areas between the Naknek River and Lake Iliamna. This difference was confirmed in a reconnaissance survey comparing lichen

abundance in several areas on the traditional range with areas close to the King Salmon-Naknek road that still receive minimal use by caribou (R. Squibb, FWS, King Salmon, personal communication).

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

During 1998 and 1999 neonate calves averaged 8.4 and 7.2 kg (capture weights) for males and females, respectively. Neonates captured in 2005 and 2006 averaged 8.2 and 7.8 kg for males and females, respectively. These weights are intermediate compared to other herds in the state.

Between 1995 and 1998 we captured female calves and collected female calves every October to further assess body condition, looking for differences over time and to make comparisons with other herds. Weights and percent bone marrow fat of female calves collected in October were also intermediate, but a high percentage of these caribou showed lesions from lungworms. In October 1999, 11 captured female calves weighed an average of 114.2 pounds. Female calves captured in April averaged 120.3 pounds in 2001 and 110 pounds in 2004.

Age-specific productivity has also been monitored since 1997. This work was reported by Valkenburg et al. (1996 and in press), Sellers et al. (1998*a*, 1998*b*, 1999 and 2000). Overall, this work demonstrates that the NAPCH is under moderate nutritional stress. No 2-year-old females have produced calves (n = 32), and only 33% of 3-year-olds (n = 18) have been pregnant. Overall pregnancy rates were low at 60% for cows over 2 years of age.

Factors affecting nutritional status are currently being studied. In 2005 a herd health assessment identified heavy parasite loads, the presence of bovine respiratory disease complex, poor immune response, low levels of micronutrients, and chronic dehydration in animals examined. An experimental study to investigate the effects of parasite removal on body condition and calf production was initiated in 2005 and is scheduled to conclude in 2007.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

A few encouraging signs of improved nutrition were noted in 2001 and 2002, including improved survival rates, higher body weights of calves captured in April 2001, higher calf:cow ratios, and renewed fidelity to traditional winter range. Additionally, postcalving counts in 2002 showed a slight increase over the previous year for the first time in 10 years. However, since 2002 survival rates and body weights of calves captured in April 2004 have returned to levels observed in the late 1990s, and calf:cow ratios are at an all-time low.

CONCLUSIONS AND RECOMMENDATIONS

In spite of the improvements observed in 2001, subsequent surveys documented that the NAPCH has continued to decline and that productivity and survival remain low. The NAPCH has been

designated a population important for high levels of human consumption. Under the state's intensive management law, a review of intensive management options was triggered in March 1999 when the Board of Game significantly reduced harvest under a Tier II permit hunt. This review occurred in October of 1999, and a new long-term population objective of 12,000 to 15,000 animals was recommended to the Board of Game. The number of Tier II permits was reduced from 600 in 1999 to 100 between 2000 and 2004. In response to increasing concern, state and federal hunts were closed in 2005 with no intention of reopening the hunts until the herd begins to recover. Biologists reevaluated intensive management options for this population in 2004 and concluded that no viable solutions existed to alter the status of this herd. Since 2004 surveys have continued to indicate a declining population suffering from low productivity, low survival and low calf recruitment. Fieldwork scheduled for the summer of 2007 includes conclusion of a parasite treatment study that should provide insight into factors currently limiting population growth.

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TABLE 1 NAP caribou fall composition counts and estimated population size, 1984–2006

Regulatory Year	Total bulls: 100 cows	Calves:100 cows	Calves (%)	Cows (%)	Small bulls (% of bulls	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size
1984	39	39	22		67	16	17	22	1087	20,000
1990	41	29	17	59				24	1484	17,000
1991	42	47	25	53	54	34	12	22	1639	17,000
1992	40	44	24	54	44	38	19	22	2766	17,500
1993	44	39	21	55	52	29	19	24	3021	16,000
1994	34	34	20	59	58	28	14	20	1857	12,500
1995	41	24	15	60	49	29	22	25	2907	12,000
1996	48	38	19	54	71	19	10	26	2572	12,000
1997	47	27	16	57	54	31	14	27	1064	10,000
1998	31	30	19	62	57	28	15	19	1342	9200
1999	40	21	13	62	58	30	12	25	2567	8600
2000	38	18	12	64	59	24	18	24	1083	7200
2001	49	28	16	57	61	24	15	28	2392	6300
2002	46	24	14	59	57	19	24	27	1007	6600
2003	36	11	8	68	46	30	24	24	2776	
2004	34	7	5	71	40	34	25	24	1355	3400
2005	23	7	6	77	37	41	22	18	1914	2500[a]
2006	26	14	10	72	26	43	31	18	1725	

[a] Population size based on the number of caribou observed during the 2005 fall composition survey.

TABLE 2 NAPCH harvest, 1999–2006

Regulatory Year	Hunter Harvest: Reported M (%)	Reported F (%)	Reported Unk.	Reported Total	Estimated Unreported	Illegal	Estimated Total[a]
1999–2000	157 (95)	8 (5)	0	165	35		200
2000–2001	85 (93)	6 (7)	0	91	30		120
2001–2002	81 (91)	8 (9)	0	89	30		120
2002–2003	77 (95)	4 (5)	1	82	30		110
2003–2004	118 (95)	6 (5)	0	124	75		200
2004–2005	31 (94)	2 (6)	1	34	30		60
2005–2006[b]	-	-	-	0	0		0

[a] Estimated total is rounded off.
[b] No permits issued

TABLE 3 NAP caribou annual hunter residency and success, 1999–2006

Regulatory Year	Successful: Local Resident[a]	Successful: Nonlocal Resident	Successful: Nonresident	Successful: Total[b] (%)	Unsuccessful: Local Resident[a]	Unsuccessful: Nonlocal Resident	Unsuccessful: Nonresident	Unsuccessful: Total[b] (%)	Total Hunters
1999–2000	157	6	0	165 (66)	81	5	0	86 (34)	251
2000–2001	81	1	0	91 (65)	48	0	0	49 (35)	140
2001–2002	89	0	0	89 (67)	42	1	0	43 (33)	132
2002–2003	74	6	0	82 (61)	46	7	0	53 (39)	135
2003–2004	111	13	0	124 (72)	39	10	0	49 (28)	173
2004–2005	34	0	0	34 (69)	13	2	0	15 (31)	49
2005–2006[c]	-	-	-	0	-	-	-	0	0

[a] Local residents are residents of Subunits 9A, 9B, 9C and 9E.
[b] Includes hunters of unspecified residency
[c] No permits issued

TABLE 4 NAP caribou annual harvest chronology percent by month 1999–2006

Regulatory Year	Percent of Harvest									
	August	September	October	November	December	January	February	March	April	*n*
1999–2000	10	20	0	5	12	13	13	8	18	164
2000–2001	13	23	1	4	4	8	19	7	20	90
2001–2002	13	11	0	8	7	6	18	10	26	89
2002–2003	19	21	0	5	4	4	5	18	25	80
2003–2004	17	18	1	5	24	7	10	6	11	124
2004–2005	21	14	0	7	28	7	0	0	24	29
2005–2006[a]	-	-	-	-	-	-	-	-	-	0

[a] No permits issued

TABLE 5 NAP caribou harvest percent by transport method, 1999–2006

Regulatory Year	Percent of Harvest							
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle	Other
1999–2000	3	0	15	47	22	3	10	0
2000–2001	4	0	27	46	18	1	3	0
2001–2002	1	0	17	44	24	6	8	0
2002–2003	9	0	20	46	5	18	0	2
2003–2004	8	0	16	35	23	13	3	2
2004–2005	0	0	18	44	26	6	6	0
2005–2006[a]	-	-	-	-	-	-	-	-

[a] No permits issued

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CARIBOU MANAGEMENT REPORT

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To: 30 June 2006

LOCATION

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

HERD: Southern Alaska Peninsula

GEOGRAPHIC DESCRIPTION: Southern Alaska Peninsula

BACKGROUND

The range of the Southern Alaska Peninsula Caribou Herd (SAPCH) extends from Port Moller to False Pass. There have been numerous reports of caribou moving between Unimak Island and the mainland, including what may have been a substantial emigration in 1976. Still, caribou on Unimak Island have been determined to be genetically isolated enough with fidelity to calving areas on the island to be designated a separate herd. Historically, the size of the SAPCH has varied widely, ranging from 500 to more than 10,000. Skoog (1968) speculated that the Alaska Peninsula was marginal habitat for sustaining large caribou populations because of severe icing conditions and ash from frequent volcanic activity affecting food supply and availability. Recent herd history includes growth from 1996 to 2002 and decline from 2002 to 2006.

Harvest of the SAPCH was fairly high from 1980 to 1985, probably exceeding 1000 in several years. Starting in 1986 restrictive regulations reduced harvests as the herd continued to decline. By 1993 the herd was below 2500 and all hunting was closed. Poor nutrition appears to have played a major role in the decline of the SAPCH. Predation by wolves and brown bears and human harvest may also have contributed to the decline (Pitcher et al. 1990). A survey by Izembek National Wildlife Refuge (INWR) staff early in 1997 showed a substantial increase in numbers, and a federal subsistence season was opened that fall. The herd continued to grow slowly, and in 1999 a general state hunt was opened. Herd size grew to 4100 caribou by 2002. Following this brief recovery, calf recruitment decreased, and the herd is currently declining.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

1. Sustain a total population of 4000–5000 animals

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

3. Discontinue harvest when the herd is below 2500 animals

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

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

METHODS

Between 1984 and 1999 postcalving aerial radiotelemetry surveys were conducted in late June or early July. Staff of INWR periodically conducted winter aerial counts along systematic transects. Fall sex and age composition surveys are conducted annually with a helicopter in October. Parturition surveys have been conducted since June 1997 when funding is available. Occasional radiotracking flights are used to monitor herd distribution. In April 1997, October 1998, and April 2004 we captured and radiocollared females calves during cooperative projects with the FWS. In October 1998 we captured 8 adult females in northeastern 9D and fitted them with satellite radio collars. A study of causes of low calf recruitment in the SAPCH was completed during 1989–1990 (Pitcher et al. 1990), and range conditions were studied in 1991 and 1992 (Post and Klein 1999). During 1999, with substantial funding from the FWS, we conducted a study of caribou productivity and calf survival (Sellers et al. 1999).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of more than 10,000 caribou in 1983, the SAPCH began a precipitous decline. By 1993 the herd was below the 2500 threshold at which all hunting was to be closed. The population appeared to stabilize during the mid 1990s, then began to grow slowly to 4100 caribou by 2002. Since 2001 estimates of calf recruitment have been chronically low, and population size has declined.

Population Size

In February 1998 the FWS counted 3127 caribou within the core area in Unit 9D. No postcalving count was attempted in summer 1998. During late June 1999 an expanded postcalving photo count of the SAPCH found 3612 caribou in Unit 9D. During late June 2000 only 2857 caribou were counted, despite locating all the functioning radio collars. A partial survey by FWS in February 2002 only counted 1700 caribou, but a more complete FWS survey in November 2002 counted 4100. FWS counted 1800 caribou in December 2004 during two surveys of the SAPCH and 1651caribou in February 2006. A postcalving count is scheduled for the summer of 2007 to confirm that the population size is now less than 2000 caribou.

Population Composition

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

Fall composition surveys conducted from 2000–2006 show a decline in calf:cow ratios, reaching an recorded low of 1 calf:100 cows in 2006 (Table 1). Bull:cow ratios averaged 45 bulls:100 cows from 1997 to 2001 and decreased to an average of 36 bulls:100 cows between 2002 and 2005. During 2006 the observed bull:cow ratio (16 bulls:100 cows) was below management objectives. While the low bull:cow ratio needs to be confirmed, the reduced ratio is not unexpected given the chronic low calf recruitment observed since 2002 and the relatively short life-span of bulls compared to cows.

Distribution and Movements

Data from radiotracking surveys indicate that the SAPCH has two main calving areas (Pitcher et al. 1990). Approximately 25% of the herd calves on the Caribou River flats. Many of these animals are relatively sedentary and remain in the area throughout winter. However, some have been located during the winter near Cold Bay. The remainder of the herd calves in the Black Hills/Trader Mountain area and winters around Cold Bay. Further radiotelemetry studies will be needed to clarify the discreteness of the two major calving components of this population. Additionally, a few caribou calve in the mountains east of the Caribou River Flats.

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

MORTALITY

Harvest

Season and Bag Limits. There was no state hunt in Unit 9D during 1993–98. In 1999 a state hunt was resumed in 9D with a resident season 1–20 September and 15 November–31 March, with a 1 caribou limit. In 2001 fall seasons were again lengthened for residents (10 August–30 September) and nonresidents (1–30 September during odd-numbered years and 1 September–10 October during even-numbered years). Between 1999 and 2005 the bag limit was 1 caribou for residents and 1 bull for nonresidents.

Board of Game Actions and Emergency Orders. In 2005 the Board of Game reduced the resident bag limit from 1 caribou during the open seasons to 1 bull in the fall portion of the season or 1 antlerless caribou during the winter. This change took affect 1 July 2005.

Federal Subsistence Board (FSB) Actions. In 2004 the FSB increased the bag limit from 1 caribou to 2 for the federal subsistence hunt in 9D. In 2006 the FSB reduced the bag limit from 2 caribou to 2 bulls.

Hunter Harvest. Hunters reported harvesting an average of 64 caribou during state hunts from regulatory year 2002 through regulatory year 2005 (Table 2; a regulatory year runs 1 July through 30 June, e.g., RY 2002 = 1 July 2002–30 June 2003). Much of the annual variation in harvest is attributed to a longer nonresident season during falls of even numbered years. Improved data sharing between the state and federal governments has provided more timely harvest data for the federal subsistence hunt (RC091), although the hunter reporting rate is still thought to be low according to federal staff.

Hunter Residency and Success. Local hunters accounted for 40% of the reported harvests and averaged 61% success during this reporting period (Table 3). Nonresident hunters accounted for 37% of the reported harvest and averaged 78% success. Alaska residents from other parts of the state reported harvesting the remaining 24% and averaged a 68% success rate. The harvest by local residents is undoubtedly under-reported in Table 3 both because of noncompliance with state harvest tickets and use of federal permits.

Harvest Chronology. Timing of the harvest (Table 4) is influenced primarily by season dates and availability of caribou on the Cold Bay road system. Fall and early winter months have accounted for the majority of the harvests since 1999.

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

Other Mortality

During June–August 1999, 66% of 49 radiocollared calves died of natural causes (Sellers et al. 1999). Wolves (*Canis lupus*) and brown bears (*Ursus arctos*) killed most of the calves for which the cause of death was determined. Annual survival rates beginning in June for 1999 and 2000 were 0.83 and 0.76, respectively. Too few radiocollared caribou have been on the air since 2001 to calculate meaningful survival rates. Of the 7 female calves collared in April 2004, 4 were still alive in November 2006.

HABITAT

Assessment

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

CONCLUSIONS AND RECOMMENDATIONS

The short duration of the recovery from the population low in the 1990s cannot be explained based on the data currently available; however, given the chronically low calf recruitment the decline is not surprising. During the same period other caribou herds throughout Southwest Alaska were also declining, and herds on the Alaska Peninsula and Unimak Island experienced similarly low calf recruitment. While the similarity in timing is not evidence of a regional change that may have affected caribou populations, the cause may involve stochastic environmental factors. In 2006 the Office of Subsistence Management provided funding to deploy 30 radio

collars on adult female caribou. Biological samples collected during the capture and improved survey results should provide more insight into the current population status.

Chronic reporting problems for the federal hunt make it difficult to predict the effect of the liberal federal subsistence bag limits. Recent actions to eliminate cow harvests without reducing the bull bag limit are not sufficient to minimize concern for the effect of these hunts on the population. Because of lack of harvest information and declining population trends, further federal restrictions are warranted and herd performance should be monitored carefully.

We are currently working on a revision of the 1994 management plan for the SAPCH that will incorporate recent changes in our understanding of caribou populations in this area. Following the protocol for caribou management, we recommend future collaring efforts be directed at female calves. However, due to low survival rates of calves collared in 2004, adult cows should also be collared to provide a more reliable pool of radiocollared animals for conducting population counts and fall composition surveys. A calf production and survival study should also be considered to investigate the low calf recruitment observed in recent years.

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TABLE 1 Southern Alaska Peninsula caribou composition and survey results, 1986-2006

Regulatory year	Bulls: 100 cows	% Calves Summer	% Calves Fall	Calves: 100 cows	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	sample size	Postcalving survey results	INWR[a] counts
1986	32	17	13	20	66	59	28	13	2,307		4,543
1987	36	12	16	26	62	54	25	21	1,769	4,067	6,401
1988	41	16	12	19	59	61	37	4	886	3,407	
1990	19	14	9	12	76				1,051	3,375	
1991	28	18	13	19	68	53	33	14	883	2,287	2,830
1992	22	15	15	22	70	46	32	21	746	2,380	
1993	30	16	16	24	65	59	24	17	745	1,495	1,929
1994	29	21	18	28	64	46	27	27	531	2,137	1,806
1996		10									1,403
1997	42	15	12	19	62	36	36	27	546	1,844	3,243
1998	32		21	35	60	42	23	36	987		3,127
1999	51	26	15	25	57	48	30	22	1,049	3,612	
2000	42	24	21	37	56	50	24	26	982		
2001	57		19	38	51	57	26	17	1,313		
2002	38		10	16	65	44	34	23	932		4,100
2003	40		5	8	68	40	26	33	1,257		
2004	36		5	7	70	24	38	38	966		1,872
2005	30		5	6	73	27	46	28	1,040		1,651
2006	16		1	1	86	26	24	50	713		

[a] Counts by INWR staff

TABLE 2 SAP caribou harvest, 1999–2006

Regulatory Year	Hunter Harvest				Estimated Unreported	Illegal	Estimated Total[a]
	Reported						
	M (%)	F (%)	Unknown	Total			
1999–2000	46 (85)	7 (13)	1 (2)	54	30	-	80
2000–2001	63 (89)	5 (7)	3 (4)	71	30	-	100
2001–2002	52 (93)	4 (7)	0	56	30	-	90
2002–2003	61 (87)	6 (9)	3 (4)	70	30	-	100
2003–2004	47 (94)	2 (4)	1 (2)	50	30	-	80
2004–2005	68 (88)	8 (10)	1 (1)	77	30	-	110
2005–2006	55 (95)	3 (5)	0	58	30	-	90

[a] Estimated total is rounded off.

TABLE 3 SAP caribou annual hunter residency and success, 1999–2006

Regulatory Year	Successful				Unsuccessful				Total Hunters
	Local resident[a]	Nonlocal resident	Nonresident	Total[b] (%)	Local resident[a]	Nonlocal resident	Nonresident	Total[b] (%)	
1999–2000	27	19	7	54 (77)	7	7	2	16 (23)	70
2000–2001	34	14	21	71 (81)	7	9	0	17 (19)	88
2001–2002	26	13	12	56 (70)	12	2	6	24 (30)	80
2002–2003	29	8	25	70 (71)	12	14	2	29 (29)	99
2003–2004	9	13	25	50 (70)	10	6	5	21 (30)	71
2004–2005	24	24	29	77 (73)	14	8	6	29 (27)	106
2005–2006	29	8	20	58 (64)	20	5	8	33 (36)	91

[a] Local residents are residents of Subunit 9D

[b] Includes hunters of unspecified residency

TABLE 4 SAP caribou annual harvest chronology percent by month 1999–2006

Regulatory Year	Percent of Harvest								n
	August	September	October	November	December	January	February	March	
1999–2000	0	46	2	17	19	7	2	7	54
2000–2001	5	62	0	15	3	14	2	0	66
2001–2002	4	41	2	13	16	20	5	0	56
2002–2003	0	35	20	17	22	6	0	0	67
2003–2004	2	67	5	9	7	0	5	5	49
2004–2005	0	36	6	16	32	5	1	3	77
2005–2006	0	47	0	28	14	5	3	3	58

TABLE 5 SAP caribou harvest percent by transport method, 1999–2006

Regulatory Year	Percent of Harvest						
	Airplane	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle	Foot
1999–2000	21	17	23	2	2	38	0
2000–2001	27	35	13	0	7	18	0
2001–2002	23	23	30	0	4	20	0
2002–2003	35	25	23	0	0	17	0
2003–2004	56	6	26	0	0	12	0
2004–2005	39	16	13	1	6	23	1
2005–2006	42	7	18	0	0	33	0

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006

LOCATION

GAME MANAGEMENT UNIT: 10 (6435 mi^2)

HERD: Unimak

GEOGRAPHIC DESCRIPTION: Unimak Island

BACKGROUND

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

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

No formal management objectives are in place for caribou on Unimak Island, and practically speaking, there is little opportunity to actively manage this herd given formidable logistics involved in reaching the island. Given poor access and the relatively limited habitat, the herd ideally should be kept below 1000 animals.

METHODS

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of more than 5000 caribou in 1975, the Unimak herd began a precipitous decline, apparently initiated by a sizable emigration. By the early 1980s the herd numbered just several hundred animals. By 1997 the herd had grown to at least 600 and continued to increase. Since 2000, the population has been relatively stable and has remained within the recommended size range.

Population Size

In January 1997 the U.S. Fish and Wildlife Service (FWS) counted 603 caribou on Unimak Island. This was the first comprehensive survey of Unimak Island in more than two decades. In May 2000 Rod Schuh, a registered guide who has hunted on Unimak for several years, counted 983 caribou on the north and west sides of the island. That count and the number classified during fall composition surveys suggest there were more than 1000 caribou on Unimak in 2000. The FWS counted 1262, 1006, and 1009 caribou during surveys in December 2002, November 2004, and November 2005, respectively.

Population Composition

Fall composition surveys in 1999 showed a ratio of 46 calves:100 cows on Unimak, but only 126 caribou were classified. In 2000 and 2002, ratios averaged 47 bulls and 26 calves per 100 cows. Large bulls made up 31% of all bulls. In 2005, 730 caribou were classified with ratios of 45 bulls and 7 calves:100 cows. Large bulls made up 39% of all bulls.

Distribution and Movements

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

MORTALITY

Harvest

Season and Bag Limits. There were no state or federal hunts on Unimak Island from 1993 to 1999. In 2000 a federal subsistence hunt (RC101) was resumed. In 2001 a general state hunt was established with a 1 caribou bag limit, with seasons of 1–30 September for nonresidents and 10 August–30 September and 15 November–31 March for residents.

Board of Game Actions and Emergency Orders. The Board of Game took no regulatory action regarding the UCH during this reporting period.

Federal Subsistence Board Actions. The Federal Subsistence Board increased the bag limit for the federal subsistence hunt from 2 caribou to 4 caribou in 2004.

Hunter Harvest. Hunters reported harvesting an average of 14 caribou in state hunts from 2001 to 2005 (Table 1). Little information was available for the federal registration permit hunt (RC101) for this reporting period. In 2002 the FWS issued 4 permits. Only one of the permittees turned in a report and stated he did not hunt.

Hunter Residency and Success. Nonresident hunters had an average success rate of 92% and have accounted for 77% of the reported harvest (Table 2) during this reporting period. Success rates for nonlocal residents have averaged 64%. Participation in the hunts by local residents is undoubtedly underreported both because of noncompliance with state harvest tickets and use of federal permits.

Harvest Chronology. All reported caribou harvest since 2001 has occurred in September with the exception of 1 caribou taken in November of 2002.

Transportation Methods. The main form of access to Unimak is small aircraft from Cold Bay. Local residents likely use off-road vehicles (ORVs) and boats to hunt caribou, but have not reported these activities.

Other Mortality

There are no active radio collars on caribou of this herd to allow calculation of survival rates.

HABITAT

Assessment

No data are available.

CONCLUSIONS AND RECOMMENDATIONS

Caribou on Unimak Island are considered a separate herd, even though it is recognized we will not be able to manage this herd to dampen population fluctuations and that some interchange with the mainland may occur, particularly at high population sizes. Under the current management agreement between the state and federal governments, caribou on Unimak Island are managed as part of the Southern Alaska Peninsula Caribou Herd in Game Management Unit 9D, which is currently declining. Given the relative stability of the Unimak herd in recent years, reducing seasons and bag limits on Unimak Island because of the decline of the Southern Alaska Peninsula Caribou Herd would unnecessarily restrict opportunity to hunt caribou in a herd that appears to be biologically healthy. Managing these herds jointly is not recommended based on the lack of significant interchange between caribou on Unimak and the mainland since 1976, differences in carrying capacity and population trend between the two areas, and the relatively poor accessibility of Unimak Island. A new agreement that reflects our current understanding of caribou populations in this region is currently being developed by state and federal agencies. The recent change in the federal bag limit, combined with a lack of information about caribou harvest by local residents and the low calf:cow ratio observed in 2005, warrants some concern. This herd should be monitored periodically to assess the effect of this liberalization and to detect changes in population status.

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Please cite any information taken from this section, and reference as:

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TABLE 1 Unimak caribou harvest, 2001–2005

Regulatory Year	Hunter Harvest				Estimated Unreported	Illegal	Estimated Total[a]
	Reported						
	M (%)	F (%)	Unknown	Total			
2001–02	19 (100)	0	0	19	-	-	19
2002–03	11 (92)	1 (8)	0	12	-	-	12
2003–04	10 (100)	0	0	10	-	-	10
2004-05	15 (100)	0	0	15	-	-	15
2005-06	15 (100)	0	0	15	-	-	15

[a] Estimated total is rounded off.

TABLE 2 Unimak caribou annual hunter residency and success, 2001–2005

Regulatory Year	Successful				Unsuccessful				
	Local Resident[a]	Nonlocal Resident	Nonresident	Total[b] (%)	Local Resident[a]	Nonlocal Resident	Nonresident	Total (%)	Total Hunters[b]
2001–02	0	5	14	19 (95)	0	1	0	1 (5)	20
2002–03	0	5	7	12 (92)	0	1	0	1 (8)	13
2003–04	0	1	9	10 (77)	0	2	1	3 (23)	13
2004-05	0	2	12	15 (71)	0	5	1	6 (29)	21
2005-06	0	4	11	15 (94)	0	0	1	1 (6)	16

[a] Local residents are residents of Unimak Island.
[b] Includes hunters of unknown residency

WILDLIFE MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

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

HERD: Chisana

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

BACKGROUND

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

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

The herd has declined since 1988 (Table 1). Weather and predation have been the primary causes for the decline (R. Boertje, ADF&G, personal communication). Harvest has had a minor effect on population fluctuations (Table 2). 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 portion of the population declined below the management objective, and all hunting of Chisana caribou was stopped in Alaska. Hunting in Alaska will remain closed until

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

the bull:cow ratio exceeds 30 bulls:100 cows for 2 years, and productivity is high enough to compensate for harvest.

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

Guided hunting became common in the Chisana area 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 Yukon). Use of the CCH and their range by tourists is minimal because of limited access.

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 that the National Park Service (NPS) preserve healthy populations and also 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, ADF&G initiated a cooperative study with the NPS and the Yukon Department of Environment (YDE) in October 1987. Initially, 15 adult female caribou were radiocollared to monitor movements and to facilitate spring and fall censuses and composition surveys. From 1990 through 2002, 57 adult females and 33 4-month-old female calves were radiocollared. Radiocollaring and herd monitoring costs were shared by ADF&G, NPS, and YDE.

A cooperative draft CCH Management Plan was developed in 2001, and a Yukon CCH Recovery Plan was developed in 2002. Both plans were designed to aid herd recovery. The management and recovery plans were in effect in regulatory year (RY) 2002 and RY03 (RY = 1 July through 30 June, e.g., RY02 = 1 July 2002–30 June 2003). Additional details about the CCH prior to 2003 can be found in Farnell and Gardner (2002).

MANAGEMENT DIRECTION

During RY99–RY05, CCH management and research was cooperatively developed to aid herd recovery. Activities that met the different mandates and philosophies of ADF&G, NPS, and Yukon Department of Renewable Resources (YDRR; formerly YDE) were assigned to the respective agencies.

The current Chisana caribou management goal and objective are:

MANAGEMENT GOAL

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

MANAGEMENT OBJECTIVE

- Cooperatively with YDRR and NPS, develop and implement management strategies to increase calf recruitment to 25 calves:100 cows.

METHODS

No population estimate was developed during RY04. Following a population survey conducted in October 2005, a population estimate was developed by Layne Adams of the U.S. Geological Survey (USGS; Anchorage, Alaska). Techniques are summarized in an unpublished USGS progress report (L. Adams, USGS, personal communication).

In 2003 we began participating in a cooperative (USGS, NPS, YDRR and ADF&G) research project to evaluate the population dynamics and effects of recovery efforts on the CCH during 2003–2008 (L. Adams, personal communication). A composition count was conducted in RY03 and RY05 by Layne Adams; methods are summarized in unpublished USGS reports (L. Adams, personal communication).

There is an established hunting season for CCH; however, no permits were issued during RY95–RY05 because recruitment levels in the population were inadequate. Harvest data since 1989 are included in this report (Table 2) to clarify herd population and composition trends. Hunting seasons are based on regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size, Population Composition, and Herd Distribution and Movements

The CCH increased through the 1980s, and the population peaked in 1988 at about 1900 caribou. During 1988–2002, ADF&G believed the herd size declined to an estimated 315 caribou in 2002 (Table 1). Following a more intense population survey by the USGS in October 2003, the CCH population was estimated at 720 caribou, substantially higher than estimates generated from previous surveys. We concluded that numerous caribou were likely missed during previous fall surveys because of the small number of radiocollared caribou, patchy aggregations of caribou, and the tendency of the CCH to use timbered habitat in the fall when surveys were conducted.

During RY04 and RY05, ADF&G suspended population monitoring efforts on the herd because population monitoring was conducted by the USGS as part of a cooperative research effort between the YDRR, USGS, NPS, and ADF&G. During RY04 and RY05, ADF&G provided technical support in cooperative management planning with YDRR, USGS, and NPS and

assisted with capture operations for a captive rearing project that was implemented in 2002 in Yukon Canada by Rick Farnell of YDDR.

The details of herd status and movement for RY04–RY05 are summarized in unpublished USGS progress reports by Layne Adams. Preliminary data indicated that the herd had an age structure skewed toward old animals and that recruitment of wild-born calves remained chronically low. A population survey was conducted by the USGS in October 2005 and the CCH was estimated at 694 caribou, with 23 calves:100 cows and 47 bulls:100 cows. Factors influencing low calf survival are still under investigation. Preliminary analysis of radiotracking data during RY04–RY05 indicated the herd primarily used historic range in the White River drainage between the Alaska Highway bridge in Yukon and Solo Creek Flats in Alaska, with some movements as far east as the Donjek River in Yukon. During RY04 and RY05, a larger portion of the herd moved into Alaska during the early summer but moved back to Yukon during early winter, where the majority of the herd remained until spring to early summer. Results of this research will be summarized in a final USGS research report in 2008 (L. Adams, personal communication).

MORTALITY

Harvest

Season and Bag Limit during RY04–RY05.

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

Alaska Board of Game Actions and Emergency Orders. The Alaska Board of Game took no actions, and no emergency orders were issued during RY04–RY05.

Human-induced Mortality. ADF&G has not issued registration hunt permits for the CCH since RY94. There has been no legal harvest of Chisana caribou in Alaska or by licensed hunters in Yukon since RY94 (Table 2). Reports from local residents and incidences of radiocollared caribou that were shot indicate an illegal harvest in Alaska of 3 or fewer caribou annually during RY04–RY05. During RY94–RY05, the Alaska hunting season in the CCH range remained in the regulations, but no permits were issued. While the bulls:100 cows ratio exceeded 30 during RY04–RY05, productivity remained below levels considered necessary to sustain hunting mortality. In Yukon, between 1996 and 1999, First Nation members killed 3–20 Chisana caribou annually along the Alaska Highway. After 2001, Yukon First Nation members voluntarily have

not harvested Chisana caribou. Because the herd is inaccessible most of the year in Alaska, illegal or incidental harvest was not a management concern during RY04–RY05.

Other Mortality

No activities were conducted during RY04–RY05 to evaluate other causes of mortality on the CCH. However, as summarized by Gardner (2003), predation by wolves was identified as the primary factor limiting herd growth.

HABITAT

Assessment

No habitat assessment activities were conducted during RY04–RY05. Gardner (2003), Lenart (1997), and Boertje (1984) provided information about habitat within the CCH range.

Enhancement

No habitat enhancement activities were conducted during RY04–RY05.

CONCLUSIONS AND RECOMMENDATIONS

Since 1988 the CCH experienced a substantial (61%) decline. This decline was primarily due to poor calf recruitment and high adult mortality associated with adverse weather conditions and predation. Between 1991 and 2003, research indicated predation was the cause of 89% of the documented mortality among radiocollared cows ≥4 months old. Preliminary results from recent research indicated that similar levels of predation occurred during RY04–RY05 (L. Adams, personal communication).

Hunting was allowed during the herd's initial decline (1989–1994); however, annual harvest was restricted to bulls and only removed 2% or less of the population. Hunting in Alaska did not appear to limit the herd's ability to grow.

Winter range quality in the eastern portion of the herd's range is below average compared with other Interior herds and may have contributed to higher overwinter adult mortality during 1994 and 1995. Lichen availability on winter range in Yukon is lower compared to other caribou herds, but herd body condition is comparable to adjacent herds with greater lichen availability within their range, except following severe winters. For the herd to stabilize, the calf recruitment rate must increase to 25 calves:100 cows while maintaining the cow mortality rate at or below 12–15% and the bull mortality rate at or below 21–25%. For calf recruitment to increase, pregnancy and natality rates must remain high, and mortality caused by predators must decline.

The low recruitment rates experienced by the CCH over the past 18 years have not been documented in any other wild caribou herd (R. Boertje, personal communication). Factors causing low calf recruitment in the CCH are not well understood, but the 2003–2008 USGS research effort will address this question.

When hunting was allowed, the primary users of the Chisana herd were nonresidents. During RY90–RY94, 43% of the hunters participating in the Chisana caribou hunt were nonresidents, who took 58% of the harvest, while local subsistence users took 9% of the harvest during this

time. Because this is an international herd and extensive efforts have been made to help the herd recover to sustainable levels, care should be taken to include input from all interested parties prior to future harvest of the herd. I recommend that an international harvest management plan be developed, with input from all interested parties, to help guide harvest once the herd recovers. In Alaska, efforts should be made to resume existing harvest regulations for bulls only to reestablish opportunity for guided nonresidents.

We partially met our management objective during RY04–RY05 by working cooperatively with the NPS and YDRR to help plan and implement a captive rearing program, beginning in June 2003, the results of which helped raise the calf recruitment in the herd. However, calf recruitment was 23 calves:100 cows during RY05, below the objective of 25 calves:100 cows. ADF&G will continue to work cooperatively with the NPS, YDRR, and USGS to try to maintain increased calf survival through the next report period.

There is currently no allocation for management activities for the CCH during RY06, and funding will not likely be available for RY07–RY08. Tok ADF&G personnel will continue to provide personnel support and participate in cooperative management activities and research efforts for this herd during the next report period, as opportunities present themselves.

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TABLE 1 Chisana caribou fall composition counts and estimated population size, 1987–2005

Date (mm/dd/yr)	Bulls: 100 Cows	Calves: 100 Cows	% Calves	% Cows	% Small bulls (% of bulls)	% Medium bulls (% of bulls	% Large bulls (% of bulls)	% Bulls	Composition sample size	Estimated herd size[a]
10/9/87	39	28	17	60	53	26	21	23	760	1800
9/27/88	36	31	19	60	28	46	26	21	979	1882
10/16–17/89[b]			9						625	1802
10/4–5/90	36	11	7	68	37	44	19	25	855	1680
9/29/91	40	1	1	71	45	42	13	28	855	1488
9/27/92	31	0	0[c]	76	34	43	23	24	1142	1270
10/5/93	24	2	2	79	30	45	24	19	732	869
9/29/94	27	11	8	72	20	44	35	20	543	803
9/30/95	21	4	4	80	30	23	47	17	542	679
9/30/96	16	5	4	83	40	18	42	13	377	575
10/1/97	24	14	10	72	3	68	28	18	520	541
9/28/98	19	4	3	81	49	14	37	15	231	493
10/1/99	17	7	6	81	57	16	27	14	318	470
9/30/00	20	6	5	80	52	25	23	15	412	425
10/01/01	23	4	3	79	42	23	34	18	356	375
9/30/02	25	13	10	72	28	23	49	18	258	315
9/30/03[d]	37	25	15	62	n/a	n/a	n/a	23	603	720
9/30/05[d]	46	23	14	59	34	34	32	27	599	694

[a] Based on population model designed by P Valkenburg and D Reed (ADF&G).

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

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

[d] USGS survey results. Bulls were not classified to size.

TABLE 2 Chisana caribou harvest, regulatory years 1989–1990 through 2005–2006

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[a]	0	0	0	0	0	0	0	0	5–20	5–20
1995–1996	0	0	0	0	0	3	3	0	1–3	4–6
1996–1997	0	0	0	0	0	3	3	0	7	10
1997–1998	0	0	0	0	0	3	3	0	3–5	6–8
1998–1999	0	0	0	0	0	3	3	0	20	23
1999–2000	0	0	0	0	0	3	3	0	3–5	6–8
2000–2001	0	0	0	0	0	1	1	0	1–3	2–4
2001–2002	0	0	0	0	0	1	1	0	1–3	2–4
2002–2003	0	0	0	0	0	0–3	0–3	0	0[b]	0–3
2003–2004	0	0	0	0	0	0–3	0–3	0	0	0–3
2004–2005	0	0	0	0	0	0–3	0–3	0	0	0–3
2005–2006	0	0	0	0	0	0–3	0–3	0	0	0–3

[a] No registration permits were issued for the Alaska hunt during RY94–RY05.

[b] After 2001, Yukon First Nation members voluntarily stopped harvesting Chisana caribou.

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. Box 115526
Juneau, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

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 while hunting from 10 August to 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 equaled or exceeded recruitment.

During the 1977 hunting season, it was necessary to close the season by emergency order 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

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

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 on incomplete data on herd size, movements, and identity of the MCH.

In 1987 the Alaska Board of Game made a customary and traditional (C&T) use determination for the MCH; the amounts necessary to meet subsistence needs were determined to be a harvest of 40 caribou. The C&T finding was based on use by residents of Dot Lake, Tanacross, and Tok and other residents outside of these communities.

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

For the 1990 fall hunting season, the hunt was changed from a drawing permit hunt to a Tier I registration permit hunt because C&T use determinations precluded conducting the hunt as a drawing permit hunt.

The hunting season was closed from regulatory years (RY) 1992 (RY = 1 Jul through 30 Jun; e.g., RY92 = 1 Jul 1992 through 30 Jun 1993) through RY96 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 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.

In RY97 and RY98 the hunting season was 10–20 September by registration permit, the season was closed again in RY99 and open in RY00 and RY01 from 10–20 September by registration permit. In RY02 the season dates were changed to 15–25 August to separate the season from the moose hunting season. At the March 2002 Board of Game meeting, the boundary of the Delta Controlled Use Area (DCUA) was moved from the Richardson Highway, west to the Delta River. The purpose of this change was to include the area between the Richardson Highway and

the Delta River within the DCUA for caribou management purposes. The boundary change, combined with the season change, was intended to make this road-accessible caribou hunt manageable, while providing reasonable opportunity to hunt (at least 10 days) without exceeding the harvest quota. A reasonable opportunity for rural residents to hunt is necessary because the board determined that this herd was customarily and traditionally used for subsistence.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

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

METHODS

We used a Robinson R-22 or R-44 helicopter in October–November to count total numbers and classify caribou sex and age composition. A fixed-wing aircraft accompanied the helicopter to help find radiocollared caribou and groups without radios and to help count total numbers. Caribou were classified according to criteria specified by Eagan (1995).

Fall radiotracking flights were flown to determine if there was mixing of the Macomb and Delta caribou herds in southwestern Unit 20D during the hunting season and to determine location of the MCH during the hunting season. Surveys were flown in a Piper PA-18 Super Cub by listening for radio signals from both herds from an altitude of 8000–10,000 feet along a route over the Delta River (the boundary between Units 20D and 20A) from Delta Junction to Black Rapids Glacier and between the Delta and Robertson Rivers. When signals were heard from radiocollared caribou, a general location was achieved and the latitude and longitude were recorded.

The U.S. Army Garrison Alaska (USAGAK) conducted radiotracking flights in RY04 to determine use of military land by Macomb and Delta caribou in Units 20D and 20A. Flights were conducted by Department of Defense personnel in a Husky fixed-wing aircraft.

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.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During this reporting period, we met our MCH population objective in RY04 and RY05; however, results were uncertain for RY06.

RY04. We conducted a census on 9 October 2004 and counted 546 caribou. Survey conditions were generally adequate; however, conditions were very windy in spots with some low fog. Observers felt there were probably at least 600–650 caribou in the herd (Table 1).

RY05. We conducted a census on 4 October 2005 and counted 628 caribou. Survey conditions were moderately poor, with high winds, fog on Knob Ridge, and mottled snow. Observers felt there were probably 630–650 caribou present (Table 1).

RY06. We conducted a census on 6 October 2006 and counted 857 caribou (Table 1). Survey conditions were fair with strong wind from the Johnson River west and little snow cover. During this survey, 11 radiocollared caribou were located in 21 aggregations ranging in size from 4 to 141 caribou.

Because of the unusually high number of caribou counted on 6 October the survey was reflown on 17 October 2006 with only a PA-18 and no attempt to collect composition data. This survey resulted in a count of 569 caribou. During this survey, 15 radiocollared caribou were located in 38 aggregations ranging in size from 1 to 49. Therefore, it appears that the MCH had begun dispersing by the 17 October survey, increasing the likelihood of missing caribou.

The RY06 survey was inconclusive, and herd size may have ranged from 569 to 857. The unusually high count on 6 October may have been the result of the helicopter counting crew inadvertently counting a large aggregation twice; however, the observers were confident that this had not occurred.

Population Composition

RY04. Composition data was collected from 546 caribou during the 9 October 2004 MCH census. The bull:cow ratio of 61:100 was the highest since at least 1982. Bulls composed 30% of the herd, with small bulls composing 18% of all bulls, medium bulls composing 37%, and large bulls composing 45% of all bulls. Calf survival to fall increased substantially to 40 calves:100 cows (Table 1), the highest ratio since 1984.

RY05. Composition data was collected from 628 caribou during the 4 October 2005 census. The bull:cow ratio of 64:100 was again the highest since at least 1982. Bulls composed 35% of the herd, with small bulls composing 53% of all bulls, medium bulls composing 16%, and large bulls composing 31% of all bulls. Calf survival was poor to fall with only 17 calves:100 cows (Table 1), substantially lower than in RY04.

RY06. Composition data was collected from 857 caribou during the 6 October 2006 census. The bull:cow ratio was 48:100. Bulls composed 27% of the herd, with small bulls composing 14% of all bulls, medium bulls composing 45%, and large bulls composing 41% of all bulls. Calf survival was 31 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. Its 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.

RY04. During our MCH fall 2004 census, most caribou were located west of the Gerstle River, with the largest groups in the McCumber Creek drainage, where 73% of caribou were located.

USAGAK personnel conducted a caribou radiotracking flight on 22 July 2004. Four Macomb caribou were detected during this flight, all off of military land south of the south boundary of the Donnelly Training Area. Specific locations were not listed for these animals.

Department staff flew a fall radiotracking flight on 6 August 2004 along the Delta River only. Smoke from nearby wildfires resulted in poor visibility and prevented us from surveying along the Alaska Range to the east. Seven Delta herd caribou were detected; 6 were west of the Delta River in Unit 20A, and 1 was located east of the Delta River in Unit 20D. Only 2 Macomb caribou radio frequencies were heard near the Delta River. Both were in Unit 20D.

USAGAK personnel conducted a radiotracking flight on 11 October 2004 and located approximately 120 Macomb caribou in the Jarvis–McCumber Creek area, including 6 radiocollared Macomb caribou.

On 26 November 2004, USAGAK personnel located an aggregation of 36 Macomb caribou with 4 radio collars near Coal Mine Road in the Jarvis Creek drainage. One radio collar was a duplicate frequency (150.210 MHz) of a Delta caribou herd collar. An aggregation of 16 caribou was located between Jarvis and Ober Creeks without a radiocollared caribou. An aggregation of 30 caribou that contained a Delta herd radiocollared caribou was located in the Ober Creek drainage. An additional aggregation of 21 caribou that contained a Macomb radiocollared caribou was located between Jarvis and McCumber Creeks.

On 8 January 2005 in the Ober Creek drainage near Coal Mine Lakes, USAGAK personnel located an aggregation of 50 caribou that contained one radiocollared Delta herd caribou and 2 radio collar frequencies that were present in both the Macomb and Delta herds. Another aggregation of 150 caribou that contained 5 radiocollared Macomb caribou and 2 Delta caribou was located in the Jarvis–McCumber Creek drainage.

RY05. No MCH fall distribution survey was flown due to poor survey and flying conditions.

RY06. A fall distribution survey was flown on 16 August 2006. Most radiocollared caribou (9 of 11 functioning collars) were located east of the Johnson River, with 8 of the 9 located in the Macomb Plateau area and 1 located in the West Fork Robertson River. Two radiocollared caribou were located west of the Gerstle River with 1 in upper McCumber Creek and 1 in upper Sawmill Creek in the Granite Mountains. Two radio collars were in mortality mode, with 1 located in the Johnson River and 1 near Sam Creek along the Tanana River.

During the 6 October 2006 census, most caribou (58%) with known locations were located on the Macomb Plateau south of Horn Mountain. One hundred eighteen caribou (16%) were located between the Johnson and Gerstle Rivers, and the remainder (27%) were located between Jarvis Creek and the Gerstle River. The 2 largest aggregations were located on the Macomb Plateau (141 caribou) and in McCumber Creek (131 caribou).

During the 17 October 2006 census, 46% of caribou were located east of the Johnson River on the Macomb Plateau area, 14% between the Gerstle and Johnson Rivers, and 36% between Jarvis Creek and the Gerstle River.

MORTALITY

Harvest

Season and Bag Limit.

RY04 — The hunt was conducted as Tier I registration permit hunt RC835 from 15 to 25 August, with a harvest quota of 25 caribou. The hunt boundaries for RC835 were changed so that the area west of Jarvis Creek was closed to caribou hunting. This boundary change, plus the season date change in RY02, meant that in RY04 hunters in southwest Unit 20 had to walk from the Richardson Highway and cross Jarvis Creek before hunting in RC835.

RY05 — The hunt was conducted as Tier I registration permit hunt RC835 from 15 to 25 August, with a harvest quota of 25 caribou, and with the portion of southern Unit 20D west of Jarvis Creek closed to hunting.

RY06 — Hunt regulations were the same as in RY05, except that 5 days were added to the beginning of the hunting season (opened 10 Aug) to allow for increased harvest and hunting opportunity.

Alaska Board of Game Actions and Emergency Orders. There were no actions or emergency orders during this reporting period.

Hunter Harvest. From RY04 though RY06 the annual harvest quota was set at 25 bulls per year. This is below the harvest objective of 30–50 per year, but is a sustainable annual harvest for this small herd that maintains a relatively high proportion of large bulls for hunting opportunity (Table 1). Harvest increased from 7 caribou in RY04 to 21 in RY06 as the season dates were adjusted with hunt boundary changes (Table 2).

Permit Hunts.

RY04 — Registration permits were issued to 76 people (Table 2), and 32 (42%) actually hunted, killing 7 bulls for a 22% success rate (Table 3). This harvest was substantially below the quota and the objective.

The substantial decrease in the number of registration permits issued was due to changing the RC835 hunt dates and western boundary. These changes resulted in making the hunt manageable without exceeding the harvest quota while providing a reasonable opportunity for subsistence hunters to hunt during a 10-day season.

RY05 — Registration permits were issued to 117 people (Table 2), and 55 (47%) actually hunted, killing 18 bulls for a 33% success rate (Table 3). This harvest was below the quota and the objective; however, it was an increase from RY04.

RY06 — Registration permits were issued to 103 people (Table 2), and 56 (54%) actually hunted, killing 21 bulls for a 38% success rate (Table 3). This harvest was below but close to the quota and below the objective.

Hunter Residency and Success.

RY04 — Hunters had a 22% success rate (Table 3). Most hunters (59%) were not local residents of Unit 20D (Table 3).

RY05 — Hunters had a 33% success rate (Table 3). Most hunters (58%) were not local residents of Unit 20D (Table 3).

RY06 — Hunters had a 38% success rate (Table 3). Most hunters (70%) were not local residents of Unit 20D (Table 3).

The fact that most of the registration hunt (RC835) hunters were not local residents of Unit 20D was probably in part because residents of Unit 20D were qualified to hunt in the federal subsistence hunt for the Nelchina caribou herd in nearby Unit 13; they probably preferred to hunt there, where they could use motorized vehicles and had a bag limit of 2 caribou. Alternatively, RC835 attracted nonlocal residents that did not qualify for federal subsistence hunts and were looking for a road accessible caribou hunt.

Harvest Chronology.

RY04 — Regulatory changes for hunt RC835 finally resulted in adequate restrictions to allow the hunting season to remain open the entire 10-day season without a necessity to close it by emergency order. Four caribou were killed on opening day, 15 August, with 1 additional caribou killed on each of 19, 23, and 25 August (Table 4).

RY05 — Harvest was distributed throughout the open season with 7 caribou killed the first 3 days of the hunt (Mon–Wed). The highest harvest occurred on Saturday, 20 August, with 5 caribou killed (Table 4).

RY06 — The season opened on a Friday with harvest of 12 caribou (57%) over the next 5 days. There was no harvest for the next 3 days (midweek), and then harvest resumed the following Friday, 18 August, with 4 caribou (19%) killed through Monday. Four caribou were killed the last 3 days of the season (Table 4).

Harvest Location.

RY04 — Only 7 caribou were killed during RY04 (Table 5); 2 (29%) were taken in the Jarvis Creek drainage, 2 (29%) on Macomb Plateau, 1 in the Granite Mountains, 1 in the Robertson River area, and 1 in an unknown location (Table 6).

RY05 — Most caribou (12 = 67%) were killed on the Macomb Plateau (Table 6).

RY06 — Most caribou (11 = 69% of known locations) were killed on the Macomb Plateau (Table 6).

Recent boundary changes for the RC835 hunt made hunting from the Richardson Highway more difficult, redirecting harvest to the Macomb Plateau area. Because hunting is more difficult from

the Richardson Highway, it has no longer been necessary to close the season by emergency order, giving hunters more time to access the Macomb Plateau walk-in hunting area.

Transportation Methods.

RY04 — The most commonly used mode of transportation for successful hunters was again highway vehicles (57%) (Table 7).

The department issued a Methods and Means Exemption permit via the Americans With Disabilities Act (ADA) to 1 hunter that allowed him to use motorized vehicles (i.e., a 4-wheeler) to participate in the RC835 hunt.

RY05 — The most commonly used modes of transportation for successful hunters were highway vehicles (33%) and horses (33%). The increase in horse use is a result of the season staying open longer due to recent boundary changes (Table 7).

The department issued Methods and Means Exemption permits via the ADA to 3 hunters that allowed them to use motorized vehicles (i.e., 4-wheelers) to participate in the RC835 hunt.

RY06 — The most commonly used mode of transportation for successful hunters was highway vehicles (48%) and horses (24%) (Table 7).

The department issued a Methods and Means Exemption permit via the ADA to 2 hunters that allowed them to use motorized vehicles (i.e., 4-wheelers) to participate in the RC835 hunt.

Other Mortality

No additional mortality sources were identified for the MCH.

HABITAT

Assessment and Enhancement

No habitat assessment work occurred for the MCH during this reporting period.

CONCLUSIONS AND RECOMMENDATIONS

The recent combined regulatory changes to season dates and hunt area boundaries appear to have allowed the MCH hunt to remain open long enough to provide a "reasonable opportunity to hunt" (defined as at least 10 days) for Tier I subsistence hunters without routinely exceeding the harvest quota. However, the RY04 harvest was substantially below the quota, even though the season was open for the full 10 days. An additional 5 days was added to the season in RY06, providing increased hunting opportunity without exceeding the harvest quota.

The MCH size objective of 600–800 was not met during RY04–RY05. The herd size objective may have been met in RY06, but the survey data were equivocal.

The MCH was hunted each year of this reporting period; however, the annual harvest quota of 25 caribou was below the objective of 30–50 per year. If the herd continues its apparent slow growth, the harvest quota may be increased from 25 to 30, thus meeting the minimum harvest

objective in the future. Hunting will be continued in the future if harvest does not compromise maintaining the herd size objective. The most significant factor required to maintain population size and achieve the harvest objective will be adequate calf survival. Intensive efforts toward harvest management will continue in the area in an attempt to meet established objectives.

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TABLE 1 Macomb caribou fall composition counts and estimated population size, 1982–2006

Survey date	Bulls: 100 cows	Calves: 100 cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	Total bulls %	Composition sample size	Count or estimate of herd size
10/82	21	26	18	68	61	29	10	14	218	700
10/83[a]	33	24	15	64	48			21	238	700
12/1/84	28	40	24	60	45	34	21	17	351	700
10/30/85	45	31	17	57	43	38	20	26	518	700
10/16/88	46	32	18	56	41	31	28	26	671	772
10/26/89	33	34	20	60	54	31	15	20	617	800
10/9/90	44	17	11	62	34	34	32	27	600	800
9/25/91	34	9	6	70	21	42	37	24	560	560
9/26/92	25	14	10	72	30	36	33	18	455	527
10/2/93	22	18	13	72	38	34	28	16	374	458
10/2/94	21	13	10	74	53	16	31	16	345	532
10/1/95	39	10	7	67	44	17	39	26	477	477[b]
10/2/96	43	30	17	58	29	31	40	25	586	586
10/28/97	28	18	12	69	40	26	33	19	451	597[c]
9/30/98	50	25	14	57	32	46	22	28	472	522–572[d]
10/15/99	57	22	12	56	49	21	30	32	606	640
10/2/00	45	11	7	64	43	29	29	29	605	650[d]
10/9/01	39	11	7	66	40	30	30	26	467	500–550[d]
11/2/02	51	21	12	58	39	43	19	30	234	Unk
10/4/03	46	19	12	60	44	22	31	28	526	550–575
10/9/04	61	40	20	50	18	37	45	30	546	600–650
10/04/05	64	17	9	55	53	16	31	35	628	630–650
10/06/06	48	31	17	56	14	45	41	27	857	569–857

[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 using spreadsheet developed by P. Valkenburg and D. Reed (ADF&G unpublished data, Fairbanks).

[d] Estimated.

TABLE 2 Macomb caribou harvest data by permit hunt, regulatory years 1985–1986 through 2006–2007

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	12
	1986–1987	100	62	26	74	10 (100)	0 (0)	0	10
570[b]	1986–1987	15	53	14	86	1 (100)	0 (0)	0	1
530[a]	1987–1988	150	53	76	24	53 (100)	0 (0)	0	53[c]
	1988–1989	150	57	55	45	36 (100)	0 (0)	0	36[d]
	1989–1990	150	47	55	45	44 (100)	0 (0)	0	44[d]
535[e]	1990–1991	351	42	21	79	42 (100)	0 (0)	0	42
	1991–1992	317	33	16	50	48 (100)	0 (0)	2	50
	1992–1993 through 1996–1997[f]								
RC835[e]	1997–1998[g]	143	34	23	77	22 (100)	0 (0)	0	22
	1998–1999	168	32	28	72	32 (100)	0 (0)	0	32
	1999–2000[f]	0							0
	2000–2001[g]	274	31	12	88	22 (100)	0 (0)	0	22
	2001–2002[g]	255	32	25	75	43 (100)	0 (0)	0	43
	2002–2003[g]	158	41	28	73	25 (100)	0 (0)	0	25
	2003–2004[g]	161	27	25	75	29 (100)	0 (0)	0	29
	2004–2005	76	58	22	78	7 (100)	0 (0)	0	7
	2005–2006	117	53	33	67	18 (100)	0 (0)	0	18
	2006–2007	103	46	38	63	21 (100)	0 (0)	0	21

[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 2006–2007

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	20	1	36	(55)	4	25	0	29	(45)	65
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 through 1996–1997[d]											
1997–1998[c]	15	7	0	22	(23)	50	22	0	72	(77)	94
1998–1999[c]	22	10	0	32	(28)	39	43	0	82	(72)	114
1999–2000[d]											
2000–2001[c]	11	11	0	22	(12)	89	75	0	164	(88)	186
2001–2002[c]	13	30	0	43	(25)	67	64	0	131	(75)	174
2002–2003[c]	10	15	0	25	(28)	30	36	0	66	(73)	91
2003–2004[c]	7	22	0	29	(25)	29	57	0	54	(75)	115[e]
2004–2005[c]	1	6	0	7	(22)	12	13	0	25	(78)	32
2005–2006[c]	10	8	0	18	(33)	13	24	0	37	(67)	55
2006–2007[c]	9	12	0	21	(38)	8	27	0	35	(63)	56

[a] Resident of Unit 20D.
[b] Hunt by drawing permit.
[c] Hunt by registration permit.
[d] Hunt canceled.
[e] Success of 32 hunters was unknown.

TABLE 4 Macomb caribou harvest by date during permit hunt RC835 with a 10–20 September hunting season, regulatory years 1997–1998 through 2006–2007

Regulatory	August harvest date																September harvest date												
year	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	10	11	12	13	14	15	16	17	18	19	20	Unk	*n*
1997–1998																	8	1	3	4	3	2	0	0	0	0	1		22
1998–1999																	13	6	4	0	0	2	7	0	0	0	0		32
1999–2000[a]																													
2000–2001																	9	3	1	3	5	0	0	0	1	0	0		22
2001–2002																	34	4	5	0	0	0	0	0	0	0	0		43
2002–2003						11	4	5	1	1	3	0	0	0	0	0													25
2003–2004						18	9	1	1	0	0	0	0	0	0	0													29
2004–2005						4	0	0	0	1	0	0	0	1	0	1													7
2005–2006						2	3	2	0	1	5	3	0	0	0	1												1	18
2006–2007	4	3	1	2	2	0	0	0	2	1	1	0	0	1	2	1												1	21

[a] Hunt canceled.

TABLE 5 Macomb caribou harvest[a] and accidental death, regulatory years 1985–1986 through 2006–2007

Regulatory year	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	2	2	0	2
1993–1994[b]					0	2	2	0	2
1994–1995[b]					0	2	2	0	2
1995–1996[b]					0	2	2	0	2
1996–1997[b]					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
2000–2001	22	0	0	22	0	0	0	0	22
2001–2002	43	0	0	43	0	0	0	0	43
2002–2003	25	0	0	25	0	0	0	0	25
2003–2004	29	0	0	29	0	0	0	0	29
2004–2005	7	0	0	7	0	0	0	0	7
2005–2006	18	0	0	18	0	0	0	0	18
2006–2007	21	0	0	21	0	0	0	0	21

[a] Includes permit hunt harvest.

[b] Hunt canceled.

TABLE 6 Macomb caribou harvest location during permit hunt RC835, regulatory years 1997–1998 through 2006–2007

Harvest location/drainage	Regulatory year 1997–1998	1998–1999	1999–2000[a]	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007
Jarvis Creek	8	16		18	24	22	22	2	4	2
Little Gerstle River	3	2		2	0	0	0	0	0	0
Granite Mountains	0	1		0	3	0	0	1	0	2
Johnson River	0	0		0	0	0	0	0	1	1
Macomb Plateau	9	9		0	13	2	6	2	12	11
Robertson River	0	3		0	0	0	1	1	1	0
Unit 12	0	0		0	1	1	0	0	0	0
Unknown	1	1		2	2	0	0	1	0	0

[a] Hunt canceled.

TABLE 7 Macomb caribou harvest percent by transport method, regulatory years 1986–1987 through 2006–2007

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 thru 1996–1997[c]										
1997–1998	0	32	0	14	0	23	18	0	14	22
1998–1999	0	9	0	25	0	25	22	0	19	32
1999–2000[c]										
2000–2001	0	0	0	46	0	46	5	0	5	22
2001–2002	0	12	0	56	0	7	16	0	9	43
2002–2003	4	0	0	0	0	8	40	0	48	25
2003–2004	0	3	0	0	0	3	62	28	3	29
2004–2005	0	14	0	14	0	0	57	14	0	7
2005–2006	0	33	0	0	0	11	33	11	11	18
2006–2007	10	24	0	0	0	5	48	5	10	21

[a] Includes permit hunt harvest.
[b] Walking was not listed as a transportation type from 1986–1987 to 1989–1990.
[c] Hunt canceled.

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
907-465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[a]

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 5000–15,000 caribou in the late 1940s. The herd increased during the early 1950s, aided by intensive predator control conducted by the federal government. The NCH continued to grow, and peaked at about 70,000 caribou by the mid 1960s. A dramatic decline began in the late 1960s, and the herd reached a population low of between 7000–10,000 caribou in 1972. Starting in 1973 the NCH began to increase and continued to grow through the mid 1990s, peaking at an estimated 50,000 animals in 1995. By 2000, the herd had declined to 29,600.

The NCH has been important to large numbers of 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 1 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 small number of caribou under a subsistence registration permit hunt. Since 1990, Nelchina permits have been issued only for state and federal subsistence hunts, except for a very limited drawing hunt in Unit 14. Both the number of permits and the allowable harvest have fluctuated, depending on herd status. During the last 20 years (1985–2005) there have been more than 55,000 caribou harvested from the NCH.

[a] This unit report also includes data collected after the end of the reporting period at the discretion of the reporting biologist.

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 3000–6,000 caribou.

METHODS

Censuses and sex and age composition counts are conducted annually. The censuses involve aerial counts of caribou observed during June in postcalving aggregations and are followed immediately by sex and age composition surveys. Aerial count techniques include fixed-wing photocensuses, or traditional censuses using hand-held cameras and direct field estimates made from fixed-wing 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 late June to determine productivity, and again in early October during the rut to determine the bull:cow ratio and calf survival. 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 establish mortality rates. To accomplish this, we attempt to maintain a minimum of 40 to 60 radiocollared cow caribou in the herd. Collars are placed on 4- or 11-month-old female calves to obtain survival and parturition data for known-age females. Radiocollared cows are located during the calving period to determine parturition rates and the mean calving date.

Biologists use permit reports, radiotelemetry 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 of 36,428 in 2005 remained virtually unchanged from the 2004 figure of 36,677 (Table 1). The estimated stocking density was 0.8 caribou/km^2 based on an approximate range of 44,200 km^2 (Lieb et al. 1988). A spring 2006 census was not completed because unseasonably cold temperatures and late snows kept the caribou from grouping into large postcalving aggregations necessary for an aerial census.

Population Composition

In 2005, pregnancy among radiocollared females was a moderate 76%, yet the summer composition survey indicated a healthy 52 calves:100 cows. Unfavorable weather conditions that prevented doing a census in 2006 also forced the cancellation of summer composition surveys.

Herd productivity in 2006 was, however, thought to be quite high based on the number of radiocollared cows observed with calves (94%) during May calving flights. historically, productivity has been high, averaging 52 calves:100 cows in June (1985–1996). The lowest calf productions ever were 32 and 31 calves:100 cows in 1999 and 2000. Observed declines in calf production in the past have been attributed to a decline in physical condition of the cows that resulted in a delay in age of first reproduction (from 2 or 3, to 4 years of age) and a reproductive pause in many adult cows. Lactating cow caribou 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 June and October. Although no composition flight was done during June 2006, the October ratio was 40:100 (Table 1). When the herd was rapidly declining in the late 1990s, fall ratios dropped to a low of 20:100. During historical periods of stability or herd growth, NCH fall ratios have ranged from 38 to 48 calves:100 cows.

Bull:cow ratios during the 1980s, when the herd was increasing, were often in the range of 50–60 bulls:100 cows. Recent fall bull:cow ratios have been lower, and were stable between 2001 and 2005, averaging 33 bulls:100 cows. In 2006, only 23 bulls:100 cows were counted. Fall bull:cow ratios have been below the management objective of 40 bulls:100 cows since 1995. Lower bull:cow ratios in recent years are largely due to 'bull only' bag limits and higher bull than cow harvest quotas in years with 'either sex' bag limits. Separate harvest quotas for bulls and cows are established every year before the season opens and the hunt for each sex closed when that quota is reached.

Considering most subsistence permittees select for large bulls, hunting can impact this segment of the population in a short period of time (Milner et al. 2007). As subsistence permit numbers were increased in the late 1990s, not only did the percentage of bulls decline, but the age structure of the bull population became skewed towards younger animals. Between 1998 and 2001, the percentage of large bulls averaged only 13%. Harvests were curtailed beginning in 2000, and as the herd began to grow, the number of large bulls increased. The percentage of large bulls averaged 21% between 2002 and 2005. In 2005–06, the harvest quota was increased and an 'either sex' bag limit was implemented. The fall 2006 composition survey indicated only 11% large bulls.

DISTRIBUTION AND MOVEMENTS

Calving takes place in the eastern Talkeetna Mountains from Fog Lakes southeast to the Little Nelchina River. The core calving area extends from the Little Nelchina River north 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 Denali Highway near Butte Lake, across the Lake Louise Flats and the Alphabet Hills, and as far east as the Gulkana River.

In 2006 the rut occurred largely in the eastern foothills of the Talkeetna Mountains near Upper Sanona and Tyone creeks, while the rut in 2005 was concentrated around the Lake Louise road. Winter habitat for the NCH extends from Cantwell in 13E, east across 13A and 13B, and northeast into units 11, 12 and 20E. Through the 1980s and 1990s, caribou use of GMU 13

winter range slowly declined as old burns (50 years and older) in Unit 20E began providing higher lichen biomass.

In 2004 much of the NCH winter range in 20E burned. Radiotelemetry flights in the winter of 2004-05 indicated a wide winter distribution between units 11, 12, 13 and 20E. Caribou that traveled to 20E were observed utilizing areas adjacent to the burn sites. Caribou that stayed in units 11 and 13 were distributed through the Copper River drainage, and many were observed in 13D as far south as the Edgerton Highway, in areas rarely used by the Nelchina herd. In 2005 and 2006 wintering caribou were spread from Cantwell in 13E, along the south side of the Alaska Range, east over to the upper Copper River in GMU 11, down the Nabesna River in GMU 12, and up through 20E along the Taylor Highway (adjacent to the burned areas). Winter locations and movements of the NCH will continue to be monitored in the next few years to assess the impacts on the herd of the loss of the high quality winter range in 20E.

MORTALITY

Harvest

Season and Bag Limit. The season dates for the state Tier II (TC566) subsistence hunt in Unit 13 are 10 August–20 September and 31 October–31 March. Since 2005, the bag limit has been 1 caribou. Since 1993, a limited state drawing hunt (DC590) for any caribou with season dates of 10 August–20 September has been held in Subunit 14B. The Unit 13 federal subsistence hunts for rural residents (RC513 and RC514) are both held 10 August–30 September and 21 October–31 March. The federal bag limit is 2 caribou. The Unit 13 federal subsistence hunt is by registration, administered by the Bureau of Land Management (BLM); only residents of Unit 11, Unit 13, Unit 12 along the Nabesna Road, and Unit 20 residents from Delta Junction are eligible. A Unit 12 federal subsistence hunt (RC412) for rural residents of Unit 12, Dot Lake, Healy Lake and Mentasta is opened by emergency order when the NCH migrate through the Tetlin Refuge during winter months. This hunt has been held 12 of the last 16 years.

Board of Game Actions and Emergency Orders. The Tier II hunt in 2006–07 was closed 4 February by emergency order.

During the March 2007 Board of Game meeting, the Nelchina Tier II scoring system was altered by the addition of two new questions: one to address income, and one to address time spent in the hunt area collecting wild game and fish. Salvage requirements and motorized access were also modified to better describe the subsistence use. Hunters must salvage the head, hide, kidneys, liver and heart, although they can no longer use aircraft or motorized vehicles over 1500 lbs.

Hunter Harvest. The reported harvest in 2005–06 for the combined state and federal hunts for the NCH was 2813 caribou, more than double the 1298 average reported harvest over the past 4 years. More Tier II permits were issued, and cows were legal for the first time since 1999–2000 (Table 2).

Illegal and unreported harvests of Nelchina caribou are an additional source of mortality. The most common type of illegal harvest occurs when a permittee fails to validate the permit after taking a caribou. Once a permittee transports a caribou from the field without validating the

permit, there is minimal chance of citation for taking additional caribou on the same permit. Individuals also transfer permits to family members or friends. The estimated illegal and unreported take (Table 3) was increased in 2005 because of the large increase in hunting pressure due to more permits issued.

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

Permit Hunts. Nelchina caribou were harvested by 4 separate permit hunts. Permit and harvest data are presented in Table 2.

The state Tier II subsistence hunt (TC566) is the primary way of allocating harvests from the NCH, and with the exception of the Tier I hunt in 1996 and 1997, has accounted for 90% of the harvest. All Alaska residents may apply for this hunt. Permits are scored according to certain subsistence criteria and issued based on an applicant's rank. This is one of the most popular hunts in the state and in the past had more than 17,000 applicants for up to 10,000 permits. The hunt takes place entirely in Unit 13 with both fall and winter seasons. The bag limit is usually 'either sex,' but was changed to 'bulls only' between 2000 and 2004 when harvests needed to be reduced. For the 2005–06 hunt, 4000 Tier II permits were issued, the harvest quota was increased, and the 'either sex' bag limit was reinstituted. Hunters reported a harvest of 2177 caribou (Table 2).

The number of participants in the federal registration hunts has been fairly stable the last six years with about 2600 permits issued. Federal hunters are generally issued 2 permits. The average annual harvest for this reporting period was 476 caribou, though the 2005–06 harvest was 615 (Table 2). The highest reported harvest under this hunt was 647 caribou in 1991, when the hunt first opened. Hunting opportunity is limited because of the reduction in available federal lands following state land selections. The state selected most of the federal lands in Subunits 13B and 13E along the Denali Highway previously open to federal subsistence caribou hunting. Selected lands, including over-selections, are not open to federal subsistence. Eventually, over-selections will return to federal status and at that time, the additional hunting opportunity will likely result in an increase in the number of caribou taken in this hunt. The potential for a high harvest under this hunt still exists even with the limited amount of land open to federal subsistence hunting. During the fall migration, caribou consistently cross in large numbers along the Richardson Highway between Paxson and Sourdough, where they are accessible by federal hunters.

The federal registration hunt (RC412) is a local subsistence hunt for rural residents of Unit 12, Dot Lake, Healy Lake and Mentasta. 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 (FWS) administers this hunt on the Tetlin National Wildlife Refuge and on Wrangell St.–Elias

National Preserve lands north of the Pickerel Lake winter trail. This hunt has primarily been 'bulls only.' Since it was established in 1990, the average take has been 23 caribou (range=1-58). The harvest was 16 caribou in 2005 (Table 2).

The state drawing permit hunt (DC590) is for any caribou and is held in Unit 14B. This is the only NCH hunt that is not a subsistence hunt, and is open to both residents and nonresidents. Up to 100 permits are issued. Bulls predominate the harvest, though the overall take has been very low, ranging from 4 to 17 animals during the last 5 years (Table 2).

The total reported harvest for the NCH in 2005 for all hunts was 2816 (1995 bulls, 798 cows, 23 unknown sex) caribou. The estimated illegal, unreported and accidental take was 800. The total estimated take was 3616 caribou (Table 3).

Hunter Residency and Success. Only Alaska residents are allowed to hunt Nelchina caribou in Units 12 and 13, while nonresident hunters are allowed to hunt the NCH in 14B under the drawing permit hunt. Table 4 lists hunter residency and success rates for local (Units 11, 13, and 12 along the Nabesna road) and nonlocal hunters for the state Tier II hunt. Most of the Tier II permits are issued to nonlocal Alaska residents. In 2005, local hunters made up 8% of the total Tier II hunters, and were responsible for 6% of the total harvest. Federal hunts (RC412, RC513, and RC514) are open only to residents of defined subsistence zones; thus, only federally defined local rural residents harvest caribou from these federal hunts.

Hunter effort varies somewhat between years, depending on caribou distribution and migration patterns in relation to the road system and hunter access points. Over the last 5 years, successful Tier II hunters spent 5–6 days hunting to get a caribou, while unsuccessful hunters averaged 7–9 days in the field.

Permit success rates for the Tier II NCH hunt averaged 50% (range=38-56) since 2001–02. Success rates for those that reported hunting averaged 65% since 2001–02. Fluctuations in hunter success between years with similar hunting effort are usually attributed to fall caribou distributions away from the road system or winter migrations out of the unit. Success rates for Tier II hunters are lower than rates observed under the old NCH drawing hunt. Considering many of the same hunters get the Tier II permit every year, a Nelchina Tier II permit is not the valued prize it was under the old drawing system. Then, an individual was fortunate to get drawn for a permit once every 4 or more years. Permit success rates often exceeded 60% for the old drawing hunts.

Harvest Chronology. The fall caribou season occurs in August and September and is the most popular time to hunt. Sixty to 100 percent of the yearly Tier II harvest occurred in August and September during this reporting period (Table 5). Bulls become more vulnerable in September because of the onset of the rut. Hunting pressure also increases during moose season by hunters on combination hunts. Historically, winter harvest levels have depended on the number of caribou that remained in Unit 13. Winter seasons are subject to emergency closures in those years when the harvest quota is reached before the season ends on March 31.

Transport Methods. For successful Tier II subsistence hunters during this reporting period, 4-wheelers were the predominant method of transportation, followed by highway vehicles and snowmachines (Table 6). During the early 1990s, highway vehicles were the most important method of transportation, but in 1994 the number of hunters using 4-wheelers began to climb. The use of snowmachines has fluctuated widely and depends on both the length of the winter hunt and the availability of caribou. Because most of the federal land open to hunting is adjacent to the Denali and Richardson highways, successful Unit 13 federal subsistence hunters (RC513 and 514) report highway vehicles (40-60%) as the most important transportation method. Aircraft is the primary transportation method in the Unit 14B drawing hunt (DC590).

Other Mortality

Eagles are abundant on the NCH calving grounds, and during flights monitoring survival of neonatal caribou calves born to radiocollared cows, there have been numerous observations of both golden and bald eagles feeding on neonates. The number of calves taken by eagles is unknown, but predation by eagles is considered to be an important source of neonatal calf mortality.

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

Wolves are present throughout the NCH range, and predation by wolves is thought to be an important source of mortality. Ballard et al. (1987) reported that Unit 13 wolves preyed on caribou whenever they were available. During the early-to-mid 1980s, the number of wolves occupying both the core Nelchina caribou range and winter range was relatively low because of high human harvests. Annual mortality rates on radiocollared caribou typically were at or below 10%. Beginning in 1988, when the land-and-shoot take of wolves became illegal, wolves increased over most of the Nelchina caribou range, especially in subunit 13A, where by 1999 wolf numbers on the core calving grounds were the highest observed in more than 25 years. A mid-winter wolf census in 1998 resulted in a density estimate of 12 wolves/1000 km^2 (Testa, ADF&G files) in 13A. During this period of increased wolf numbers, observed caribou mortality was also high. Mortality rates for radiocollared caribou averaged 20%.

Though undocumented calf loss occurs prior to summer composition surveys, by comparing summer and fall calf:cow ratios, calf loss during this period can be estimated. Between 1997 and 2000, calf loss between surveys averaged 32%. Increased wolf harvests by hunters, trappers and wolf control permittees since 2000 have reduced wolf numbers, especially in the core calving area. In the fall of 2005, 13A had an estimated 4.1 wolves/1000km^2, which over the course of the winter was reduced to 2.3 wolves/1000km^2. The average summer to fall calf loss since 2001 has averaged only 12%. The most recent estimate of annual mortality for radiocollared caribou was down to 8% in 2004–05.

An important factor affecting winter predation on caribou by wolves is the migratory pattern of the NCH. In most years, a large percentage of the caribou leave Unit 13 in October and do not return from wintering areas in units 11, 12 and 20E until April. Though wolf numbers have been reduced recently in Unit 13, and more recently in 20E, losses to wolf predation in units 11 and

12 continue to be substantial. In 2004, 25 additional calves were collared for part of a winter range study. Many of these young radiocollared caribou succumbed during their first winter to deep snow and wolf predation in the Tetlin Refuge, particularly between Tetlin Lake and Tuck Creek.

In winters with deep snow, in addition to being particularly vulnerable to wolf predation, caribou are more nutritionally and energetically stressed, which can impact future productivity. Following severe winters, 10-month-old female weights can be lower than normal. After the severe winter of 1999-2000, spring weights averaged 107.3lbs., 8% below the average of 116.2 lbs. observed following subsequent normal winters (2001-05).

Habitat

Assessment

Between 1955 and 1962, Alaska Department of Fish and Game (ADF&G) established 39 range stations, including exclosures, throughout much of the Nelchina caribou range. Biologists examined these stations at approximately 5- to 6-year intervals from 1957 through 1989. A complete description of the Nelchina caribou range, range station locations, and results of long-term monitoring was 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 until 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. Lichen standing crops are expected to improve considering the herd has been reduced in recent years.

Initial research in the early 1990s designed to evaluate body condition in various caribou herds led to the conclusion that Nelchina animals were in poorer body condition than animals from the Alaska Peninsula or Mulchatna Caribou Herds (Pitcher 1991). Between 1992 and 2003, female calves were captured and radiocollared, or collected to assess body condition and future age-specific productivity data. Four-month fall and 10-month spring weights have ranged between 105 and 129 lbs since 1992. These represent the lightest and most variable weights for the Interior caribou herds (Valkenburg, ADF&G files).

Variations in spring and summer weather conditions that influence timing of plant emergence, rate of growth, and overall forage quality may be responsible for much of the variation in fall body condition. During hot summers, insect harassment may also be an important factor (Colman et al. 2003). Considering the traditional calving grounds and summer range of the Nelchina herd have been heavily grazed for years, even slight annual variations in weather may be significantly impacting foraging conditions. During hot, dry summers, increased stress from low forage availability combined with insect harassment minimizes summer weight gain; some of the lowest calf weights have been observed following these summers. Alternately, cool,

cloudy summer conditions minimize insect activity as well as increase forage quality in terms of higher nitrogen levels in vascular plants (Lenart 1997). Most recently, the lowest 4-month old calf weights (106.5 lbs) were observed following a dry summer in 1996; the highest (129.2 lbs) in 2001 following a wet, cool July. In 2004, 4-month weights were also high (128.5 lbs.), though the difference that year was an early green-up; the average May temperature was 7 degrees higher than May temperatures between 1995 and 2003 (Gulkana weather station).

The NCH has the genetic potential to produce heavier caribou, provided adequate nutrition. Female calves weighed in Kenai, which were the progeny of NCH animals translocated in 1986 and 1987, have weighed as much as 151.4lbs. (fall 2001), and are among the heaviest in the state (ADF&G files).

Herd productivity is assessed by monitoring age of first reproduction among radiocollared cows captured initially as 4-month old calves. Since 1992, no 2-year old cows have produced calves in the NCH. In years with favorable to good forage production and availability, up to 64% of the 3-year old cows (7 of 11 in 2002), and 94% of all radiocollared cows have had calves (27 of 31 in 2006). During years following drought or deep snow conditions, no 3-year old cows calved and overall pregnancy rate has been as low as 42%. Productivity consistently increases when favorable weather patterns result in high annual forage growth that allows cows to improve their overall body condition going into the rut.

Enhancement

Short-term caribou habitat enhancement depends more on weather conditions than any other factor. The Nelchina summer range has a short growing season due to the high average elevation of 1256m (4122 ft). An early spring can provide caribou with abundant early nutritious forage that can have a substantial impact on lactation and summer body growth. If precipitation is adequate through the rest of the summer, range conditions should only improve. Drought summers can be devastating to both vascular and nonvascular forage plants.

Long-term caribou habitat enhancement is dependent on limiting herd growth beyond historical sustainable levels. The current herd objective is to maintain 35,000–40,000 caribou on the range versus the 45,000–50,000 level during the late 1990s. Since 1999, the herd has been maintained at or below the objective range, though more time is needed to fully evaluate the impact on range condition.

The other aspect of long-term enhancement is dependent on habitat diversity, and the return of wildfire or controlled burns. The Copper River basin fire management plan (Alaska Interagency Fire Management Council 1983), 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. While wildfire likely enhances summer range conditions by increasing forbs, sedges and deciduous shrub growth, recent research has focused on the role of fire on winter range. Joly et al. (2003) found that Nelchina caribou routinely select winter habitat that is more than 50 years post burn (Joly et al. 2003), likely due to the slow growth of lichen. Considering wildfire may play a role in the recovery of depleted or decadent stands of lichens important for overwintering caribou, a diversity of burn mosaics and habitat types is considered

ideal. Therefore, small periodic wildfires ensure the availability of both winter and summer caribou forage.

Long-term fire suppression increases fuel buildup and the possibility of an intense fire over a large area. This type of wildfire creates less diversity and decreases year-round habitat availability for caribou (Joly et al. 2003). In spite of the current fire management plan and the benefits of wildfire, Unit 13 has had only one significant natural fire (5000-acre Tazlina Lake burn) since 1950 because wildfire ignitions are rare, and many of the small strikes that did take were suppressed. A controlled burn in the Alphabet Hills and Lake Louise flats to improve moose and caribou habitat burned about 5000 acres in 2003, and another 36,000 acres in 2004. The burn plan calls for additional burning in subsequent years when conditions are adequate. Despite these recent fires, there are more than 5 million acres of caribou habitat in Unit 13 that can be improved upon.

Nonregulatory Management Problems/Needs

A proposed open pit mine adjacent to the Tangle Lakes in critical caribou fall and wintering habitat presents a very real threat to the NCH. In addition to this being an important rutting and migration area, in many years thousands of caribou winter in this area. Wintering caribou have heavily utilized this area most recently in 2005–06 and 2006–07, perhaps in response to the recent large-scale wildfires on the 20E wintering grounds. Because of the presence of caribou in this area during the fall and winter hunting seasons, this area has a history of traditional use for subsistence as well as sport hunters. Extensive mining, processing and associated development and disturbance endangers future use of this critical habitat by the NCH. Additional management needs include: (1) monitoring range condition by continuing to monitor body condition parameters, (2) monitoring sources and rates of natural mortality, and (4) minimizing land use activities that adversely affect the Nelchina range.

CONCLUSIONS AND RECOMMENDATIONS

The fall 2005 NCH herd estimate of 36,428 caribou indicates the herd has increased from the low of 29,601 in 2000, and is within the population management objective of 35,000–40,000 caribou. Although a census was not completed in 2006, a modeled population estimate was derived that was similar to one in 2005 that was based on an actual count. The large declines in herd size observed between 1998 and 2000 were attributed to both low productivity and increased wolf predation. Calf production in 2000 was the lowest ever observed. Parturition was only 58% (of all collared cows), and the summer calf:cow ratio was only 31 calves:100 cows. Productivity has since improved. Calf survival to fall has also increased during the last 6 years, as active wolf management in Unit 13 has appreciably reduced the number of wolves across the core calving grounds, and fall and winter ranges within the unit.

Declines in herd productivity are often attributed to lower pregnancy rates due to reduced forage production or availability because of overstocking, severe winter conditions, summer droughts, or late spring or early fall snow conditions. Similar to Cameron and Ver Hoef's (1994) conclusions, declines in body condition of NCH cows in 1998 and 1999 may have caused caribou to skip a calving interval until body condition improved, partially explaining record low calf ratios in 1999 and 2000. Other factors include severely deep snow in 1999–2000 and 2000–

01, record high wolf numbers, and habitat recovery from several years of overstocking. Fortunately, NCH productivity recovered quickly.

Prolonged low herd productivity, especially during periods with favorable weather, is most likely attributable to severe overuse of the range (Messier et al. 1988). In the case of the NCH, the conclusion that the range was overstocked when the herd exceeded 40,000 animals is supported by observed declines in body weights of female calves, delayed age of first pregnancy, and reduced pregnancy rates. Maintaining the NCH at or below the current objective population range is the most important management tool to maintain range quality.

To ensure the management objective of 35,000-40,000 is maintained, caribou harvests need to be adjusted yearly. Individual yearly harvest objectives for cows and bulls should be based on annual recruitment, bull:cow ratios, and the population trend. Harvest objectives for the NCH can be successfully attained by adjusting the number of Tier II permits issued, as well as separately closing the season for bulls and cows by emergency order when the management goal for each has been reached.

The decline in the bull:cow ratio from 36:100 in 2005 to 23:100 in 2006 was partly attributed to sampling problems as the fall composition survey was unusually late due to bad fall weather. The average bull:cow ratio of 30:100 since 1995 however, has been well below the management objective of 40 bulls:100 cows for the NCH. Composition data for the bull segment of the population show most of the decline was in the large bull category. Higher harvest quotas for bulls are considered to be a major factor, as most hunters select for older, larger bulls when they are available. Wolf predation may also have contributed to the decline in the number of large bulls, as their vulnerability to predation increases following the rut (Colman et al. 2003). Moderately high bull:cow ratios should be maintained to allow more adult bulls in the population to participate in the rut. While young bulls are capable of breeding, adequate numbers of large bulls are considered essential for an efficient and timely rut. Cows are stimulated and estrus induced by bull physiology and behavior. Synchrony of the rut is important to achieve synchrony in parturition, which provides a survival advantage for calves.

The NCH is probably the only herd in the state over 30,000 animals 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. The substantial increases in calf recruitment and adult survival since recent active wolf management began have directly resulted in an increased harvestable surplus for hunters. Given hunter interest and accessibility of this herd, there is little chance that the population will increase to unsustainable levels. Other caribou herds with less hunter access may not be manageable under the same conditions. Because of this, the NCH management strategy is considered a long-term experiment.

The management objective of having hunters control NCH size at a level that is below prior peak herd numbers, but well above herd lows, over a prolonged number of years, has never been accomplished on a large herd. A major benefit of this management strategy is to provide a more stable and predictable harvest of caribou from the herd over the long term. Historic annual harvests prior to the NCH peak in the 1960s ranged from 360 to 10,100. Following the crash in

the 1970s, harvests remained low for many years. If losses to wolf predation can be held at 10% or less, and the herd can be stabilized at 35,000–40,000, the projected annual harvests are expected to be about 3000–4000 caribou each year, thus eliminating the boom-and-bust cycle. In addition to stable harvestable surpluses for hunters, herd stability should provide a consistent prey supply for wolves, somewhat reducing predation pressure on moose.

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TABLE 1 Nelchina caribou fall composition counts and estimated herd size, regulatory years 2001–2006

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
2001–2002	37	40	22	57	21	3949	26,159	33,745	35,106
2002–2003	31	48	27	56	17	1710	25,161	34,380	35,939
2003–2004	31	35	21	60	19	3140	23,786	30,141	31,114
2004–2005	31	45	26	57	17	1640	27,299	36,677	38,961
2005–2006	36	41	23	57	20	3263	28,133	36,614	36,993
2006–2007	23	40	25	61	14	3300	NA	39,000[b]	NA

[a] Spring census.
[b] Modeled estimate.

TABLE 2 Nelchina caribou harvest data by permit hunt, regulatory years 2001–2006

Hunt No. /Area	Regulatory year	Permits Issued	Percent did not hunt	Percent Successful Hunters	Percent Unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
TC566[a]	2001–2002	1996	16%	49%	31%	977	99%	4	1%	1	982
	2002–2003	2003	15%	48%	35%	965	99%	1	0%	0	966
	2003–2004	2005	24%	38%	36%	746	99%	3	0%	3	752
	2004–2005	1869	10%	48%	30%	884	99%	5	1%	5	894
	2005–2006	4001	14%	54%	29%	1614	74%	548	25%	15	2177
RC	2001–2002	2568	25%	20%	38%	492	98%	3	1%	6	501
513/514[b]	2002–2003	2552	31%	14%	42%	349	96%	2	1%	12	363
	2003–2004	2598	32%	12%	36%	318	99%	2	1%	1	321
	2004–2005	2558	34%	13%	39%	250	74%	86	26%	1	337
	2005–2006	2570	39%	24%	35%	369	60%	239	39%	7	615
RC412[c]	2001–2002	No data Available									
	2002–2003	111	59%	6%	25%	7	100%	0	0%	0	7
	2003–2004	91	31%	11%	22%	9	90%	1	10%	0	10
	2004–2005	113	25%	17%	28%	18	95%	1	5%	0	19
	2005–2006	78	21%	21%	29%	6	38%	10	63%	0	16
DC590[d]	2001–2002	100	51%	17%	30%	7	41%	10	59%	0	17
	2002–2003	60	50%	13%	30%	5	63%	3	38%	0	8
	2003–2004	60	68%	7%	22%	4	100%	0	0%	0	4
	2004–2005	60	67%	18%	15%	10	91%	1	9%	0	11
	2005–2006	100	69%	8%	20%	6	75%	1	13%	1	8
Totals for	2001–2002	4664	22%	32%	35%	1476	98%	17	1%	7	1500
all permit	2002–2003	4726	25%	28%	39%	1326	100%	6	0%	12	1344
hunts	2003–2004	4754	29%	23%	35%	1077	99%	6	1%	4	1087
	2004–2005	4600	25%	27%	35%	1162	93%	93	7%	6	1261
	2005–2006	6749	24%	42%	31%	1995	71%	798	29%	23	2816

[a] Tier II subsistence drawing permit.
[b] Subsistence registration for local residents (Unit11 & 13), administered by BLM as federal hunt RC513 in 1990, and includes 20D residents in hunt 514. Bag limit was 2 caribou, so percentages related to permits, not hunters.
[c] Subsistence registration for Unit 12 residents, administered by FWS as Federal Hunt RC412.
[d] A drawing hunt.

TABLE 3 Nelchina caribou harvest and accidental death, regulatory years 2001–2006

Regulatory	Reported						Estimated			Accidental	Grand
Year	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	death	Total
2001–2002	1476	98%	17	1%	7	1500	200	100	300	200	2000
2002–2003	1326	100 %	6	0%	12	1344	200	100	300	200	1844
2003–2004	1077	100 %	6	0%	4	1087	200	100	300	200	1587
2004–2005	1162	93%	93	7%	6	1261	200	100	300	200	1761
2005–2006	1995	71%	798	29%	23	2816	400	200	600	200	3616

TABLE 4 Nelchina caribou Hunt TC566 annual hunter residency and success, regulatory years 2001–2006

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total	Local[a] resident	Nonlocal resident	Nonresident	Total	Total hunters
2001–2002	99	883	--	982	110	508	--	618	1600
2002–2003	69	897	--	966	104	599	--	703	1669
2003–2004	48	704	--	752	85	650	--	735	1487
2004–2005	66	828	--	894	69	486	--	555	1449
2005–2006	125	2052	--	2177	158	1016	--	1174	3351

[a] Local resident is a resident of Units 13, 11, or 12 along the Nabesna Road.

TABLE 5 Nelchina caribou hunt TC566 annual harvest chronology percent by harvest period, regulatory years 2001–2006

	Harvest Periods														
	Weeks (fall)								Months (winter)						
Regulatory year	1	2	3	4	5	6	7	8	Oct	Nov	Dec	Jan	Feb	Mar	n
2001–2002	9	7	5	11	12	17	12	0	7	20	--	--	--	--	955
2002–2003	0	6	10	8	11	11	16	17	2	3	3	4	3	5	958
2003–2004	0	7	8	12	11	16	23	22	--	--	--	--	--	--	747
2004–2005	0	5	9	9	11	15	14	13	8	6	2	3	1	4	892
2005–2006	0	4	7	7	8	12	12	10	16	6	3	3	3	8	2100

TABLE 6 Nelchina caribou hunt TC566 harvest percent by transport method, regulatory years 2001–2006

	Percent of harvest									
Regulatory Year	Airplane	Horse	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Airboat	Unk.	n
2001–2002	6	1	7	38	8	12	26	1	1	980
2002–2003	7	1	10	33	10	9	28	2	1	966
2003–2004	7	1	9	44	0	12	24	2	0	746
2004–2005	5	0	7	42	7	11	26	1	1	892
2005–2006	4	0	6	37	12	10	29	1	1	2174

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
907-465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006

LOCATION

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

GEOGRAPHIC DESCRIPTION: Yukon–Kuskokwim Delta

BACKGROUND

Historically, caribou ranged throughout the Yukon–Kuskokwim Delta (Y-K Delta), including Nunivak Island, and populations probably peaked during the 1860s (Skoog 1968). By the early 1900s, there were few caribou in the lowlands of the Y-K Delta. From the 1920s to the 1930s, reindeer were herded throughout much of the area but declined sharply in the 1940s (Calista Professional Services and Orutsararmuit Native Council 1984). Since the decline of the reindeer herds, the abundant caribou habitat throughout Unit 18 was only lightly used until 1994, when large numbers of Mulchatna caribou herd (MCH) animals began regular, seasonal use of the Kilbuck Mountains.

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

Caribou from the Western Arctic herd (WAH), the largest herd in Alaska, occasionally venture into the northern part of Unit 18. Until this reporting period, hunting regulations north of the Yukon River were liberal to allow hunters to take advantage of these infrequent hunting opportunities. However, now that MCH caribou are as likely as WAH caribou to use the area north of the Yukon River, caribou management throughout Unit 18 is based on MCH considerations.

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

Since 1985, Alaska Department of Fish and Game (ADF&G) and U.S. Fish and Wildlife Service (FWS) have cooperated to study the KCH, and more recently, the MCH in Unit 18. We deployed radio collars and completed numerous aerial surveys and radiotelemetry flights during this study. A technical paper detailing this effort is pending.

In 1990 the department joined with local residents and FWS to develop the Kilbuck Caribou Herd Cooperative Management Plan, but this plan is no longer followed due to the assimilation of the KCH by the MCH. The working group associated with this plan provided a forum to discuss caribou management with local residents in Unit 18 but has not been active due to budget considerations. Future public input will be accomplished through the Fish and Game Advisory Committees (AC) and the Federal Subsistence Regional Advisory Council (RAC).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

The caribou management goals for Unit 18 are:

- Increase the number of caribou.
- Improve compliance with caribou hunting regulations.
- Develop a better understanding of the interaction between caribou herds using Unit 18.

MANAGEMENT OBJECTIVES

The caribou management objectives for Unit 18 are:

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

METHODS

Since December 1990, we've discussed caribou management in Unit 18 with a working group made up of representatives from local villages and other agencies. More recently, we've gathered public input from the ACs and the RAC.

We continued the cooperative caribou study and participated in preparation of a manuscript being submitted for publication, though this work was primarily accomplished by other agencies. We also met with other agencies with an interest in MCH caribou to coordinate our resources and efforts more efficiently.

We conducted fall sex and age composition surveys in the Kilbuck Mountains during October 2004. Two observers and a pilot used a Robertson R44 helicopter to sample caribou for composition. A fixed-wing Cessna 185 aircraft equipped with radiotelemetry equipment was used to locate groups of caribou throughout the area. We conducted a similar survey during October 2005 using a Bell 206 Jet Ranger helicopter.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Before 1994, the KCH was small but growing. It was expanding its range when approximately 35,000 Mulchatna caribou overran it in September–October 1994. There have been annual influxes of approximately 10,000 to 40,000 Mulchatna caribou ever since.

We concluded that the MCH has assimilated the KCH because we have radiotelemetry information showing that former KCH caribou were calving with the MCH; composition surveys during spring 2001 and 2002 revealed that more than 90% of the caribou in the traditional KCH calving areas during the calving season were bulls; and the last time a significant number of caribou were found calving in a traditional KCH calving area was in spring of 2000. Because the caribou using Unit 18 are from the MCH, the population size information for Unit 18 should be taken from the Unit 17 caribou report, but in general, the MCH is declining.

Population Composition

We conducted a fall sex and age composition survey among MCH caribou in Unit 18 during October 2004 and in October 2005 (Table 1). Complete MCH composition data will be reported in the MCH caribou management report for Unit 17.

Distribution and Movements

Since 1994 and continuing through this reporting period, approximately 10,000 to 40,000 Mulchatna caribou entered Unit 18 from the east, generally during mid August to mid September. They wintered throughout the eastern lower Kuskokwim River and Kuskokwim Bay drainages, extending from the Whitefish Lake area near Aniak to the southernmost portions of Unit 18, and stayed through late March to early April, when they moved eastward into Units 17A, 17B, and 19B, following trails such as those near Kisaralik Lake, along the upper Kwethluk River and Trail Creek, and other trails.

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

WAH caribou occasionally use portions of Unit 18 north of the Yukon River; however, the number of caribou using this area is small relative to the size of the entire herd. Unit 18 is on the periphery of WAH range, and use of this area is occasional and intermittent. We did not find nor hear of any evidence of WAH caribou in Unit 18 during this reporting period.

MORTALITY

Harvest

Season and Bag Limit

2004–2005 and 2005–2006 Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18, south of the Yukon River		
RESIDENT HUNTERS: Up to 5 caribou	1 Aug– 15 Apr	
NONRESIDENT HUNTERS: 1 bull		1 Sep–1 Oct

Board of Game Actions and Emergency Orders. During its March 2006 meeting, the Board of Game changed the caribou season throughout Unit 18 so that beginning in 2006–2007, the resident season will be 1 August–15 March with a bag limit of 3 caribou, but no more than 1 bull may be taken prior to 1 November; the nonresident season will be 1–30 September with a 1 bull bag limit.

Hunter Harvest. In 2004–2005, 354 successful hunters reported killing 473 caribou, including 387 bulls, 85 cows, and 1 of unrecorded sex. In 2005–2006, 300 successful hunters reported killing 536 caribou, including 351 bulls, 177 cows, and 8 of unrecorded sex.

Harvest reporting remains poor, and the value of our reported harvest data for resident hunters is limited, except for those hunters using aircraft. Coffing et al. (2000) report that Akiachak residents (population of 560) harvested 374 caribou during the 1998 calendar year. If we consider that a similar harvest rate is possible among approximately 10,000 residents having similar access to caribou in Unit 18 (4792 people in 13 villages and 5449 people in Bethel), we can begin to grasp the extent of underreported caribou harvest in Unit 18.

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

Hunter Residency and Success. During the 2004–2005 season 96 nonresident hunters (75%) were successful, while 258 residents (72%) reported taking at least one caribou. In 2005–2006, 76 nonresident hunters (58%) were successful, while 224 residents (69%) reported taking at least 1 caribou.

Harvest Chronology. Typically, most of the harvest is unreported and occurs during the winter months, when caribou are available and snow conditions are favorable for travel by snowmachine. Even though the harvest is unreported, the chronology of the unreported harvest probably parallels the reported harvest. During 2004–2005, snow conditions were poor in the southern part of the unit near Goodnews Bay and Quinhagak. Snow conditions close to the Kuskokwim River were much better. Caribou were distributed more to the south during the early

and midwinter of 2004-2005. Later in the winter the caribou moved closer to the Kuskokwim River and more hunters had access to them. During 2005–2006, conditions were very good for travel through most of the season and caribou were generally available.

The reported harvest is greater during the month of September than any other single month. March and April experience the next highest harvests (Table 2).

Transport Methods. During the open water months, many caribou were reported taken using boats (25 in 2004–2005 and 63 in 2005–2006), but most were reported taken using airplanes (172 in 2004–2005 and 160 in 2005–2006). Nonresidents used airplanes almost exclusively.

During the winter months, caribou were typically taken using snowmachines (272 in 2004–2005 and 309 in 2005–2006) after snow conditions improved enough to permit safe travel. Only rarely are other transportation methods used.

Other Mortality

Little direct information is available regarding other mortality of caribou in Unit 18. Caribou are an important prey species for wolves, and predation by wolves has increased in recent years. The reported wolf harvest has increased more than tenfold in the last 15 years. Most of the wolves harvested in Unit 18 are taken opportunistically by caribou hunters. In the area south and east of the Kuskokwim River, we rarely see wolf tracks when caribou are absent.

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

HABITAT

Assessment

The lichen ranges throughout Unit 18 are in excellent condition. Before the influx of Mulchatna caribou into the KCH range, neither the Andreafsky nor the Kilbuck mountains had been substantially grazed by caribou or reindeer since the 1940s (Calista Professional Services and Orutsararmuit Native Council 1984).

Enhancement

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

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Cooperative Management Plan

The KCH Cooperative Management Plan provided guidelines for management of the KCH, but since the KCH no longer exists as a separate herd, this management plan is no longer being followed. No additional meetings are planned and we have suggested to the working group that it disband. Funding is not available for additional meetings, and public input is being accomplished through the ACs and the RAC. However, working group members are still consulted for public input as the need arises.

CONCLUSIONS AND RECOMMENDATIONS

Caribou found in Unit 18 are from the MCH and management direction reflects that interpretation. We should continue to test this interpretation through searches for calving caribou during the calving season.

The KCH Cooperative Management Plan is obsolete, but working group members remain interested in caribou management in Unit 18. There is no funding to maintain this working group, so we should solicit public input from the ACs and the RAC and continue to informally keep interested working group members abreast of caribou issues.

We should continue coordination with other agencies to consider our common interests in MCH caribou and better use our limited resources. This will become increasingly important if fall season hunting in Unit 18 continues to increase in the future. Though the reasons for increased hunting are difficult to ascertain, part of the increase is due to the establishment of a nonresident caribou season south of the Yukon River in 2002–2003. Other possible explanations expressed by hunters include: 1) the increasing difficulty hunters have accessing caribou hunting opportunities elsewhere; 2) a desire by hunters to hunt new areas; 3) a belief that "the whole herd" is in Unit 18, when generally only a small portion of it can be found in the unit; 4) a growing number of transporters serving caribou hunters; and 5) a sense that if hunters "just get far enough away," they will find better hunting conditions. This increased demand for caribou hunting opportunities coincides with a declining trend in the size of the MCH and will probably not be satisfied.

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TABLE 1 Fall composition of caribou from the Mulchatna Caribou herd (MCH) in Unit 18, 1999–2005

			Bulls			
Year	Cows	Calves	Small	Medium	Large	Total
1999	3277	462	594	261	137	4731
2000	1439	350	329	168	140	2426
2001	1299	286	223	153	90	2051
2002	808	191	190	118	36	1343
2003	1233	419	129	169	55	2005
2004	3948	713	304	183	63	5211
2005	2117	539	181	106	28	2971

TABLE 2 2000–2001 and 2005–2006, reported caribou harvest chronology in Unit 18

	Month											
Year	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
2000		28	117	2	11	16	14	27	38	2		
2001		35	132		10	116	56	92	131			
2002		28	117	2	11	16	14	27	35			
2003		35	248	1	10	116	56	92	131			
2004		17	158	5	8	44	36	26	78	84		
2005		4	169	19	25	54	21	14	104	88		

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

GAME MANAGEMENT UNITS: 19A, 19B, 19C, 19D, 21A, and 21E (59,756 mi^2) (55,303 mi^2)[2]

MCGRATH AREA HERDS: Beaver Mountains, Big River–Farewell, Rainy Pass, Sunshine Mountains, and Tonzona

GEOGRAPHIC DESCRIPTION: Unit 19, all drainages into the Kuskokwim River upstream from a straight line drawn between Lower Kalskag and Paimiut. Unit 21A, the Innoko River drainage upstream from and including the Iditarod River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers (beginning 1 July 2006, Unit 21A will no longer include the upper Nowitna drainage). Unit 21E, the Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage, and the Innoko River drainage downstream from the Iditarod River drainage.

BACKGROUND

Historically, caribou have played an important role in the McGrath area. During the 1800s caribou occurred sporadically in far greater numbers over a greater range than at present. Discussions with village elders and reports of early explorers corroborate this, although documentation is poor (Hemming 1970). The Mulchatna caribou herd once roamed throughout the Kuskokwim basin, but as numbers dwindled, this herd retreated south to better range (Whitman 1997). As the Mulchatna herd increased during the 1990s, it expanded its winter range northward into portions of Unit 19. The Mulchatna herd has recently declined substantially from over 200,000 animals in the mid 1990s to fewer than 45,000 toward the end of this report period. This decline is expected to continue and the impact of this once large herd will diminish accordingly.

The Beaver Mountains herd and Sunshine Mountains herd are the only 2 herds in the Kuskokwim Mountains north of the Kuskokwim River (Pegau 1986). Previous reports described these herds as the Kuskokwim Mountains herd/herds or the Beaver Mountains herd and

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

[2] Beginning 1 July 2006, Unit 21A will no longer include the upper Nowitna drainage.

Sunshine Mountains (Sunshine–Nixon) herd (Shepherd 1981; Pegau 1986). In the early 1980s, Pegau (1986) radiocollared caribou in the Beaver and Sunshine Mountains. Range overlap was not documented during the 4-year study. However, radiocollared caribou from the Beaver Mountains ranged south almost to Horn Mountain. Caribou in that vicinity were previously called the Kuskokwim Mountains herd, but are now considered Beaver Mountains herd animals.

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

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

Hunting effort for these 5 caribou herds has been in decline since RY01. Most local residents of Unit 19A harvest Mulchatna herd caribou, although changing movement patterns and a recent dramatic decline may affect each village's annual use of caribou. Nonresident and nonlocal residents also primarily harvest Mulchatna caribou migrating into Unit 19.

Hunter effort is low on the Beaver Mountains and Sunshine Mountains herds with <15 hunters annually. A low but stable number of nonresidents hunt these herds, mostly in combination with moose hunts in adjacent Unit 21A.

The Tonzona herd is used by local hunters from Nikolai and Telida when the herd moves near those villages during the late fall and winter. However, nonresidents and nonlocal residents harvest the greatest proportion of this herd.

Residents of Nikolai periodically hunt the Big River–Farewell herd during the winter. However, nonresidents and nonlocal residents primarily hunting for moose, sheep, and bison take the majority of animals harvested from this herd.

The Rainy Pass herd is hunted entirely by nonlocal and nonresident hunters primarily seeking moose and sheep.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Big River–Farewell 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

Population and harvest data were summarized for the report period by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY04 = 1 July 2004–30 June 2005). These data do not include Mulchatna herd animals taken in Unit 19. In RY98, ADF&G's Information Management Section began to send out reminders to hunters who failed to report their harvests, resulting in higher reporting rates. While data with higher reporting rates are closer to actual effort and harvest figures, they should still be interpreted as minimums. Some harvest reports were difficult to code to specific location because hunters provided ambiguous information. This causes difficulty in discerning which herd the harvested animal was from, especially in Unit 19C, where there are 3 different herds.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Current population size and recent trends in abundance for McGrath area caribou herds are based primarily on incidental observations and hunter information.

Population Size

The Beaver Mountains herd declined from the early 1960s until the late 1990s. Skoog (1963) estimated 3000 animals in 1963, Pegau (1986) estimated 1600 in 1986, and Whitman (1995) estimated 865 in 1992 and 536 caribou in 1994 (Whitman 1997). In early summer 1995, Whitman counted approximately 400 animals concentrated on the calving area. The normal herd range was searched in June 2001, and 86 caribou were observed in a single group. A second group of more than 50 caribou was observed on the same day in an adjacent area by a member of the public. The current population estimate for the Beaver Mountains caribou herd is 150–200.

The Sunshine Mountains herd also declined over the same period as the Beaver Mountains herd. Whitman (1997) estimated the population was 700 animals in 1994 and 500 in 1995. In July 2000, a search of the Sunshine Mountains was conducted from the Cloudy Mountains north to Von Frank Mountain, mostly along ridges and open hillsides. No caribou were observed; however, Sunshine Mountains caribou were observed calving in the Nixon Fork of the Takotna River during 2002, 2003, and 2004. The current population estimate for this herd is 100–150 animals.

In July 1996, 1093 caribou from the Rainy Pass herd were counted in Unit 16 during sheep surveys. Whitman (ADF&G, personal communication) suspected that 1000–1500 more caribou of the Rainy Pass herd were located in Unit 19 at that time but were not counted. Based on observations and composition surveys, this herd may have 1500–2000 caribou.

In 1997, Whitman estimated the Big River–Farewell herd at 1000–2000 animals. The herd may have declined since that estimate, based on composition surveys and mortality of radiocollared caribou from the adjacent Rainy Pass herd (Boudreau 2003). The current estimate for the Big River–Farewell herd is 750–1500 animals.

In 1991, Denali National Park Service staff estimated 1300 caribou in the Tonzona herd while conducting surveys of the nearby Denali herd in Denali National Park and Preserve. The current estimate for the Tonzona herd is 750–1000 animals. This is based on both hunter observations and extrapolation of information collected from the adjacent Rainy Pass herd.

Population Composition

No composition surveys were conducted during RY04–RY05.

Distribution and Movements

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

Sunshine Mountains. The Sunshine Mountains caribou range 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 mostly on the Nixon Flats. Other than the Kenai Lowlands herd, the Sunshine Mountains herd is the only herd in Alaska known to regularly calve in low-lying, forested muskeg habitat. Wintering areas are primarily in the drainages of the Nixon Fork. In midsummer these caribou are found predominantly in the Sunshine Mountains; however, small groups were observed in summers 2003 and 2004 on the Nixon Flats.

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

Big River–Farewell. The range of the Big River–Farewell herd is from the South Fork 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 in the flats north of the summer range.

Rainy Pass. The range of the Rainy Pass herd 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 summer in both Units 16B and 19C.

Identified wintering areas of radiocollared individuals are in the Post Lake area, upper South Fork, and upper Ptarmigan Valley.

MORTALITY

Harvest

Season and Bag Limit.

RY04 and RY05 Herd/Unit/Bag limit	Resident open seasons	Nonresident open seasons
Mulchatna		
Unit 19A, Lime Village Management Area.		
RESIDENT HUNTERS: 4 caribou total.		
Bulls.	1 July–30 Jun	
Any caribou.	10 Aug–31 Mar	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–31 Mar
Mulchatna, Beaver Mountains		
Unit 19A and Unit 19B within the Nonresident Closed Area.		
RESIDENT HUNTERS: 5 caribou, no more than 1 bull may be taken 1 Aug–30 Nov.	1 Aug–15 Apr	
NONRESIDENT HUNTERS:		No open season
Remainder of Units 19A and 19B.		
RESIDENT HUNTERS: 5 caribou, no more than 1 bull may be taken 1 Aug–30 Nov.	1 Aug–15 Apr	
NONRESIDENT HUNTERS: 1 caribou.		1 Aug–15 Apr
Tonzona, Big River–Farewell, Rainy Pass		
Unit 19C.		
RESIDENT AND NONRESIDENT HUNTERS: 1 bull.	10 Aug–20 Sep	10 Aug–20 Sep
Beaver Mountains, Tonzona, Big River–Farewell		
Unit 19D, except the drainages of the Nixon Fork River.		
RESIDENT HUNTERS: 1 bull;	10 Aug–20 Sep	
or 1 caribou;	1 Nov–31 Jan	
or 5 caribou.	May be announced	
NONRESIDENT HUNTERS: 1 bull.		10 Aug–20 Sep
Sunshine Mountains		

RY04 and RY05 Herd/Unit/Bag limit	Resident open seasons	Nonresident open seasons
Remainder of Unit 19D. RESIDENT AND NONRESIDENT HUNTERS: 1 bull.	10 Aug–20 Sep	10 Aug–20 Sep
Beaver Mountains, Sunshine Mountains Unit 21A. RESIDENT AND NONRESIDENT HUNTERS: 1 bull.	10 Aug–20 Sep	10 Aug–20 Sep
Beaver Mountains Unit 21E. RESIDENT AND NONRESIDENT HUNTERS: 1 caribou and 2 additional caribou during winter if season announced.	10 Aug–30 Sep	10 Aug–30 Sep

Alaska Board of Game Actions and Emergency Orders. During the March 2004 meeting, the Alaska Board of Game passed several proposals that changed caribou bag limits and seasons. In both the nonresident closed area and in the remainder of Units 19A and 19B, the resident bag limit remained at 5 caribou; however the bull portion of the bag limit was reduced from 2 to 1 and the bull season was extended from 10 October–30 November to 1 August–30 November. Additionally, the nonresident bag limit was reduced from 2 caribou to 1.

The department introduced several proposals based on concerns about the Beaver Mountains and Sunshine Mountains herds' population and harvest. The board aligned the Unit 19D fall season with Unit 19C (10 August–20 September) and changed the bag limit from 1 caribou to 1 bull in that portion of Unit 19D excluding the Nixon Fork River drainage.

In Unit 21A the bag limit was changed from 1 caribou to 1 bull and the winter season (10–20 Dec) was eliminated. Additionally, the season was shortened from 10 August–30 September to 10 August–20 September.

In 2006 the board revised the boundary between Units 21A and 21B. The upper Nowitna River drainage was transferred from Unit 21A to Unit 21B so that Unit 21A will encompass only the Innoko River drainage beginning in RY06.

Hunter Harvest. There was a general decline in reported harvest from RY01 to RY05 for local caribou herds in the McGrath area (Table 1). However, hunter effort also declined over the same period with only 92 hunters in RY05, compared to 188 hunters in RY01 (Table 2a). In general, harvest and effort fluctuated during RY01–RY05, but remained low (Tables 2b–2f). The average McGrath area caribou harvest during RY01–RY05 was 44 animals, of which 90% were bulls (Table 1). No caribou were harvested in the upper Nowitna River drainage during RY01–RY05. A large percentage of the decline in harvest and effort occurred where herd identification was not known (Table 2g); this decline may reflect changing dynamics associated with the much larger Mulchatna herd.

Hunter Residency and Success. During RY01–RY05, local hunters took 5% of the reported harvest of local caribou herds. However, local users were less likely to report hunting activities than nonlocal residents and nonresidents. During RY01–RY05, nonlocal residents took 37% and nonresidents took 56% of harvested animals.

Harvest Chronology. The majority of the caribou harvested were taken during August and September (Table 3) with 28% and 66% of all harvest in August and September, respectively.

Transport Methods. Aircraft were the most common means of hunter transportation to access all area caribou herds. From RY01–RY05, 73% of caribou hunters used aircraft. Three- or 4-wheelers were the next most commonly used method of transportation at 21%. All other means of transportation averaged less than 5% from RY01–RY05 (Table 4).

Other Mortality

No specific data were collected concerning natural mortality rates or factors during RY01–RY05. High mortality may have occurred during winter 1994–1995, which had heavy snowfall.

HABITAT

Biologists have not investigated caribou range conditions in Units 19 or 21 in recent years, but range is probably not limiting. Lichens appear abundant on winter ranges, and these areas supported 4–5 times as many caribou during the 1960s. Adult body size was also relatively large when we weighed caribou during deployment of radio collars in the 1990s.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

Limited data are available related to McGrath area caribou herds. Our current population estimates are based on various data resources, often incidental to other work. We should periodically conduct rigorous surveys in order to estimate population size to aid in decisions regarding harvest objectives.

CONCLUSIONS AND RECOMMENDATIONS

Harvest was low for all McGrath area herds and met management objectives during RY01–RY05. The Big River–Farewell herd was managed to provide for a harvest of up to 100 bull caribou and an average of 14 were harvested. The objective for the Rainy Pass herd was up to 75 bull caribou, and the average reported harvest was 8. The objective for the Sunshine Mountains and Beaver Mountains herds was to provide for a combined harvest of up to 25 caribou, and the average reported harvest was less than 1 caribou. The Tonzona herd objective was a harvest of up to 50 caribou, and the average reported harvest was 4 caribou.

Caribou harvest from all McGrath area herds decreased during RY01–RY05. However, during this same period, hunter effort also declined by nearly 50%. This may reflect a decline in sheep hunter numbers in Unit 19C (which could reduce incidental caribou harvest) or a change in hunting pressure on the Mulchatna herd. Finally, changes in seasons and bag limits for these herds may also have had an effect on total harvest.

All the herds in the McGrath area are small and pose special challenges in developing cost-effective and efficient survey–inventory programs. Research is needed to develop more efficient techniques directed at management applications for these small caribou herds.

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TABLE 1 McGrath[a] area caribou harvest by herd, regulatory years 2001–2002 through 2005–2006

Regulatory year	Beaver Mtns			Big River			Rainy Pass			Sunshine Mtns			Tonzona			Unknown			Total harvest		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
2001–2002	2	0	2	26	4	30	12	0	12	4	0	4	6	0	6	23	4	27	73	8	81
2002–2003	2	0	2	21	0	21	5	0	5	0	0	0	5	0	5	25	3	28	58	3	61
2003–2004	1	3	4	5	1	6	11	0	11	0	0	0	3	0	3	12	0	12	32	4	36
2004–2005	2	0	2	9	2	11	10	0	10	0	0	0	3	0	3	6	2	8	30	4	34
2005–2006	0	0	0	3	1	4	1	0	1	0	0	0	2	0	2	1	0	2[b]	7	1	9

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

[b] Includes 1 caribou of unknown sex.

TABLE 2A McGrath area[a] caribou herds hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[b]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[b]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	3	28	49	1	81	(43)	13	60	34	0	107	(57)	188
2002–2003	4	19	35	3	61	(30)	6	80	53	2	141	(70)	202
2003–2004	2	15	19	0	36	(29)	3	54	30	3	90	(71)	126
2004–2005	1	14	19	0	34	(34)	7	33	26	1	67	(66)	101
2005–2006	2	5	2	0	9	(10)	4	54	24	1	83	(90)	92

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.
[b] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2B Beaver Mountains caribou herd hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	0	0	2	0	2	(15)	5	4	2	0	11	(85)	13
2002–2003	0	0	2	0	2	(20)	1	6	1	0	8	(80)	10
2003–2004	0	3	1	0	4	(29)	0	7	3	0	10	(71)	14
2004–2005	0	0	2	0	2	(25)	2	1	3	0	6	(75)	8
2005–2006	0	0	0	0	0	(0)	0	5	1	0	6	(100)	6

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2C Big River caribou herd: hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	2	16	12	0	30	(48)	1	26	6	0	33	(52)	63
2002–2003	1	5	12	3	21	(30)	1	29	17	2	49	(70)	70
2003–2004	1	4	1	0	6	(18)	2	16	9	0	27	(82)	33
2004–2005	0	7	4	0	11	(28)	1	15	12	0	28	(72)	39
2005–2006	2	2	0	0	4	(9)	1	26	14	1	42	(91)	46

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2D Rainy Pass caribou herd hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	0	2	10	0	12	(43)	0	6	10	0	16	(57)	28
2002–2003	0	4	1	0	5	(11)	0	26	13	0	39	(89)	44
2003–2004	0	3	8	0	11	(27)	0	17	11	2	30	(73)	41
2004–2005	0	5	5	0	10	(59)	0	4	3	0	7	(41)	17
2005–2006	0	1	0	0	1	(6)	0	12	5	0	17	(94)	18

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2E Sunshine Mountains caribou herd hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	0	0	4	0	4	(57)	1	2	0	0	3	(43)	7
2002–2003	0	0	0	0	0	(0)	1	1	0	0	2	(100)	2
2003–2004	0	0	0	0	0	(0)	1	1	0	0	2	(100)	2
2004–2005	0	0	0	0	0	(0)	1	0	0	0	1	(100)	1
2005–2006	0	0	0	0	0	(0)	0	1	0	0	1	(100)	1

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2F Tonzona caribou herd hunter residency and success, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	1	0	5	0	6	(100)	0	0	0	0	0	(0)	6
2002–2003	0	0	5	0	5	(45)	0	3	3	0	6	(55)	11
2003–2004	0	1	2	0	3	(60)	0	1	1	0	2	(40)	5
2004–2005	0	1	2	0	3	(43_	0	1	3	0	4	(57)	7
2005–2006	0	0	2	0	2	(67)	0	1	0	0	1	(33)	3

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 2G Hunter residency and success for caribou where herd identification was not known, regulatory years 2001–2002 through 2005–2006

Regulatory year	Successful						Unsuccessful						Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	Local resident[a]	Nonlocal resident	Nonresident	Unk	Total	(%)	
2001–2002	0	10	16	1	27	(38)	6	22	16	0	44	(62)	71
2002–2003	3	10	15	0	28	(43)	3	15	19	0	37	(57)	65
2003–2004	1	4	7	0	12	(39)	0	12	6	1	19	(61)	31
2004–2005	1	1	6	0	8	(28)	3	12	5	1	21	(72)	29
2005–2006	0	2	0	0	2	(11)	3	9	4	0	16	(89)	18

[a] Local resident is any resident of Units 19, 21A, or 21E.

TABLE 3 McGrath[a] area caribou harvest chronology by month, regulatory years 2001–2002 through 2005–2006

Regulatory year	Harvest chronology by month								
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Unk	*n*
2001–2002	18	60	0	1	1	1	0	0	81
2002–2003	21	34	0	0	3	0	0	3	61
2003–2004	10	23	0	0	0	3	0	0	36
2004–2005	12	22	0	0	0	0	0	0	34
2005–2006	1	6	0	0	0	0	0	1	9[b]

[a] Excludes Mulchatna caribou herd animals taken in Unit 19.
[b] Includes 1 caribou harvested in April.

TABLE 4 McGrath[a] area transportation method of successful caribou hunters, regulatory years 2001–2002 through 2005–2006

Regulatory year	Harvest by transport method															
	Airplane	(%)	Horse	(%)	Boat	(%)	3- or 4-Wheeler	(%)	Snowmachine	(%)	ORV	(%)	Highway vehicle	(%)	Unk	*n*
2001–2002	56	(69)	0	(0)	1	(1)	18	(22)	3	(4)	3	(4)	0	(0)	0	81
2002–2003	51	(84)	0	(0)	0	(0)	5	(8)	3	(5)	2	(3)	0	(0)	0	61
2003–2004	22	(61)	0	(0)	0	(0)	10	(28)	3	(8)	0	(0)	0	(0)	1	36
2004–2005	28	(82)	0	(0)	1	(3)	5	(15)	0	(0)	0	(0)	0	(0)	0	34
2005–2006	6	(67)	0	(0)	0	(0)	3	(33)	0	(0)	0	(0)	0	(0)	0	9

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

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO Box 115526
Juneau, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

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

HERD: Delta (including former Yanert herd)

GEOGRAPHIC DESCRIPTION: Central Alaska Range and Tanana Flats

BACKGROUND

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

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

Estimated at 1500–2500 in 1975, by 1989 the Delta herd had grown to a peak of nearly 11,000. It declined sharply in the early 1990s, as did other central Alaska Range herds, to less than 4000. Valkenburg et al. (1996) present a detailed analysis of the decline. The herd continued a slow decline and dropped to less than 3000 animals by the late 1990s (Table 1).

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

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

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 Delta caribou herd. This ground-based control program was terminated amid considerable controversy. Valkenburg et al. (2002) summarized the effects of this program on the Delta caribou.

Harvest and harvest regulations also varied widely due to population fluctuations and strong hunter interest. The Alaska Board of Game suspended hunting in 1992 in response to declining numbers, and the herd remained closed to hunting through regulatory year (RY) 1995 (RY = 1 July through 30 June; e.g., RY95 began 1 July 1995 and ended 30 June 1996). Hunting has been by drawing permit for bull caribou only since the hunt was resumed in RY96 (Table 2).

Research and enhancement of Delta caribou was a regional priority through the late 1990s. 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 a higher level of consumptive use. The current management objectives are defined in Intensive Management regulations (5 AAC 92.108) that permitted the 1993–1994 wolf control effort to reverse the decline. Although the wolf control program was suspended before an increase in caribou abundance was realized, the regulations remain in place.

MANAGEMENT OBJECTIVES

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

METHODS

POPULATION STATUS AND TREND

Population Census

In 2004 we conducted a census of the Delta caribou herd on 14 July using the radio-search technique (Valkenburg et al. 1985). The herd was surveyed using 6 fixed-wing aircraft (P. Valkenburg – pilot, D. Young – observer; and R. Boertje – pilot/observer; C. Gardner pilot/observer; B Dale – pilot/observer; T. Cambier pilot/observer and P. Zackowski

pilot/observer). Caribou were radiotracked with 4 aircraft (P. Valkenburg, R. Boertje, C. Gardner, B. Dale). Valkenburg and Young conducted all photography. We did not use the ADF&G DeHavilland Beaver aircraft during this survey.

Searching began at approximately 7:30 a.m. Weather was hot, skies were clear with a light, smoky haze, and winds and turbulence were negligible. We searched all appropriate habitat between Jarvis Creek to the east, the Parks Highway to the west, the Alaska Range foothills to the north, and the upper Nenana River as far east as the Clearwater mountains to the south. Search time was approximately 42 hours.

All photographs were taken with a handheld digital camera (Olympus Stylus, 4 megapixel, 5.8–17.5 mm lens). Digital photographs were downloaded to a computer and imported into Microsoft PowerPoint® where image enlargement could be adjusted from 100% to 400% for counting purposes.

We counted 1495 caribou in the 7 large groups which were photographed in Coal Creek north of Mystic Mountain, near Keevy Peak, in the upper Wood River and Yanert Fork, and the East Fork Susitna River. An additional 390 caribou were counted in 52 smaller groups scattered across the herd's entire range. In all, we counted 1885 caribou and accounted for 52 of 61 (85%) active collars.

A 2005 census was not conducted due to smoke from Interior forest fires.

Population Composition

We conducted composition surveys in late September or early October using R-22 or R-44 helicopters and Bellanca Scout or Piper PA-18 aircraft. Classification categories consisted of cows; calves; and large, medium, and small bulls. Observers identified bulls by the absence of vulva and classified them as large, medium, or small by antler characteristics (Eagan 1993). Biologists in the fixed-wing aircraft located the radiocollared caribou. Biologists in the helicopter classified caribou that were in groups with radiocollared members. We broadly searched areas containing numerous radiocollared caribou for additional groups. The helicopter observer also classified any caribou found in a search of the surrounding area and any caribou encountered while in transit between search areas. We tallied the composition of each group on a 5-position counter and recorded the tallies on a data sheet.

In 2004 we classified 1267 caribou: 99 large bulls, 142 medium bulls, 97 small bulls, 686 cows and 243 calves (Table 1). We located approximately 80% of the 61 active radiocollared caribou. The largest number of caribou classified from a single group was 158, the smallest a group of 2 caribou, and mean group size was 55.

In 2005 we classified 1182 caribou: 90 large bulls, 157 medium bulls, 73 small bulls, 646 cows and 216 calves (Table 1). We located approximately 38 of 63 (60%) active radiocollared caribou. The largest number of caribou classified from a single group was 176, the smallest a single caribou, and mean group size was 30. The 2005 calf:cow ratio of 33:100 was similar to 2004 (35:100) and second highest since 1989 (36:100). Caribou were found primarily in the Yanert Fork, the northern foothills of the Alaska Range between Dry Creek and the Little Delta River,

and the south side of the Alaska Range between Wells Creek and the West Fork Susitna River (Unit 13).

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The Delta herd declined from more than 10,000 in 1989 to less than 4000 in 1993 (Table 1). The decline resulted from interrelated effects of adverse weather and predation, and also occurred in neighboring herds (Valkenburg et al. 1996). However, the Delta herd declined more than the neighboring Denali and Macomb herds. The Delta herd existed at a much higher density than Denali and Macomb herds, indicating that density-dependent food limitation might have influenced the magnitude of the decline (Valkenburg et al. 1996). Since the decline, estimates of the size of the herd have varied. Survey data indicated the herd increased slightly in 1994 and 1995, but subsequent data indicated a declining trend. The minimum herd size declined from 4646 caribou in 1995 to 2211 caribou in 2004.

Population Composition

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

In general, calf:cow ratios were relatively low and declining through the 1990s, and that trend continued into the early 2000s (Table 1). Ratios in 2000 and 2001 were the lowest observed since 1993. Calf mortality studies conducted during 1995–1997 indicate this was primarily due to predation by wolves, grizzly bears, and golden eagles (Valkenburg et al. 2002). Analysis of fecal samples collected in late winter 1989 and 1993 indicated depletion of the foothill lichen range in Unit 20A (Valkenburg 1997; Valkenburg et al. 2002). The proportion of lichens in the diet was relatively low and the proportion of mosses high compared to caribou from other Interior herds. Calf:cow ratios in autumn have shown improvement recently (2002 – 25:100; 2003 – 20:100; 2004 – 35:100; and 2005 – 33:100), but whether this was the result of higher productivity or lower mortality is not known.

Distribution and Movements

Through the mid 1980s, the Delta herd showed strong fidelity to calving areas between the Delta and the Little Delta rivers in southeastern Unit 20A (Davis et al. 1991). However, as the herd increased, the area used for calving extended to the foothills between Dry Creek and the Delta River (Valkenburg et al. 1988). After 1993 the herd also used the upper Wood River, Dick Creek, upper Wells Creek, and the upper Nenana and Susitna drainages for calving (Valkenburg et al. 2002). During the remainder of the year, the herd is generally distributed among the

northern foothills from the Delta River to the Nenana River. However, during fall and early winter 2000, a significant portion of the Delta herd was located east of the Delta River in the Donnelly Dome/Flats area, and this trend has generally continued through 2006.

MORTALITY

Harvest

Season and Bag Limit (RY04 and RY05).

	Resident open season	Nonresident open season
Unit 20A		
1 bull by drawing permit only; up to 200 permits may be issued.	10 Aug–20 Sep	10 Aug–20 Sep

Alaska Board of Game Actions and Emergency Orders. In response to a proposal at the March 1996 meeting, the Alaska Board of Game authorized a drawing permit hunt (DC827) 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–RY03 and 200 annually during RY04–RY05 in response to proposals to increase the number of permits. No emergency orders were issued during RY04–RY05.

Permit Hunts. Since RY96, when the department first issued permits for DC827, the percentage of permittees who did not hunt has ranged between 17% (RY97) and 47% (RY05) (Table 2). The percentages who did not hunt in RY04 (42%) and RY05 (47%) were higher than the previous 6-year average (34%). Success rates of those who hunted have ranged between 35% (RY00) and 71% (RY97). Success rates of 53% in RY04 and 44% in RY05 were similar to the previous 6-year average (54%). Relatively low hunter participation, especially for a drawing permit hunt, was probably a function of a large portion of the herd being distributed across the eastern portion of its range, which is relatively inaccessible compared to the western portion, where access is good, especially by all-terrain vehicles (ATVs).

Hunter Residency and Success. Beginning in RY02, harvest by nonlocal resident and nonresident hunters (22 caribou) surpassed that of local residents (15 caribou) for the first time since the hunt began in RY96 (Table 3). This trend continued through RY04–RY05 where 43 caribou were taken by nonlocal resident and nonresident hunters and 38 were taken by local resident hunters. This hunt is becoming more popular with nonlocal and nonresident hunters. Success rates of nonresident hunters (71%) continued to be higher in RY04–RY05 than that of resident (local and nonlocal) hunters (47%). A likely explanation is that nonresidents are more inclined to participate in guided hunts, which typically have higher success rates than nonguided hunts preferred by resident hunters. For example, in RY04–RY05, 36% (5/14) of the nonresident hunters reported using a guide compared to 1% (1/152) for resident hunters.

Harvest Chronology. No clear trends were apparent in harvest chronology for RY96 through RY05 (Table 4). During RY96 harvest was, for the most part, evenly distributed. During RY97 the highest harvest of caribou occurred late in the season, whereas in RY98 and RY02–RY04 the

highest harvest occurred early in the season. In RY99 the highest harvest occurred in late August, while in RY00, RY01 and RY05 the highest harvests were in early September. Variations in harvest chronology within and among years were likely influenced by seasonal and annual variations in weather and caribou distribution.

Transport Methods. Overall, the most common mode of transportation used by successful hunters (RY96–RY05) was 3- or 4-wheelers followed by aircraft, off-road vehicles (ORVs), highway vehicles, horses, and boats (Table 5). Interestingly, RY05 was the first year since this permit hunt began that successful hunters did not access the hunt area by highway vehicle.

Other Mortality

Research staff conducted calf mortality studies during 1995–1997, and wolves, grizzly bears, and eagles were primary predators of caribou in Unit 20A. Details of causes and trends in calf and adult mortality are in research reports and publications (Davis et al. 1991; Boertje et al. 1996; Valkenburg et al. 1996; Valkenburg 1997; Valkenburg et al. 1999; Valkenburg et al. 2002). Calf and adult survival were poor during the population decline; consequently, the Board of Game adopted a wolf predation control implementation plan in Unit 20A to reduce wolf numbers to rebuild the caribou population. In addition, Valkenburg (1997) and Valkenburg et al. (2002) tested a diversionary feeding program that addressed predation by a wolf pack in the Wells Creek area. They concluded diversionary feeding of wolves near caribou calving areas could be a successful method of reducing predation in some circumstances, but has significant limitations, primarily because wolves will continue to hunt even when they are not hungry.

HABITAT

Assessment and Enhancement

Research and management staff members periodically collect fecal samples on the winter range to monitor the status and use of lichen ranges. We also weigh female caribou calves to determine body condition and relate body condition to natality rates. Analysis of fecal samples collected in late winter 1989 and 1993 indicated depletion of lichens on winter ranges used by caribou in Unit 20A. The proportion of lichens in the diet was relatively low, and the proportion of mosses was high compared to caribou in other Interior herds (Valkenburg et al. 2002). Two studies, Valkenburg (1997) and Valkenburg et al. (2002), detailed trends in weights of caribou calves. They found the heaviest mean April calf weights occurred during 1979–1983 as the Delta herd was recovering from its population low in the early 1970s. Mean calf weights declined dramatically from 1989 to 1991 coincident with deep snow winters and dry summers. Calf weights remained relatively low between 1992 and 2001, and have not recovered to the high levels seen during the late 1970s and early 1980s.

CONCLUSIONS AND RECOMMENDATIONS

The primary concern at this juncture is whether the herd will be able to grow or support improved harvests even though wolf densities may increase due to high density of moose. Currently, wolf numbers are believed to be moderately high (about 13–16 wolves/1000 km^2) due to the abundant moose population. The degree to which high wolf:caribou ratios will influence predation rates on caribou is unknown. While high ratios seem bound to increase caribou

mortality to some degree, a variety of mechanisms may have mitigating effects. Wolf behavior patterns, prey selection, and hunting patterns may result in wolves preying primarily on moose. Low vulnerability of caribou due to improved nutritional status, from the herd being at lower density, 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 Intensive Management objectives to reverse the decline of the herd and increase the midsummer population to 5000–7000 and to sustain an annual harvest of 300–700 caribou. Continued research on the Delta herd as funding is available, including analysis of fecal samples and condition of caribou, will help to determine if the current population objective is still too high. However, even with favorable weather, meeting the management objectives will be unlikely without more effective management of predation.

In March 2004 the board authorized an increase in the number of drawing permits the department may issue for hunt DC827, from 100 to 200, because hunter participation had been declining and the harvest of bulls had been below the recommended allowable harvest of 2–3% annually. The proportion of large bulls in the population has remained high, and our estimates indicate that additional bulls can be harvested from the population without affecting herd dynamics. We will continue to monitor sex ratios during fall surveys to ensure that management objectives concerning bull:cow ratios continue to be met.

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TABLE 1 Delta caribou fall composition counts and estimated population size, 1983–2006

Survey date	Bulls: 100 Cows	Large bulls: 100 Cows	Calves: 100 Cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	% Total bulls	Composition sample size	Minimum herd size[a]	% Herd sampled
10/4/83	35	12	46	25	55	59	6	36	20	1208	5055	24
10/17/84	42	17	36	20	56	28	32	40	24	1093	6227	18
10/9–12/85	49	9	36	20	54	57	24	19	26	1164	8083	14
10/22/86	41	9	29	17	59	49	30	21	24	1934	7204[b]	27
10/05/87	32	8	31	19	61	53	23	24	20	1682	7780[b]	22
10/14/88	33	4	35	21	60	50	38	12	20	3003	8338[c]	36
10/10/89	27	2	36	22	62	64	28	7	16	1965	10,690	18
10/4/90	38	6	17	11	65	45	39	16	24	2411	7886[c]	31
10/1/91	29	5	8	6	73	55	29	16	21	1705	5755	30
9/28/92	25	3	11	8	74	46	43	11	19	1240	5870	21
9/25/93[d]	36	7	5	3	72	45	33	22	25	1525	3661	42
10/3–6/94[d]	25	10	23	16	68	33	29	39	7	2131	4341	49
10/3/95	24	10	20	14	69	41	19	40	17	1567	4646	34
10/3/96	30	9	21	14	66	51	20	29	20	1537	4100	37
9/27/97	27	9	18	12	69	48	20	32	19	1598	3699	43
10/1/98	44	9	16	10	62	31	49	20	27	1519	3829	40
10/2/99	44	10	19	11	62	37	40	23	27	674	3625	19
10/3–4/00	46	10	11	7	64	41	37	22	30	1010	3227	31
9/30/01	39	9	13	8	66	46	30	24	26	1378	2965	46
9/28/02	50	17	25	14	57	43	23	34	29	924	2803	33
10/6–7/03	37	10	20	13	64	32	39	29	23	1023	2581	40
9/29/04	49	14	35	19	54	29	42	29	27	1267	2211	58
9/26/05	50	11	33	18	55	28	49	23	27	1182	–[e]	62
10/5&15/06	40	8	27	16	60	45	36	19	24	1022	–[e]	64

[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.
[e] Census was not conducted.

TABLE 2 Delta caribou harvest data by permit hunt, regulatory years 1996–1997 through 2005–2006

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	100	38 (38)	29 (47)	33 (53)	33 (100)	0 (0)	0 (0)	33
	2002–2003	100	33 (33)	30 (45)	37 (55)	37 (100)	0 (0)	0 (0)	37
	2003–2004[a]	101	37 (37)	31 (48)	33 (52)	33 (100)	0 (0)	0 (0)	33
	2004–2005	150	63 (42)	41 (47)	46 (53)	45 (98)	1 (2)	0 (0)	46
	2005–2006	150	71 (47)	44 (56)	35 (44)	35 (100)	0 (0)	0 (0)	35

[a] Includes 1 bull killed in hunt SC827 (Governor's Permit).

TABLE 3 Delta caribou annual hunter residency and success, permit hunt DC827, regulatory years 1996–1997 through 2005–2006

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
2001–2002	24	6	3	33 (54)	10	14	4	28 (46)	61
2002–2003	15	19	3	37 (55)	18	11	1	30 (45)	67
2003–2004[b]	17	10	6	33 (52)	14	14	3	31 (48)	64
2004–2005	24	17	5	46 (53)	20	20	1	41 (47)	87
2005–2006	14	16	5	35 (44)	14	27	3	44 (56)	79

[a] Residents of Unit 20.

[b] Includes 1 bull killed in hunt SC827 (Governor's Permit).

TABLE 4 Delta caribou annual harvest chronology percent by harvest periods, permit hunt DC827, regulatory years 1996–1997 through 2005–2006

Regulatory year	Chronology percent by harvest periods					
	8/10–8/20	8/21–8/31	9/1–9/11	9/12–9/20	Unk	*n*
1996–1997	27	18	27	27	0	22
1997–1998	27	18	14	41	0	44
1998–1999	34	14	26	26	0	50
1999–2000	29	37	16	16	3	38
2000–2001	33	17	38	13	0	24
2001–2002	21	18	48	12	0	33
2002–2003	49	22	27	3	0	37
2003–2004[a]	39	15	15	27	3	33
2004–2005	43	28	17	9	2	46
2005–2006	20	17	46	14	3	35

[a] Includes 1 bull killed in hunt SC827 (Governor's Permit).

TABLE 5 Delta caribou harvest percent by transport method, permit hunt DC827, regulatory years 1996–1997 through 2005–2006

Regulatory year	Harvest percent by transport method							
	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
2001–2002	39	0	0	45	9	3	3	33
2002–2003	30	3	0	51	11	5	0	37
2003–2004[a]	27	6	3	58	3	3	0	33
2004–2005	30	7	0	52	4	7	0	46
2005–2006	40	3	0	49	6	0	3	35

[a] Includes 1 bull killed in hunt SC827 (Governor's Permit).

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. Box 115526
Juneau, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

GAME MANAGEMENT UNITS: 20B, 20C, 20D, 20E, and 25C (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 currently ranges up to 50 miles into Yukon, Canada

BACKGROUND

The Fortymile caribou herd (FCH) is an international herd shared between Alaska and Yukon, Canada, and is an important herd for consumptive and nonconsumptive uses in Interior Alaska and southern Yukon. Like other caribou herds in Alaska, the FCH has displayed major changes in abundance and distribution. During the 1920s it was the largest herd in Alaska and was one of the largest in the world, estimated at over 500,000 caribou (Murie 1935). For unknown reasons, the FCH declined during the 1930s to an estimated 10,000–20,000 caribou (Skoog 1956). Timing of the subsequent recovery is unclear, but by the 1950s the FCH had increased to an estimated 50,000 caribou (Valkenburg et al. 1994). Herd recovery was likely aided significantly by a federal predator control program that began in 1947. Through the early 1960s the herd fluctuated slightly, but most population estimates were around 50,000 animals (Valkenburg et al. 1994).

Between the mid 1960s and mid 1970s, the herd experienced a significant decline, which was attributed to a combination of factors, including high harvests, severe winters, and predation by high numbers of wolves (Davis et al. 1978; Valkenburg and Davis 1989). The population low occurred during 1973–1976,when the herd was estimated at 5740–8610 caribou (Valkenburg et al. 1994). During this decline, the FCH reduced its range size and changed its seasonal migration patterns. By the early 1960s, the herd stopped crossing the Steese Highway in significant numbers, and by the early 1970s, few Fortymile caribou continued to make annual movements into Yukon, Canada. Since the early 1970s, the herd's range has remained about 19,300 mi^2

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

(50,000 km^2), less than 25% of the range thought to have been used by the herd during the 1920s.

The FCH began increasing in 1976 in response to favorable weather conditions, reduced harvests, and a natural decline in wolf numbers. By 1990, the herd was estimated at 22,766 caribou (an annual rate of increase of 5–10%). Between 1990 and 1995, the herd remained relatively stable with an estimated population of about 22,000 caribou. Population growth stabilized due to high adult mortality, unusually low pregnancy rate in 1993, and low to moderate calf survival during this period (Boertje and Gardner 2000*a*). In combination with public trapping, ADF&G conducted nonlethal wolf control from November 1997 through May 2001. Within the calving and summer range of the FCH, wolf numbers were reduced by 78% to 2 sterilized alpha wolves in 15 pack territories (Gardner 2003). During 1996–2002, the herd doubled in size due to elevated pregnancy rates and increased adult and calf survival (Table 1). The current population objective of 50,000–100,000 and harvest objective of 1000–15,000 were established by the Alaska Board of Game in 2000 and are defined in Intensive Management regulations (5 Alaska Administrative Code 92.108).

The FCH historically provided much of the food needed by residents within its range. 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 upstream from 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, Alaska's FCH hunting regulations were designed to benefit subsistence hunters 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 highways to trail systems accessed from the Taylor and Steese Highways and areas accessed from small airstrips within the Fortymile and Charley River drainages.

Harvest was further restricted during the early 1990s to ensure little impact on herd growth. Harvest regulations also became increasingly complex due to a court decision that resulted in federal management of the herd on federal lands. Competition among Alaska hunters increased because of reduced harvest quotas and complex regulations. During this period, many residents within the herd's range were unhappy with the ineffectiveness of dual federal and state management in administering the hunts and bringing about a herd increase. In response, the Upper Tanana/Fortymile Advisory Committee, the Tr'ondëk Hwëchîn First Nation in Yukon, and other public groups requested that ADF&G, the U.S. federal agencies, and Yukon Department of Renewable Resources (YDRR, now called Yukon Department of Environment, YDOE) work with the public to develop the *Fortymile Caribou Herd Management Plan* (Multi-agency report *in* Boertje and Gardner 1996).

In 1994 the Fortymile Caribou Herd Management Planning Team was established. The team was comprised of 13 public members who represented subsistence users from Alaska and Yukon, sport hunters, Native villages and corporations, environmental groups, and agency

representatives from ADF&G, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, and YDOE.

The team completed a management plan in October 1995 that included recommendations for herd size, harvest, and habitat management. The plan recommended a combination of nonlethal wolf control by ADF&G and wolf trapping by the public to reduce wolf predation on caribou calves. Harvest management recommendations prompted the Alaska Board of Game and the Federal Subsistence Board to develop new harvest regulations. The Alaska Board of Game, the Federal Subsistence Board, and the Yukon Fish and Wildlife Management Board endorsed the plan, which they used during 1996–2000 to develop new harvest regulations that satisfied the plan.

In 1999, the 5 Fish and Game advisory committees within the herd's range (Central, Delta, Eagle, Fairbanks, and Upper Tanana/Fortymile) recognized the need to cooperatively develop harvest regulations that would benefit hunters and carry out the goals of the *Fortymile Caribou Herd Management Plan*. These advisory committees, with input from the federal Eastern Interior Regional Advisory Council to the Federal Subsistence Board, YDOE, Yukon First Nations, and many other interested parties, developed the *2001–2006 Fortymile Harvest Management Plan* (Fairbanks, Upper Tanana-Fortymile, Delta, Central and Eagle Fish and Game Advisory Committees. 1999 unpublished document). This 2001–2006 harvest plan was endorsed by the Alaska Board of Game in March 2000 and guided regulation development and implementation during regulatory years (RY) 2002 through 2005 (RY = 1 July through 30 June; e.g., RY03 = 1 July 2003 through 30 June 2004).

MANAGEMENT DIRECTION

Gardner (2003) summarized Fortymile caribou herd management direction during the 1970s through 2000. During RY02–RY05, herd management followed recommendations in the 2001–2006 harvest plan. In 2005, recognizing the 2001–2006 harvest plan was about to end, the 5 advisory committees within the herd's range reconvened to develop an updated plan.

In March 2006, with input from the federal Eastern Interior Regional Advisory Council, YDOE, Yukon First Nations, and many other interested parties, they developed the *2006–2012 Fortymile Caribou Herd Harvest Plan* (Alaska Department of Fish and Game 2006). This 2006–2012 harvest plan was endorsed by the Alaska Board of Game in March 2006 and will guide regulation development and implementation during regulatory years RY06–RY12. During RY06, herd management began following recommendations in the 2006–2012 harvest plan.

These harvest plans have proved to be a highly successful joint state–federal management program benefiting users and the herd. Since 2001 the harvest plans have had the public support to withstand a number of state and federal proposals that could have resulted in detrimental harvest levels or a return to separate state and federal systems. The following management goals and objectives were developed to meet the goals of the harvest plan and the intensive management law.

MANAGEMENT GOAL

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

MANAGEMENT OBJECTIVES

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

ACTIVITIES

- Minimize the impact of human activities on caribou habitat.
- Work with land agencies, landowners, and developers to mitigate developments detrimental to Fortymile caribou.
- Maintain a near-natural fire regime.

METHODS

POPULATION STATUS AND TREND

Population Census

During RY04–RY06, we attempted annual photocensus counts of the FCH between late June and mid July. Photocensuses were conducted once the herd formed 5–15 tightly aggregated groups in areas that provided conditions adequate to visually count and photograph the caribou. Prior to the census, we conducted several reconnaissance flights of the herd to determine if the caribou were adequately grouped near or above tree line. Once the herd was grouped, we attempted the census using 3–5 spotter planes (Piper PA-18 or Bellanca Scout), 1 radiotracking plane (Cessna 185 or 206, Bellanca Scout, or PA-18), and a camera plane (DeHavilland Beaver) equipped with a belly-mounted, 9-inch format aerial camera. During the census, the radiotracking plane located all radiocollared animals in the herd and the spotter planes flew search patterns to locate groups of caribou that did not have radiocollared animals associated with them. 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 one another, the 2 counts were averaged; otherwise, photographs were counted a third time. We derived the population estimate by adding individual caribou counted on photographs to caribou counted from spotter planes that were not photographed. No correction factors were used to account for caribou missed during the search. If caribou were not adequately aggregated or were not in areas that allowed for visual counting and photographing, the census was not conducted and estimates were based on population models developed by Boertje and Gardner (2000*b*) that used annual spring birthrate, fall composition, and survival estimates from monthly monitoring surveys of radiocollared caribou.

Population Composition

We conducted an aerial survey between late September and mid October to estimate herd sex and age composition. To locate most of the herd, we radiotracked caribou using a radiotracking plane and used a Robinson R-44 helicopter to visually classify 12–15% of the herd. During counts, we classified each caribou as a cow, calf, or bull. Bulls were further classified as small, medium, or large, based on antler size (Eagan 1993). We tallied the composition of each group on a 5-position counter and recorded the tallies on a data sheet.

Distribution and Movements

We obtained herd distribution, movements, and estimates of annual mortality by radiotracking approximately 60–90 adults. Radiocollared caribou were located approximately weekly during hunting seasons in August–September and December, 3–4 times during calving in mid May, and approximately once a month during the rest of the year.

In September 2004–2006, we radiocollared an additional 15–17 5-month-old female calves annually to replace those that went off the air due to collar failure or mortality. In September 2005, only 61 caribou had radio collars prior to collaring additional female calves. Therefore, we collared an additional 20 adult females to increase the number of radiocollared caribou in the herd in order to more accurately monitor herd movements.

Harvest

Harvest was monitored using hunter checkstations, hunter contacts in the field, and registration hunt reports. To guard against overharvest, successful hunters were required to report their kill within 3–5 days. Harvest data were summarized by regulatory year. We analyzed data on harvest success, hunt area, hunter residence and effort, method of transportation, and harvest chronology. The annual harvest quota was established using the 2001–2006 harvest plan for RY04 and RY05 and the 2006–2012 harvest plan for RY06. During RY04–RY06 the harvest quota was 850 caribou, with no more than 25% cows. The portion of the annual quota allocated to the fall season (RC860) was 640 caribou. The winter season (RC867) allocation was 210 caribou, plus any unharvested portion of the fall quota. During RY04–RY06, the fall quota was subdivided between 3 traditional hunt areas: 1) Taylor Highway area, 2) Steese Highway and Chena Hot Springs Road area, and 3) the roadless area between these 2 areas. The winter hunt quota was divided between the 1) Taylor Highway area and 2) the Steese Highway and Chena Hot Springs Road area. During the winter hunt, the road-accessible area that had the greatest number of caribou immediately prior to the season opening was allocated 60% of the winter quota. The roadless area was included with the road-accessible area that was allocated 60% of the harvest and was closed in conjunction with that road-accessible area.

During the fall hunting season in RY04 and RY05, the Taylor Highway area harvest quota was 320 caribou, the Steese Highway–Chena Hot Springs Road area harvest quota was 230 caribou, and the roadless area harvest quota was 90 caribou. During the fall RY06 hunt, the Taylor Highway area harvest quota was 290 caribou, the Steese Highway–Chena Hot Springs Road area harvest quota was 190 caribou, and the roadless area harvest quota was 160 caribou.

During the RY04–RY06 winter hunts, harvest quotas of 135, 227 and 149 caribou were allocated to the Taylor Highway area and harvest quotas of 200, 151 and 223 caribou were allocated to the Steese Highway–Chena Hot Springs Road area.

We issued emergency orders to close hunting seasons when the harvest quotas for given seasons and areas were met. Further discussion of Fortymile caribou harvest management can be found in the 2001–2006 and 2006–2012 Fortymile harvest management plans.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During 1900–1995, the herd size remained relatively stable at around 22,000 caribou (Table 1). Between 1995 and 2003, the herd doubled in size (annual growth rates = 4–14%). Annual increases in herd size resulted from increased adult and calf survival rates and adult pregnancy rates (Table 1; Boertje and Gardner 1998*b*, 1999, 2000*a*). The herd experienced an estimated 4% decline in RY03. This decline was likely due to drought conditions in summer 2003 which caused caribou to be in poor body condition in the fall, and resulted in high mortality during winter 2003–2004 and low birth rates in May 2004 (R. Boertje, ADF&G, personal communication).

RY04. The herd again experienced a decline, estimated at 6% during RY04, likely due to deep snow conditions that resulted in increased wolf predation on both adult and calf caribou (R. Boertje, personal communication). In May 2005 the estimated precalving population was 39,700 caribou, lower than the estimated 42,300 caribou in May 2004 (Table 1).

RY05. Poor survival rates among calves to the fall (18 calves:100 cows in early October 2005) and high winter (November–April) mortality among calves due to wolf predation (4 of 15 calves radiocollared in fall 2005) resulted in a 2% decline in the population in RY05 (R. Boertje, unpublished data). The estimated precalving population size in May 2006 was 39,000 caribou (Table 1).

RY06. Good survival rates among calves to autumn (34 calves:100 cows in early Oct 2006) and mild winter conditions allowed the population to increase by an estimated 4% during RY06. The estimated precalving population size in May 2007 was 41,400 caribou (Table 1).

Population Composition

The percent calves observed during fall composition surveys has been used as an indicator of population trend in the FCH. During herd growth phases in the 1980s, calves averaged 18.1% of the population in autumn, and during growth phases in 1996–1999 and 2001–2002, calves averaged 20.7% of the autumn population. During stable years (1990, 1992–1995, 2000), calves averaged 16.7% of the population, whereas calves averaged only 10% of the population during years of population decline (1991 and 2003; Table 1).

We observed 16% calves in the herd during the autumn 2004 composition survey. Although this level of calf survival to the fall generally indicates the herd is likely to increase, above average

mortality rates among calves and adults during winter 2004–2005 resulted in a herd decline. In RY05 we observed 10% calves during the fall composition survey and the herd declined slightly. The herd increased an estimated 6% in RY06, with 19% calves observed during the fall 2006 composition survey.

The bull:cow ratio was ≥43 bulls:100 cows (43–51) during RY04–RY06. Harvest quotas will remain conservative through 2012 to allow for continued herd growth and a stable bull:cow ratio. This harvest strategy should also maintain the ratio of large bulls in the herd.

Distribution and Movements

In May 2005 (RY04), the FCH primarily calved along the southern edge of the Yukon–Charley Rivers National Preserve in the upper Goodpaster and upper Middle Fork Fortymile river drainages. The majority of the herd spent June through mid September between Mosquito Mountain, upper Sand Creek–Healy River and Mount Harper, and the upper Goodpaster, Salcha, Charley, and Seventymile river drainages.

In May 2006 (RY05), the herd primarily calved along the eastern edge of the Yukon–Charley Rivers National Preserve in the upper Seventymile and in the upper Middle and North Fork Fortymile river drainages. The majority of the herd spent June through mid September between Mosquito Mountain, upper Sand Creek–Healy River and Mount Harper, and the upper Goodpaster, Salcha, Chena, Seventymile, and upper North Fork Fortymile river drainages.

In RY04–RY06, during pre-rut and rut (mid September–October), the herd was concentrated in the Seventymile, Charley, Chena, and Salcha River and Birch Creek drainages. During winters (November–March) RY04–RY06, 5000–15,000 caribou were located along, or in the area just to the south of, the Top of the World Highway, from Boundary, Alaska west into Yukon, Canada. During these years, the majority of the herd wintered in small scattered groups in the drainages of the Seventymile, Goodpaster and Salcha rivers, Mosquito, Middle and North Fork Fortymile River, and Birch Creek.

MORTALITY

Harvest

Season and Bag Limit. Both fall and winter hunts were in place for the FCH during RY04–RY06, with various unit-specific bag limits and season dates for state and federal hunts (Table 2). Gardner (2003) summarized the regulatory history of the FCH.

Alaska Board of Game Actions and Emergency Orders. In spring 2004, the Alaska Board of Game (board) passed a proposal to enlarge the RM865 hunt area in Unit 20E, where hunters are restricted to hunting one species (moose or caribou) at a time. The area was expanded to include all of Unit 20E, except the part of the upper Middle Fork Fortymile River upstream from and including Joseph Creek. The board also consolidated the 3 fall registration hunt areas (RC863, RC865 and RC866) into a single hunt (RC860) beginning RY04.

In spring 2006, the board reviewed and endorsed the 2006–2012 harvest plan. Harvest quotas during RY06–RY12 were to be set annually based on herd trend, similar to the 2001–2006 harvest plan. Under the 2001–2006 and 2006–2012 harvest plans, emergency orders were issued

to announce the closure of hunting seasons once the harvest quotas were met (Table 3). Important modifications in the 2006–2012 harvest plan included fixing the annual harvest quota for Alaska at 850 caribou, with up to 25% cows, until the herd has at least 50,000 caribou. When the herd reaches 50,000 caribou the annual harvest quota will be increased to 1000 caribou, with up to 25% cows.

Also at the spring 2006 meeting, in response to lack of population growth after the FCH peaked at approximately 44,100 animals in 2003, the board expanded the Upper Yukon–Tanana Predation Control Area (5 AAC 92.125[b]) to include most of the FCH range. This change was intended to expand wolf control to initiate an increase in the FCH and aid in achieving the population objective of 50,000–100,000 caribou and harvest objective of 1000–15,000 caribou under intensive management regulations. The 2006–20012 harvest plan also recommended a 1–3 day hunt for up to 30 caribou during late October–November to be announced by emergency order in the Eagle area, if caribou are present. The board approved the proposed Eagle area hunt at the March 2007 meeting.

Hunter Harvest. We issued 4217, 4438, and 3975 registration permits in RY04, RY05, and RY06. In RY04, 2497 hunters reported taking 846 caribou; in RY05, 2483 hunters reported taking 741 caribou; and in RY06, 2602 hunters reported taking 852 caribou (Table 4). Total human-caused mortality of Fortymile caribou, including harvest reported on registration permits and general harvest tickets, accidental death, and illegal and unreported harvest, was estimated to be 880, 759, and 868 in RY04, RY05, and RY06 (Table 5). To assist herd growth during RY04–RY06, the Tr'ondëk Hwëchîn First Nation members in Yukon, Canada chose to not exercise their constitutional rights to hunt the FCH, and other Canadian hunting seasons for FCH were closed.

Hunter Residency and Success. Nonresidents composed 8% of the hunters annually in RY04–RY06 and accounted for 8–9% of the total harvest (Table 6). Annual success rates for residents were 29–36% during RY04–RY06, whereas success rates for nonresidents were 35–41% (Table 6).

Harvest Chronology.

RY04 — During RY04, the herd was accessible along the Taylor Highway and adjacent trails through most of the fall hunting season, resulting in a fairly consistent harvest throughout the season (Table 7). Although hunters were successful, harvest was low enough to allow the season in this area to remain open through 30 September. Fewer caribou were available near the Steese Highway and Chena Hot Springs Road during the fall hunting season, resulting in lower harvest than in the Taylor Highway area. Harvest in the Steese Highway and Chena Hot Springs Road area was spread evenly throughout the season, which also remained open through 30 September. Harvest was consistent in the roadless portion of the fall hunt area from the beginning of the season until mid September and slowed during late September. The roadless area also remained open through 30 September. Between RY96 and RY06, the fall hunting season remained open in all portions of the fall hunt area only in RY01 and RY04. The primary reason this occurred in RY04, was that the main portion of the herd did not move into areas accessible from main highways or trails.

At the beginning of the RY04 winter hunting season, a large portion of the FCH was accessible from the Steese Highway and Chena Hot Springs Road. The harvest quota for this area was reached quickly, and the area closed on 3 December (Table 8). A smaller portion of herd was accessible from the Taylor Highway throughout the winter season, but that harvest quota was not reached, so the season remained open through 28 February.

RY05 — During RY05, the herd was accessible along the Taylor Highway and adjacent trails at the beginning of the fall season, resulting in that harvest quota being met and the area being closed on 19 August. Very few caribou were available to hunters during the fall hunting season along the Steese Highway and Chena Hot Springs Road, which resulted in very low hunter success and the season in that area remained open through 30 September. Harvest success was fairly high throughout the season in the roadless portion of the fall hunt area, resulting in an emergency order closing the season on 12 September.

Throughout the winter hunting season, a portion of the herd was available to hunters along the Taylor Highway. Although harvest was consistent, it was low enough to allow the Taylor Highway season to remain open through 28 February. There were very few caribou available to hunters along the Steese Highway and Chena Hot Springs Road throughout the entire winter season, so the hunting season in this area also remained open through 28 February.

RY06 — During RY06, a portion of the herd was accessible along the Taylor Highway and adjacent trails at the beginning of the fall season, resulting in heavy harvest and an early season closure on 17 August when the harvest quota was met. For the second year in a row, very few caribou were available to hunters during the entire fall season along the Steese Highway and Chena Hot Springs Road, which resulted in very low harvest levels, and the season remained open through 30 September.

At the beginning of the winter hunting season a portion of the herd was available to hunters in both the Taylor Highway and the Steese Highway and Chena Hot Springs Road areas and hunter success was high. The high hunter success resulted in the quota being reached and the season closing in the Steese Highway and Chena Hot Springs Road area on 9 December, and in the Taylor Highway area on 14 December.

Transport Methods. Types of transportation used by successful hunters in the fall depended primarily on the number of all-terrain vehicle (ATV) trails available and whether air taxi companies worked in the area. During RY04–RY06, all successful fall hunters in the central portion of the FCH range used boats and airplanes. This remote hunt area has no trails and cannot be reached by ground transportation.

During the RY04–RY06 fall hunting seasons in Unit 20E, successful hunters primarily used ATVs, followed by highway vehicles. The Chicken Ridge trail, along with its spur trails, was the primary trail system used by ATV hunters to access the FCH in Unit 20E. In addition, walk-in hunters accessed the herd from the Taylor Highway near American Summit in the Glacier Controlled Use Area during RY04–RY06. Interest from walk-in hunters remained strong during RY04–RY06. American Summit provided an ideal location for hunters without ORVs or ATVs to access the FCH when caribou were in this area.

During the fall hunt in RY04–RY06, successful hunters in the Steese Highway and Chena Hot Springs area in northeastern Unit 20B and southeastern Unit 25C primarily used ATVs, followed by highway vehicles. Hunters had moderate harvest success using ATVs during the entire fall season in RY04 and low harvest success in RY05–RY06.

During the winter hunts, successful hunters primarily accessed the FCH using snowmachines and highway vehicles along the Steese and Taylor Highways. Hunters on snowmachines had excellent success along the trail system off the Steese Highway during early December in both RY04 and RY06, but poorer success in RY05, when fewer caribou were available. The Taylor Highway had good numbers of caribou available to hunters who used highway vehicles and snowmachines in RY04–RY06. Most successful hunters who used highway vehicles during these years harvested caribou in November and December, when caribou were either close to the Steese Highway or before the Taylor Highway became impassible due to snow conditions.

The FCH was accessible to successful hunters who used each type of transportation during some part of the season (Table 9). Accessibility should improve if the herd continues to increase and occupy a larger range. The most important factors to ensuring opportunity for all hunters are for the seasons to go to term and for hunters to have the patience to wait for the herd to migrate to the areas they can hunt.

Other Mortality

Boertje and Gardner (1998*a*, 1998*b*, 1999, 2000*b*) and Gardner (2001) described in detail the factors that limited FCH growth during 1996–2000 and the management actions taken to mitigate those factors and encourage herd recovery. However, these factors continued to influence the FCH through RY06. ADF&G research staff continues to monitor the effects of the 1996–2000 management actions.

RY04. The 6% population decline during RY04 was likely due to increased wolf predation on both adult and calf caribou as a result of deep snow conditions. Deep snow benefits wolves because caribou bog down in deep snow and tire quickly, while wolves travel more easily on top of the snow. During RY04, estimated mortality rates of radiocollared adults (0.14) and calves (0.77) were above the previous 10-year (RY94–RY03) average of 0.09 for adults and 0.57 for calves (R. Boertje, unpublished data). Wolf predation was determined to be the cause of mortality for all radiocollared caribou that died (4 adults and 5 calves) during winter (November–April) RY04.

RY05. Wolf predation was again determined to be the primary cause of the relatively high winter mortality rate among calves. Of the fifteen 5-month-old female calves radiocollared during fall 2005, the 4 that died (27% mortality) during November–April were killed by wolves.

RY06. Preliminary data indicate that wolf predation remained the primary source of mortality among radiocollared adult and calf caribou during RY06**.**

HABITAT

Assessment

In 1998, for the first time in 3 decades, the FCH exceeded 500 caribou/1000 km^2 (500 caribou/386 mi^2). Beginning in 2001, the herd expanded its range use, apparently as a result of increased herd size. It moved farther west near the Steese Highway in fall 2001 and used winter range in Yukon, Canada during winters 2000–2001 through 2006–2007. Even so, more than 75% of the historic Fortymile range has not been used for more than 40 years, and the far eastern portion of the range has not been used for more than 50 years.

During winters 1991–1992, 1992–1993, 1995–1996, 1996–1997, and 1999–2000, range conditions were excellent, as evidenced by high proportions of lichen fragments (72–81%) and a low proportion of mosses (8%) in fecal samples. Fecal samples from overgrazed winter ranges contain a relatively high proportion of mosses or vegetation other than lichens (Boertje 1984). Preliminary data collected during 2000–2004 indicated a high proportion of lichens in fecal samples (W. Collins, ADF&G, personal communication), suggesting that Fortymile winter range continued to be in excellent condition. Wildfires in 2004 destroyed the habitat plots prior to the final assessment, but habitat quality in adjacent unburned areas of Unit 20E was likely unchanged during RY04 and RY05. The Nelchina herd has wintered in portions of the Fortymile winter range since 1999. B. Dale (ADF&G, personal communication) captured and weighed Nelchina herd calves each spring and found calves that winter in the Fortymile area were significantly heavier than calves that wintered in adjacent Units 11 and 13. Also, Nelchina calves on Fortymile range gained weight over winter, except in years when snow depth was above average.

Weights of FCH 5-month-old female calves captured during October 2004–2006 were not significantly different from those weighed during October 1990–2003 (R. Boertje, personal communication). However, birthrates in spring 2003 and 2005 were among the lowest observed since 1990. Conditions were drier than average during summers 2002–2004 and deep snow conditions prevailed during most of the winter of 2004–2005. These conditions likely contributed to reduced caribou nutritional status in 2003 and 2005, and may be the cause of the lower birthrates observed in 2003 and 2005 (R. Boertje, personal communication). Additionally, wildfires in 2004 and 2005 occurred on about 15% of the winter range of the FCH and may have influenced habitat selection or predation risk of caribou starting in winter 2004–2005.

The Pogo Mine project began in 2003 in the Goodpaster River drainage. This gold mine is expected to have limited impact on the Fortymile herd, but concern remains focused on future plans in this area. If additional roads are built for the Pogo Mine, it may lead to a complex of roads that reach to the upper Goodpaster River and Mount Harper area. If so, careful access management will be required to ensure that the herd is not negatively impacted during calving and postcalving. Future access decisions have not been adequately addressed in the mine planning process.

Enhancement

The *Alaska Interagency Wildland Fire Management Plan* (Alaska Wildland Fire Coordinating Group 1998) was implemented in the early 1980s to limit suppression of wildfire where human resources are not at risk. Limited suppression should ensure a near-natural fire regime necessary

for the long-term maintenance of caribou range in Interior Alaska. No habitat enhancement efforts in the FCH range were initiated during RY04–RY06. However, wildfires during summers 2004 and 2005 burned nearly 15% of the FCH winter habitat. Caribou from the Nelchina herd occupied adjacent winter range in Unit 20E and used recent (<50 year old) burns less than expected (Joly et al. 2003). Recent burns provide much lower biomass of terrestrial lichens than mature spruce forest with lichen understory, and caribou may avoid recent burns because of unfavorable snow conditions or deadfalls that impede movement (Joly et al. 2003). Despite the area of winter range that burned in recent years, a large portion of the historic range of the FCH remains unoccupied by caribou. Thus, availability of winter range is likely not limiting growth of the FCH. However, if the fire return interval becomes shorter or additional large areas of historic winter range burns, availability of winter range and changes in habitat use (and fire management options) should be more closely evaluated relative to herd population dynamics (Rupp et al. 2006).

One of the goals of the *Fortymile Caribou Management Plan* was to ensure adequate protection for the herd's range during and after recovery. Current habitat and development issues are mostly related to mining and military activities in the herd's calving and postcalving areas. The herd is most sensitive to disturbance during calving and postcalving. Working together with the mining community and the Air Force, we minimized the effects of mining exploration and low-flying military aircraft during calving and postcalving by maintaining a website that displayed the areas the herd was using. The website was updated when the herd distribution changed. The mining industry and military used this website during 1999–2006 to plan their activities away from the herd and have minimized their impacts during calving and postcalving.

Final language of the *Upper Yukon Area Plan* (Alaska Department Of Natural Resources 2003) gave adequate protection to the Fortymile herd throughout its range and strong protection for the calving and postcalving ranges. The plan was completed in February 2003 and guided management of state lands within the herd's range during RY04–RY06.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

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

Several public awareness projects are ongoing. Informational signs were placed along the Taylor and Steese Highways in summer 2004. The Fortymile caribou newsletter *The Comeback Trail* was produced annually during RY04–RY06 and distributed to about 4500 Alaska and Yukon residents, advisory committees, regional councils, state and federal management boards, and area schools. Additional public awareness programs would help ensure continued public support for the FCH. A cooperative state–federal program enhancing the viewing, education, and hunting opportunities of the FCH would benefit the herd and people interested in the herd.

CONCLUSIONS AND RECOMMENDATIONS

We did not meet our objective to provide conditions for the Fortymile herd to grow at a moderate annual rate of 5–10% in RY04 and RY05; instead, the herd declined by 6% and 2%, respectively. During RY04–RY05, the FCH population estimate ranged between 37,000 and 39,000 caribou, below the intensive management objective of 50,000–100,000 caribou. Based on the sex and age structure of the herd, the FCH had the potential to continue to increase. Winter range conditions were good, and >75% of the traditional range remained unused by the herd.

Harvest was managed using the guidelines in the 2001–2006 harvest plan. During RY04 and RY05, the annual harvest quota was 850 caribou (including up to 25% cows). This was below the intensive management harvest objective of 1000–15,000 caribou annually.

During RY04–RY05, 2483–2497 hunters took 741–846 caribou. Harvest was maintained at a level that had little effect on the bull:cow ratio, and the objective to maintain an October bull:cow ratio of at least 35:100 was met.

We also met the objective to provide for increased caribou hunting, viewing, and other wildlife-related recreation in Alaska and Yukon. Recovery has made the FCH one of the most accessible herds in the state, benefiting hunters and nonconsumptive users. Also, the FCH currently offers one of the best opportunities in the state to observe large bulls.

The Pogo Mine project began in 2003 in the Goodpaster River drainage. This project is expected to have limited impact on the Fortymile herd, but concern remains regarding future access decisions. This project will continue to be monitored during RY06–RY07. The *Alaska Interagency Fire Management Plan*, implemented in the early 1980s, allowed for a near-natural fire regime within the herd's range in Alaska during RY04–RY05.

The current goals, objectives, and activities will remain in place for the next report period (RY06–RY07), except that the first objective will be changed to:

- Provide conditions for the Fortymile herd to grow at a moderate annual rate of 5–10% to a herd size of 50,000–100,000 caribou.

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TABLE 1 Fortymile caribou fall composition counts and population size, regulatory years 1985–1986 through 2006–2007

Regulatory year	Date of composition count	Bulls: 100 Cows	Calves: 100 Cows	% Calves	% Cows	% Small bulls	% Medium bulls	% Large bulls	% Bulls	Composition sample size	Photocensus estimate[a]	Estimate of herd size
1985–1986	10/16/85	50	36	19	54	39	23	38	27	1067	15,307	15,307[b]
1986–1987	10/13/86	36	28	17	61	35	24	41	22	1381		
1987–1988	9/28/87	40	37	21	57	13	43	44	22	2253	19,975	19,975[b]
1988–1989	10/2–3/88	38	30	18	59	29	41	30	23	1295		
1989–1990	10/13/89	27	24	16	66	34	41	25	18	1781	22,766	22,766[b]
1990–1991	9/27–28/90	44	29	17	58	42	39	19	26	1742		
1991–1992	10/10/91	39	16	10	64	41	34	25	25	1445	21,884	21,884[b]
1992–1993	9/26/92	48	30	17	56	37	36	27	27	2530		
1993–1994	10/3/93	46	29	17	57	48	36	17	26	3659	22,104	20,000[c]
1994–1995	9/30/94	44	27	19	57	45	33	22	24	2990	22,558	20,100[c]
1995–1996	10/3/95	43	32	18	57	43	31	27	25	3303	23,458	22,100[c]
1996–1997	9/30/96	41	36	20	57	46	31	23	23	4582	25,910	23,900[c]
1997–1998	9/30/97	46	41	22	53	48	28	24	25	6196	31,029	29,000[c]
1998–1999	9/29/98	40	38	21	56	49	27	24	23	4322	33,110	33,500[c]
1999–2000	9/29/99	48	37	20	54	55	29	16	26	4336	34,640	33,600[c]
2000–2001	10/01/00	45	27	16	58	48	28	24	26	6512		35,900[c]
2001–2002	9/29/01	49	38	20	53	44	32	24	27	6878		40,800[c]
2002–2003	9/28/02	43	39	21	55	42	28	30	24	6088	43,375	44,100[c]
2003–2004	9/27/03	50	17	10	60	51	29	21	30	6296		42,300[c]
2004–2005	9/28/04	45	28	16	59	31	37	32	25	4157		39,700[c]
2005–2006	10/5/05	51	18	10	59	25	23	52	30	2350		39,000[c]
2006–2007	10/5/06	43	34	19	57	27	29	44	24	4995		41,400[c,d]

[a] Number yearling, adults, and a portion of the calves counted during photocensus between mid June of the current regulatory year to early July of the following regulatory year. Census counts were not conducted in 2001, 2002, or 2004–2006 because caribou were too scattered or visual conditions were inadequate.
[b] Herd estimates were the result of the summer censuses, and population models were used to derive total estimates. Population estimate for mid June of the current regulatory year to early July of the following regulatory year.
[c] Herd estimates were derived from population models using data from summer census counts, fall composition counts, spring parturition surveys and monthly mortality surveys of collared caribou. Population estimate for 15 May of the current regulatory year.
[d] Preliminary data.

TABLE 2 Fortymile caribou seasons and bag limits managed as joint state–federal registration permit hunts, regulatory years 2004–2005 and 2006–2007

	Unit 20B SE of Steese Hwy		Unit 20D N of Tanana River		Unit 20E		Unit 25C E of Preacher Creek	
	State	Federal[a]	State	Federal[a]	State	Federal[a]	State	Federal[a]
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
2004–2005 through 2006–2007								
RESIDENT:	10 Aug–30 Sep 1 caribou. 1 Dec–28 Feb 1 caribou.	No open season	10 Aug–30 Sep 1 caribou. 1 Dec–28 Feb 1 caribou	No open season	10 Aug–30 Sep 1 caribou. 1 Dec–28 Feb 1 caribou.	10 Aug–30 Sep 1 caribou. 1 Nov–28 Feb 1 caribou.	10 Aug–30 Sep 1 caribou. 1 Dec–28 Feb 1 caribou.	10 Aug–30 Sep 1 caribou. 1 Nov–28 Feb 1 caribou.
NONRESIDENT:	10 Aug–20 Sep 1 bull.	No open season	10 Aug–20 Sep 1 bull.	No open season	10 Aug–20 Sep 1 bull.	No open season	10 Aug–20 Sep 1 bull.	No open season

[a] Federal subsistence hunters are residents who live in communities or units in rural areas defined by the Federal Subsistence Board. Definition of who qualifies as a Fortymile caribou federal subsistence user differs among units: In Unit 20E the definition includes rural residents of Unit 12 (north of Wrangell–St Elias National Park and Preserve), Unit 20D, and Unit 20E, whereas in Unit 25C eligible federal subsistence users are all rural residents in the state.

TABLE 3 Emergency orders issued during regulatory years 2004–2005 through 2006–2007

Regulatory year	Effective date	Emergency order number	Permit hunt and area affected	Action taken/reason
2004–2005	26 Nov 2004	03-09-04	The part of RC867 in Unit 20E south of milepost 60 of the Taylor Highway.	Closed part of hunt. Prevent Nelchina caribou harvest.
2004–2005	3 Dec 2004	03-10-04	The part of RC867 in areas accessible from the Steese Highway and Chena Hot Springs Road in Units 20B and 25C.	Closed part of hunt early. Quota met.
2005–2006	19 Aug 2005	03-04-05	The part of RC860 in areas accessible from the Taylor Highway in Unit 20E.	Closed part of hunt early. Quota met.
2005–2006	12 Sep 2005	03-06-05	The part of RC860 in the roadless portions of Units 20B, 20D, 20E and 25C.	Closed part of hunt early. Quota met.
2005–2006	8 Dec 2005	03-08-05	The part of RC867 in Unit 20E south of milepost 60 of the Taylor Highway.	Close part of hunt. Prevent Nelchina caribou harvest.
2006–2007	17 Aug 2006	03-03-06	The part of RC860 in areas accessible from the Taylor Highway in Unit 20E.	Closed part of hunt early. Quota met.
2006–2007	30 Nov 2006	03-06-06	The part of RC867 in Unit 20E south of milepost 60 of the Taylor Highway.	Close part of hunt. Prevent Nelchina caribou harvest.
2006–2007	9 Dec 2006	03-07-06	The part of RC867 in areas accessible from the Steese Highway and Chena Hot Springs Road in Units 20B and 25C and in the roadless areas in 20D and 20E.	Closed part of hunt early. Quota met.
2006–2007	14 Dec 2006	03-08-06	The part of RC867 in the remainder of Unit 20E.	Close remaining part of hunt early. Quota met.

TABLE 4 Reported Fortymile caribou harvest by joint state–federal registration permit, regulatory years 2002–2003 through 2006–2007[a]

Regulatory year	Permits issued	Did not hunt (%)	FTR[b] (%)	Total hunters	Successful hunters (%)	Unsuccessful hunters (%)	Harvest			Total reported harvest	Harvest quota
							Bulls	Cows	Unk		
2002–2003[c]	4155	1397 (34)	138 (3)	2620 (63)	860[d] (33)	1760 (67)	663	185	12	860	950 total quota; 235 cows
2003–2004[c]	5718	2135 (37)	143 (3)	3440 (60)	799[e] (23)	2641 (77)	612	181	6	799	850 total quota; 210 cows
2004–2005[f]	4217	1540 (37)	179 (4)	2497 (59)	846[g] (34)	1651 (66)	592	243	11	846	850 total quota; 210 cows
2005–2006[f]	4438	1786 (40)	169 (4)	2483 (56)	741[h] (30)	1742 (70)	556	182	3	741	850 total quota; 210 cows
2006–2007[f,i]	3975	1291 (32)	82 (2)	2602 (65)	852[j] (33)	1750 (67)	601	247	4	852	850 total quota; 210 cows

[a] Data from RC860, RC863, RC865, RC866 and RC867 harvest reports.
[b] Failure to report.
[c] Includes RC863, RC865, RC866 and RC867.
[d] An additional 16 hunters reported harvesting Fortymile caribou on general harvest reports.
[e] An additional 15 hunters reported harvesting Fortymile caribou on general harvest reports.
[f] Includes RC860 and RC867.
[g] An additional 12 hunters reported harvesting Fortymile caribou on general harvest reports.
[h] An additional 4 hunters reported harvesting Fortymile caribou on general harvest reports.
[i] Preliminary harvest data.
[j] An additional 3 hunters reported harvesting Fortymile caribou on general harvest reports.

TABLE 5 Fortymile caribou harvest, regulatory years 2002–2003 through 2006–2007

Regulatory year	Reported on registration permit				Reported on general harvest report	Estimated			Yukon harvest	Total
	M	F	Unk	Total		Unreported	Illegal	Total		
2002–2003[a]	676	187	13	876	16	5	5	10	1	903
2003–2004[a]	624	182	8	814	15	5	5	10	0	839
2004–2005[b]	597	250	11	858	12	5	5	10	0	880
2005–2006[b]	559	185	1	745	4	5	5	10	0	759
2006–2007[c]	604	247	4	855	3	5	5	10	0	868

[a] Data from RC863, RC865, RC866 and RC867 harvest reports.

[b] Data from RC860 and RC867 harvest reports.

[c] Preliminary harvest data.

TABLE 6 Fortymile caribou hunter residency and success of hunters who reported residency, regulatory years 2002–2003 through 2006–2007[a]

	Successful						Unsuccessful							
Regulatory year	Local[b] resident	Nonlocal resident	Nonresident	Unknown residency	Total[c]	(%)	Local[b] resident	Nonlocal resident	Nonresident	Unknown residency	Total	(%)	Unknown success	Total hunters
2002–2003	184	626	59	7	876	(31)	239	1574	140	6	1959	(69)	4	2839
2003–2004	102	617	92	3	814	(24)	227	2209	182	6	2624	(76)	14	3452
2004–2005	109	745	79	4	937	(36)	163	1356	124	10	1653	(64)	8	2598
2005–2006	133	543	68	1	745	(29)	162	1499	129	0	1790	(71)	2	2537
2006–2007[c]	141	626	88	0	855	(32)	206	1501	125	1	1833	(68)	1	2689

[a] Data from RC860, RC863, RC865, RC866 and RC867 harvest reports and general season harvest reports for the Fortymile caribou herd.
[b] Residents of Unit 12 north of Wrangell–St Elias, Unit 20E, Unit 20D, and residents of Circle and Central.
[c] Preliminary harvest data.

TABLE 7 Fortymile caribou autumn harvest by month/day, regulatory years 2002–2003 through 2006–2007[a]

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*
2002–2003	148	75	140	254	11	15	9	6	658
2003–2004	113	79	93	84	43	131	3	0	546
2004–2005	129	80	126	88	55	51	4	3	536
2005–2006	272	85	42	46	26	4	1	0	476
2006–2007[b]	337	39	34	36	19	15	2	1	483

[a] Data from RC860, RC863, RC865, RC866 and RC867 harvest reports and general season harvest reports for the Fortymile caribou herd.
[b] Preliminary harvest data.

TABLE 8 Fortymile caribou winter harvest by month/day, regulatory years 2002–2003 through 2006–2007[a]

Regulatory year	Harvest by month/day								
	11/1–11/16	11/17–11/30	12/1–12/15	12/16–12/31	1/1–1/15	1/16–1/31	2/1–2/15	2/16–2/28	*n*
2002–2003	4	7	183	1	1	5	0	0	201
2003–2004	30	6	201	7	0	0	0	0	244
2004–2005	23	22	224	24	4	1	0	13	311
2005–2006	68	5	42	42	33	20	17	38	265
2006–2007[b]	63	27	279	0	0	0	0	1	370

[a] Data from RC860, RC863, RC865, RC866 and RC867 harvest reports and general season harvest reports for the Fortymile caribou herd.
[b] Preliminary harvest data.

TABLE 9 Fortymile caribou harvest by transport method, regulatory years 2002–2003 through 2006–2007[a]

Regulatory year	Harvest by transport method									
	Airplane (%)	Horse (%)	Boat/Airboat (%)	3- or 4-Wheeler (%)	Snowmachine (%)	ORV (%)	Highway vehicle (%)	Walking (%)	Unk (%)	Total
2002–2003	67 (8)	0 (0)	26 (3)	347 (40)	132 (15)	38 (4)	235 (27)	2 (<1)	29 (3)	876
2003–2004	104 (13)	0 (0)	48 (6)	282 (35)	160 (20)	35 (4)	120 (15)	45 (5)	20 (2)	814
2004–2005	77 (9)	1 (<1)	43 (5)	320 (37)	201 (23)	34 (4)	136 (16)	12 (1)	34 (4)	858
2005–2006	75 (10)	1 (<1)	64 (9)	274 (37)	98 (13)	58 (8)	166 (22)	4 (1)	5 (1)	745
2006–2007[b]	83 (10)	5 (1)	46 (5)	305 (36)	232 (27)	26 (3)	136 (16)	6 (1)	16 (2)	855

[a] Data from RC860, RC863, RC865, RC866, and RC867 harvest reports and general season harvest reports for the Fortymile caribou herd.

[b] Preliminary harvest data.

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

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

HERDS: Galena Mountain, Ray Mountains, Wolf Mountain

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

BACKGROUND

Named for their distinct calving areas, the Galena Mountain, Wolf Mountain, and Ray Mountains caribou herds occur north of the Yukon River in the Kokrines Hills and Ray Mountains. The Galena Mountain herd (less than 125 animals) typically calves east of Galena Mountain and winters west of the mountain. The Wolf Mountain herd (300–500 animals) calves and winters to the north and east of Wolf Mountain in the Melozitna and Little Melozitna River drainages. The Wolf Mountain herd and the Galena Mountain herd are sympatric on a portion of their ranges near Black Sand Creek in Unit 21C, and the identity of these 2 herds has never been adequately determined. The Ray Mountains herd (approximately 1850 animals) calves in the Ray Mountains around Kilo Hot Springs and winters to the north in the Kanuti Kilolitna River area or to a lesser degree in the Tozitna drainages to the south. Small groups of caribou to the northeast of the Ray Mountains were considered part of the Ray Mountains herd. Recent efforts have been made by the Alaska Department of Fish and Game (ADF&G) and federal Bureau of Land Management (BLM) to gain better information on these animals, which are sometimes called the Hodzana Hills caribou herd. Local residents were aware of these herds for many years, but ADF&G did not survey them until 1977. In this report, caribou to the northeast of the Ray Mountains are referred to as the Hodzana herd.

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

The origin of these herds is unknown. Some residents suggested they were reindeer from a

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

commercial operation in the Kokrines Hills that ended around 1935. However, evidence suggests these animals are caribou because 1) reindeer physical characteristics are not apparent, 2) reindeer genes were not found when tested (Cronin et al. 1995), and 3) reindeer calve earlier than these 3 caribou herds (Saperstein 1997; Jandt 1998). Traditional ecological knowledge suggests that these herds are simply relict populations of once vast herds that migrated across western Alaska.

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. The combined average of reported and known unreported harvest from all 3 herds combined over the last 10 years was <10 caribou per year. All seasons were closed in the area of the Galena Mountain caribou herd in regulatory year (RY) 2004 (e.g., RY04 = 1 July 2004 through 30 June 2005) due to declines observed in that herd (Table 1).

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

Caribou from these herds were monitored through cooperative radiotelemetry studies involving ADF&G, U.S. Fish and Wildlife Service (FWS), and BLM. On 10 April 2002, 3 short yearling, 1 short 2-year-old, and 6 adult females were radiocollared in the Galena Mountain herd. Galena Mountain is a local name given the 3274-ft, unnamed mountain northeast of Galena. On 2 October 2004, 6 caribou calves and 4 adult cows were radiocollared in the Galena Mountain herd. On 11 April 2002, 1 short 2-year-old and 9 adult females were radiocollared in the Wolf Mountain herd. We radiocollared 15 short yearling and 2 short 2-year-old females on 29 March 2002 in the Ray Mountains herd. On 20 October 2003, 2 adult female caribou were radiocollared in the Ray Mountains herd along with 4 caribou (2 adult females and two 5-month-old females) in the Hodzana Hills east of the Dalton Highway. Currently there are 9 active collars in the Galena Mountain herd, 1 active collar in the Wolf Mountain herd, and 20 active collars in the Ray Mountains/Hodzana Hills herd.

We conducted aerial surveys with helicopters (Robinson R-22 or R-44) and fixed-wing aircraft (Piper PA-18 or Bellanca Scout) during October 1994 through 2006 following techniques outlined by Eagan (1993). Surveys conducted using helicopters allowed for composition data to

be collected. Fixed-wing aircraft were used during RY98–RY06 to survey the Galena Mountain and Wolf Mountain herds; therefore, only numerical counts were typically completed.

We monitored hunting mortality from hunter harvest reports and hunter interviews. Harvest reports submitted by hunters were entered into the statewide harvest database. The data from these caribou herds were summarized annually from the statewide harvest database. Data summarized include total harvest, harvest location, hunter residency and success, harvest chronology, and the types of transportation used. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Galena Mountain Herd. The Galena Mountain herd has been difficult to census comprehensively, but the population has probably declined from 250–500 prior to RY02 to less than 125 caribou by RY05. The highest number of caribou seen during RY04–RY05 was 95 animals in January 2006 (Table 1). The population probably declined because of predation and movement from the Galena Mountain herd to the Wolf Mountain herd (Stout 2001). It is also likely that some caribou were missed during a December 2004 survey. Having more caribou radiocollared did not increase the number of caribou found, but did demonstrate that during the rut caribou occupy dense black spruce habitat where sightability is low (Stout 2001). Continuing surveys or censuses during winter or spring postcalving aggregations will provide the best estimates of population size for this herd. Regardless, it appears the Galena Mountain herd is declining to a point where recovery is unlikely without substantial management intervention or chance infusion of caribou from another herd.

Wolf Mountain Herd. The first comprehensive fall composition survey of the Wolf Mountain herd was conducted in October 1995, when 346 caribou were counted (Table 2). During a photocensus on 17 July 2002, we counted 516 caribou. The 2002 count may have been high because Galena Mountain herd animals were mixed with the Wolf Mountain herd at the time of the survey. Based on the 17 July 2002 count, and low counts during RY03–RY05, I estimated the Wolf Mountain herd had 300–500 caribou in RY05. Continuation of surveys or censuses during summer or postcalving aggregations will provide the best estimates of population size for this herd.

Ray Mountains Herd. The Ray Mountains herd was first thoroughly surveyed by ADF&G and BLM in fall 1983 and periodically surveyed by BLM for the next 2 years (Table 3). 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 except the Caribou Mountain area, which is in the range of the Hodzana Hills herd. Composition counts during a radiotracking flight and photocensus in October 2000 indicated a minimum herd size of 1736. The 2001 survey yielded a count of 1685 caribou. A photocensus in June 2004 generated a herd estimate of 1858 (M. Keech, ADF&G, personal communication 2004), and a composition count of 1403 was conducted in October 2004. The October 2005 survey yielded 795 caribou, and 1022 were found in the April 2006 survey. Composition data are not available for the October 2004 and April

2006 surveys due to weather conditions that only allowed for a total count. The population probably declines in years of poor recruitment and increases when recruitment is good. Continuation of surveys or censuses during summer or postcalving aggregations will provide the best estimates of population size for this herd.

For many years, small groups of caribou to the northeast of the Ray Mountains were more or less considered part of the Ray Mountains herd. Efforts over the past 4 years by ADF&G and BLM to gain better information on these animals included radiocollaring caribou east of the Dalton Highway in the Hodzana Hills. In October 2003, 306 caribou located in the upper drainages of the Kanuti and Hodzana Rivers were classified in 4 groups. Radio collars were placed on 4 caribou in that herd in October 2003. In June 2004, 242 caribou were counted in the Hodzana Hills, 1115 were classified in October 2005, and 320 were counted in April 2006. Surveys will continue to be conducted to improve our understanding of movements and calving locations. Future discussions between department researchers and managers are needed to determine whether the Ray Mountains caribou and the Hodzana Hills caribou should be classified as the same herd or separate herds. More research is necessary to distinguish the two groups of caribou.

Population Composition

Because some counts of the 3 herds were conducted with fixed-wing aircraft, not all surveys yielded composition data (Tables 1–5). During RY04–RY05, the Wolf Mountain herd was the only herd that did not have a least one survey that included composition data. The majority of the Wolf Mountain herd was not surveyed during RY04–RY05 because they could not be located during survey flights conducted in June. Caribou tracks and recently worn trails indicated the presence of the herd, but they were last counted in 2003.

The most recent calf:cow ratio data collected for the Ray Mountains/Hodzana Hills, Wolf Mountain, and Galena Mountain herds were within the range of other Interior herds at 14:100, 22:100, and 16:100, respectively. Calf:cow ratios for the Fortymile herd between 1985 and 1994 averaged 29:100 with a range of 16–37:100 (Boertje et al. 1995). The Delta caribou herd calf:cow ratio between 1970 and 1993 averaged 29:100 with a range of 2–65:100 (Valkenburg 1994). The highest calf:cow ratios in caribou 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 were found on the alpine slopes of the southern Kokrines Hills during the calving season. Most radiocollared caribou were in alpine areas west of the Melozitna River from June to September in all years. In September a few bulls have been seen along the Yukon River and also north of Galena. During October the caribou usually migrated from alpine areas across Galena Mountain toward the Holtnakatna Hills and Hozatka Lakes, where they wintered. In October 1995 radiocollared caribou from the Galena Mountain herd were in the Holtnakatna Hills when composition counts were conducted. In 1996 caribou were scattered from the Holtnakatna Hills eastward to the Melozitna River, where some were mixed with Wolf Mountain caribou (Saperstein 1997). Seasonal movements during RY04–RY05 appear to be generally consistent with earlier investigations.

Wolf Mountain Herd. A general migration pattern for the Wolf Mountain herd was surmised based on tracks seen during surveys in the early 1980s. The herd calved on the south facing slopes of the Kokrines Hills south of Wolf Mountain, spent most of the summer in the surrounding alpine habitat nearer Wolf Mountain, then in October moved northward toward Lost Lake on the Melozitna River. These patterns were confirmed and more specifically determined with radiocollared caribou. 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. The herd was on the north side of Wolf Mountain in the west fork of Wolf Creek in October 1995. In October 1996 the herd was on the lower part of the Melozitna River, approximately 10–35 miles southwest of Wolf Mountain. Currently there is only one radiocollared caribou left in the Wolf Mountain herd, so data on the current migration pattern is limited.

Ray Mountains/Hodzana Hills 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. Groups of 10–20 bulls were regularly seen near Sithylemenkat Lake 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 the Western Arctic herd (WACH).

Since radiocollaring began in October 1994, relocations 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). The caribou that reside in the Hodzana Hills have been typically been found since 2003 in the headwaters of the Hodzana and Kanuti Rivers. In October 2006, these caribou were found in the upper Hodzana River, with a few groups south of Caribou Mountain on the west side of the Dalton Highway. Currently 20 radio collars remain active in the Ray Mountains/Hodzana Hills herd.

Body Weights and Genetics

During October 1994 female calves from the Galena Mountain herd were weighed and were among the heaviest (143.4 lb) in Alaska compared to calf weights reported by Valkenburg et al. (1996). Wolf Mountain and Ray Mountains calves were also relatively heavy (Valkenburg et al. 1996).

In contrast, caribou calves caught in the Ray Mountains on March 2002 were relatively light ($\bar{x}$ = 114.1 lb; M. Keech, personal communication 2005) compared to 1994 weights reported for the Ray Mountains calves (134.4 lb), indicating that body condition of that group of calves was considerably less than the earlier cohort. It is unknown whether that decline in condition was due to a short-term event (previous summer weather) or was a density-dependent decline in condition.

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 Alaska 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 during RY04–RY05.

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
Ray Mountains Herd: Unit 20F, North of the Yukon River. 1 caribou.	10 Aug–31 Mar (General hunt only)	10 Aug–30 Sep
Galena Mountain Herd: Units 21B, that portion north of the Yukon River and downstream from Ukawutni Creek.	No open season	No open season
Wolf Mountain Herd: Remainder of Unit 21B. 1 caribou.	10 Aug–30 Sep	10 Aug–30 Sep
Galena Mountain Herd: Unit 21C, that portion within the Dulbi River drainage and that portion within the Melozitna River drainage downstream from Big Creek	No open season	No open season
Wolf Mountain Herd: Remainder of Unit 21C. 1 caribou.	10 Aug–30 Sep	10 Aug–30 Sep
Galena Mountain Herd: Unit 21D, that portion north of the Yukon River and east of the Koyukuk River. 2 caribou.	Winter season to be announced	No open season
Western Arctic Herd: Remainder of Unit 21D. RESIDENT HUNTERS: 5 caribou per day; however, cow	1 Jul–30 Jun	

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
caribou may not be taken 16 May–30 Jun. NONRESIDENT HUNTERS: 5 caribou per day; however, cow caribou may not be taken 16 May–30 Jun.		1 Jul–30 Jun
Ray Mountains Herd: Unit 24, that portion south of the south bank of the Kanuti River, upstream from and including that portion of the Kanuti Kilolitna River drainage, bounded by the southeast bank of the Kodosin Nolitna Creek, then downstream along the east bank of the Kanuti Kilolitna River to its confluence with the Kanuti River. 1 caribou.	10 Aug–31 Mar	10 Aug–30 Sep
Ray Mountains/Hodzana Hills Herd: Unit 25D, that portion drained by the west fork of the Dall River, west of the 150°W long. 1 bull.	10 Aug–31 Mar	10 Aug–30 Sep

The Western or Central Arctic caribou herds seasonally occupy areas in Units 24 and 21D north of the Yukon River and west of the trans-Alaska pipeline. Seasons and bag limits in that area reflect harvest recommendations for those herds.

Alaska Board of Game Actions and Emergency Orders. In March 1991 the Alaska Board of Game gave ADF&G emergency order authority to open a portion of Unit 21D when WACH are present. A bag limit of 2 caribou was established. This action allowed hunters the opportunity to take caribou while protecting the smaller Galena Mountain herd that may be intermixed with the WACH. This special winter season is not opened unless the Galena Mountain herd constitutes 10% or less of the total number of caribou north of the Yukon River and east of the Koyukuk River in Unit 21D. It was not opened during RY98–RY05.

The Board of Game adopted several changes in regulations for the Galena Mountain herd at the March 2004 meeting. The changes were designed to eliminate harvest in the range of the Galena Mountain herd due to conservation concerns. The new regulations closed the fall season in portions of Units 21B, 21C, and 21D beginning in RY04.

Hunter Harvest. During RY04–RY05, only 3 caribou (2 bulls, 1 cow) were reported taken. The 3

caribou were harvested from the Ray Mountains herd in RY04. During RY04–05 no caribou were reported harvested in the Galena or Wolf Mountain herds (Table 6).

Hunter access to the Ray Mountains herd is limited to lengthy snowmachine trips during the winter season or to a few ridgetop landing areas. The Galena Mountain herd is most accessible for hunting when it crosses the Galena–Huslia winter trail during winter. However, that area is closed to prevent overharvest. The Wolf Mountain herd is almost never accessible for hunting because of the scarcity of aircraft landing areas. Several years ago, a guide who used horses accessed 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 was limited, and all 3 harvested caribou were taken by locals (Table 7).

The total reported harvest for all these herds combined continues to average less than 10 caribou per year (Table 6). Each year 1 or 2 caribou are taken but not reported along the Yukon River near Ruby, and 3–5 caribou are taken along the Yukon River in the Rampart–Tanana section (Osborne 1995). These caribou, usually bulls, are occasionally found on remaining snowfields near the river in August, or wander to the river during September. In addition, 5–7 caribou are probably taken each year by hunters from Tanana using snowmachines (Osborne 1995).

Other Mortality

Judging from fall calf percentages (Tables 1–5), natural mortality of caribou calves continued to be high in all 3 herds during RY04–RY05. Predation was probably the main limiting factor, but no studies to determine mortality factors have been completed for these herds. Judging from adult abundance, total adult mortality was probably very low. Black bears were probably the primary calving ground predators on the Wolf and Galena Mountain herds (Paragi and Simon 1993). Grizzly bears are found throughout the calving ranges of all 3 herds, and calf mortality studies in other areas indicate that they are important predators of caribou calves (Boertje et al. 1995). There was some concern that the recent high moose populations have supported higher numbers of wolves and bears and that an increase of incidental predation on the Galena Mountain caribou may be contributing to a decline in that herd.

CONCLUSIONS AND RECOMMENDATIONS

The mountains between Galena and the upper Hodzana River on the north side of the Yukon River contain 2300–2750 caribou in 3 herds centered around 3 distinct calving areas. However, the calving areas of the Galena and Wolf Mountain herds may overlap, and some animals thought to be part of the Ray Mountains herd may be a separate herd in the Hodzana Hills. Although open hunting seasons for caribou exist, few animals were harvested due to limited access. Poor survival due to predation is likely the primary factor restricting herd growth. Survey and inventory information for wolves and bears indicated predator numbers were increasing during RY96–RY99 (Stout 1999, 2000). During RY00–RY05 predator populations were believed to be stable (G. Stout, ADF&G, personal communication 2006). Prior to RY03, habitat apparently did not restrict growth because lichen ranges were lush. Large body size and weight of calves and adults for the Ray Mountains herd and Galena Mountain herd previously indicated good nutrition (Osborne 1995). The recent low calf weights may be more related to less

high-quality summer range available for Ray Mountains herd caribou than previously thought, although they could also have been an annual effect of previous growing season in the recent sample.

The decline in the Galena Mountain herd was not due to harvest; therefore, the first management goal, to ensure harvest does not result in a population decline, was met. However, the second goal, to provide increased opportunity for people to participate in caribou hunting, was not achieved for the Galena Mountain herd. All management objectives were met. Harvest of bulls and cows did not exceed desired levels for the 3 herds. Very little has changed with respect to management since the last reporting period.

To allow harvest from the WACH in Unit 21D east of the Koyukuk River and to protect the Galena Mountain and Wolf Mountain caribou herds, we need to maintain a restricted season for the smaller herds when the WACH is not present. Maintaining radio collars in the Galena and Wolf Mountain herds would help managers distinguish these caribou 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 low harvest and relatively few animals in these herds.

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TABLE 1 Galena Mountain caribou composition counts, 1991–2006

Month/ Year	Bulls:100 cows	Calves:100 cows	Calves	Cows	Bulls	Total caribou observed
12/91[a]						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	62	232
12/98[a]						313
12/99[a]						89
01/01[a]						65
06/01[a]						105
07/02[a]						102
09/04	20	11	7	64	13	84
12/04[a]						95
04/05[a]						78
11/05	10	16	9	58	6	73
01/06[a]						95

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

TABLE 2 Wolf Mountain caribou composition counts, 1991–2006

Month/ Year	Cows	Calves (%)	Bulls	Total caribou observed
06/91	117	18 (12)	11	146
06/92[a]				595
05/94	337	121 (26)	16	474
01/95[a]				194
10/95	192	51 (15)	103	346
03/96[a]				561
10/96	167	37 (14)	62	266
05/97[a]				423
01/98[a]				163
06/01[a]				489
04/02[a]				455
07/02[a]				319
07/02[b]		27 (5)		516
06/03[a]				271
05/04[a]				146
06/05[c]				13
05/06[a]				95

[a] Fixed-wing survey, no composition classifications.
[b] Photocensus (fixed wing).
[c] No significant caribou groups found.

TABLE 3 Ray Mountains caribou composition counts and estimated population size, 1991–2006

Survey date (month/year)	Bulls: 100 cows	Calves: 100 cows	Calves %	Cows %	Small bulls %	Medium bulls %	Large bulls %	Total bulls %	Composition sample size	Count or estimate of herd size
06/91		31						13[a]		446
06/91			19							303[b]
10/91[c]										140[d]
10/94[c]										652
10/94	37	19	12	64	4	8	11	24	629	629
01/95[c]										684
06/95[e]										1731
10/95	34	12	8	69	3	9	11	23	994	994
10/96	28	15	10	70	3	8	9	20	1387	1387
07/97[c]										1575
10/97	33	13	9	68	5	6	12	23	1114	1114
10/98	26	32	20	63	6	3	7	16	1756	1756
10/00[e]	38	19	12	64	10	6	9	24	1736	1800
09/01	30	15	11	68	10	5	5	21	1685	1800
09/02	51	31	17	55	11	15	2	28	140	
10/03	33	18	12	66	10	6	7	22	921	
06/04[e]									1705	1858
10/04[c]									1403	
10/05	35	20	7	69	10	6	8	24	795	
04/06[c]									1022	

[a] Includes 50 unclassified adults.
[b] Included 245 unclassified adults.
[c] No composition classifications.
[d] Caribou Mountain portion only.
[e] Photocensus.

TABLE 4 Hodzana Hills caribou surveys, 2003–2006

Date	Cows	Calves (%)	Bulls	Total caribou observed
10/03	173	43 (14)	90	306
06/04				242
10/04				136
06/05				318
10/05	661	111 (10)	343	1115
04/06				320

TABLE 5 Galena Mountain caribou summer calving surveys, 1991–2006

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 (12)	40	194
5/94	56	13 (12)	40	109
6/94	104	34 (18)	53	191
1995–2006[a]				

[a] No counts completed.

TABLE 6 Ray Mountains, Galena Mountain, and Wolf Mountain caribou reported harvest, regulatory years 1990–1991 through 2005–2006

Regulatory year	Herd/Reported harvest					
	Ray Mountains		Galena Mountain		Wolf Mountain	
	Bulls	Cows	Bulls	Cows	Bulls	Cows
1990–1991	3	0	0	0	1	0
1991–1992	2	0	0	0	1	0
1992–1993	5	0	0	0	2	0
1993–1994	9	0	0	0	0	0
1994–1995	2	0	1	0	2	0
1995–1996	0	0	0	0	0	0
1996–1997	0	0	1	0	0	0
1997–1998	0	0	0	0	0	0
1998–1999	0	0	0	0	0	0
1999–2000	0	1	0	0	1	0
2000–2001	2	0	2	0	0	0
2001–2002	1	2	0	0	0	0
2002–2003	2	0	0	0	0	0
2003–2004	2	0	0	0	0	0
2004–2005	2	1	0	0	0	0
2005–2006	0	0	0	0	0	0

TABLE 7 Galena Mountain, Wolf Mountain, and Ray Mountains caribou hunter residency and success, regulatory years 1990–1991 through 2005–2006

Regulatory year	Successful				Unsuccessful				Total hunters
	Local resident[a]	Nonlocal resident	Nonresident	Total	Local resident[a]	Nonlocal resident	Nonresident	Total	
1990–1991	0	4	0	4	3	23	3	29	33
1991–1992	0	3	0	3	2	28	0	30	33
1992–1993	0	5	2	7	1	7	2	10	17
1993–1994	1	6	1	8	0	15	2	17	25
1994–1995	0	3	2	5	2	18	0	20	25
1995–1996	0	0	0	0	2	10	0	12	12
1996–1997	0	1	0	1	1	11	1	13	14
1997–1998	0	0	0	0	1	5	2	8	8
1998–1999	0	0	0	0	4	0	2	6	6
1999–2000	0	1	1	2	0	4	2	6	8
2000–2001	3	1	0	4	3	13	2	18	22
2001–2002	1	2	0	3	0	20	8	28	31
2002–2003	1	0	1	2	4	4	3	11	13
2003–2004	0	2	0	2	1	13	1	15	17
2004–2005	3	0	0	3	9	8	2	19	22
2005–2006	0	0	0	0	10	1	1	12	12

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

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[a]

LOCATION

GAME MANAGEMENT UNIT: 21D, 22A, 22B, 22C, 22D, 22E, 23, 24 and 26A

HERD: Western Arctic

GEOGRAPHIC DESCRIPTION: Northwest Alaska

BACKGROUND

The Western Arctic caribou herd (WAH) ranges over approximately 140,000 mi^2 (363,000 km^2) of northwestern Alaska (Figures 1–5). Summer range encompasses the calving grounds and consists of the Brooks Range and its northern foothills west of the trans-Alaska pipeline. In most years during the mid 1980s through 1995 much of the WAH wintered in the Nulato Hills as far south as the Unalakleet River drainage. In many years since 1996 much of the WAH has wintered on the eastern half of the Seward Peninsula.

In 1970 the WAH numbered approximately 242,000 caribou (Figure 6). By 1976 it had declined to about 75,000 animals. From 1976 to 1990 the WAH grew 13% annually, and from 1990 to 2003 it grew 1–3% annually. In 2003 the WAH numbered $\geq$490,000 caribou, and density over its total range was 3.5 caribou/mi^2 (1.3 caribou/km^2). The herd may have peaked around this time because, by 2007, the herd had declined to 377,000 caribou.

Although the concept of density (total population/total area of range) is a useful measure for monitoring long term impacts of caribou on their habitat, it can also be misleading. Caribou exhibit a "clumped" distribution in both space and time. Additionally, spatial patterns of seasonal range use, especially winter range, vary among years. Seasonal densities calculated on an annual basis provide a more useful measure for evaluating effects of density on range and on individual caribou. For example, during the 2003 censuses, 99% of the WAH was on its summer range for a density of 11.2 caribou/mi^2. However, caribou were extremely aggregated during the first 2–3 weeks of July and actual density was much higher than 11.2 caribou/mi^2 during this time.

[a] This report also contains information collected outside the reporting period at the discretion of the reporting biologist.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Protect and maintain the WAH and its habitat.
- Provide for subsistence and recreational hunting on a sustained yield basis.
- Provide for viewing and other uses of caribou.
- Perpetuate associated wildlife populations, including carnivores.

MANAGEMENT OBJECTIVES

The following management objectives compose the 7 basic elements of the Western Arctic Caribou Herd Cooperative Management Plan (2003):

- Encourage cooperative management of the herd and its habitats among state, federal, and local entities and all users of the herd.
- Recognizing that caribou herds naturally fluctuate in numbers, manage for a healthy population using strategies adapted to population levels and trends.
- Assess and protect important habitats of the WAH.
- Promote consistent, understandable, and effective state and federal regulations for the conservation of the WAH.
- Seek to minimize conflict between reindeer herders and the WAH.
- Integrate scientific information, traditional ecological knowledge of Alaska Native users, and knowledge of all users into management of the herd.
- Increase understanding and appreciation of the WAH through use of scientific information, traditional ecological knowledge of Alaska Native users, and knowledge of all other users.

METHODS

Many of the terms used in this report are defined as follows:

Caribou terms:

> "Caribou" in the generic sense refers to individuals belonging to the WAH. Acronyms used for other caribou herds are: CAH for Central Arctic herd; TLH for Teshekpuk Lake herd and PCH for Porcupine caribou herd.
>
> "Adult caribou" is any caribou >12 months old.
>
> "Calf" is any caribou <12 months old.

"Short yearling" is any caribou 10–11 months old.

"Maternal cow" refers to a female caribou accompanied by a calf or having ≥1 hard antler during June.

Satellite collar and telemetry terms:

"Collar year" is the period 1 October–30 September of the subsequent year.

"Conventional telemetry" refers to techniques using radio collars with very high frequency (VHF) transmitters and antennas mounted on airplanes to locate caribou. When referring to radio collars, the terms "VHF" and "conventional" are used interchangeably.

"Satellite collar" is a radio collar that contains both a VHF transmitter and a PTT (platform terminal transmitter). The terms "satellite collar" and "PTT" are used interchangeably.

"Light weight satellite collar" refers to model ST-10, ST-18 or ST-20 collars manufactured by Telonics, Inc. (Mesa, AZ). Model ST-3 or ST–14 satellite collars were not included in this definition.

Hunting-related terms:

"Guide" is a commercial operator who accompanies a hunter in the field and provides professional services to assist in the taking of trophy wildlife.

"Local hunter" is anyone that resides within the range of the WAH.

"Nonlocal hunter" includes residents of Alaska that live outside the range of the WAH as well as nonresident and alien hunters.

"Transporter" is a commercial operator who provides transportation services only to hunters and others.

Survey terms:

"Photocensus" is the aerial direct count photo extrapolation technique (Davis et al. 1979). Caribou are counted on photos taken through rigorous survey procedures.

"Recruitment survey" is used interchangeably with "short yearling survey." These surveys are conducted during late March through May to estimate the ratio of short yearlings:100 adult caribou.

Other terms:

The acronym "BOG" refers to the state Board of Game.

The acronym "FSB" refers to the Federal Subsistence Board.

"c.i." is the abbreviation for "confidence interval."

"Department" refers to Alaska Department of Fish and Game, Division of Wildlife Conservation.

"Winter" is 1 November–31 March.

Population Status and Trend. Our understanding of WAH population status and trend is based almost wholly on conventional and satellite telemetry information. Implementation and early objectives of the conventional telemetry program in the WAH were previously reported (Dau 2005). The Alaska Department of Fish and Game (department, or ADF&G) initially deployed satellite collars (PTTs) in the WAH primarily to assist in locating caribou with VHF radio collars, and to provide more information on the distribution of cows than possible using conventional telemetry techniques alone. As the PTT database has expanded through time and included additional collars, we have used this information to evaluate seasonal movement patterns. Although we rely heavily on telemetry information to monitor the WAH, we have never collared >0.03% of the herd. We have typically conducted ≥15–20 relocation flights annually since the late 1980s.

During this reporting period, conventional radio and satellite telemetry techniques were used to estimate population size, adult mortality, calf production and recruitment, sex and age composition, movement patterns, and distribution. Telonics Inc. (Mesa, AZ) manufactured all radio collars deployed in the WAH. Configuration of conventional and satellite collars, PTT duty cycles, VHF relocation techniques, types of data collected, allocation of collars between bulls and cows, and sources of error in telemetry data have been previously described (Dau 1997, 1999). It appears that most PTTs now transmit 3-4 yrs rather than the 2-3 yrs we experienced in the past. This may be due to improved battery technology or modifications to PTT duty cycles made in 2005.

As in the past, during this reporting period we attempted to complete each collar year with ≥100 functional transmitters on living caribou. To meet this goal we typically begin each collar year with 115–140 potentially active collars in the herd ('potentially active' collars are those that have been found during the previous 2 years; there is no way to determine when a VHF transmitter has exhausted its batteries so some potentially active collars are, in fact, not functional). We have not attempted to radiocollar a cross-section of ages and sexes in the population partly because the age structure is unknown. Instead, we attempt to maintain only ~15 collared bulls in the total marked sample annually primarily to facilitate photocensuses. Also, we deploy collars only on large, healthy, adult bulls. This prevents skeletal growth from combining with seasonal expansion of the neck during rut that could cause a collar to choke a bull. Collars are randomly deployed on cows ≥2 years old annually, irrespective of maternal status. Only cows in very poor physical condition are not collared.

We began the 2004–2005 collar year with 138 potentially active conventional collars on living caribou (120 cows and 18 bulls). Of these, 16 collars on cows and 8 on bulls were also equipped with a functional PTT. We began the 2005–2006 collar year with 127 potentially active

conventional collars on living caribou (113 cows and 14 bulls), of which 22 cows and 3 bulls also had a functional PTT. Initial sample sizes of conventional- and PTT-collared caribou are inconsistent between consecutive WAH management reports because collars are retroactively dropped from the initial sample after we determine their batteries were likely exhausted or that a caribou died prior to the start of a collar year.

During the reporting period all radio collars were deployed during September in Unit 23 at Onion Portage on the Kobuk River. The rationale and methods for this technique have been previously described (Dau 1997). Many residents of northwest Alaska object to chemical immobilization and helicopter capture techniques. Therefore, to avoid using these techniques, we have physically captured caribou while they cross the Kobuk River using boats (Dau 1997). Because it would be impractical to recapture collared individuals using this technique, we have not removed or replaced radio collars on WAH caribou since at least the mid 1980s.

In September 2005 and September 2006 we deployed model ST-20 (A36-10 option) satellite collars. This configuration enclosed both the PTT and a Mark 9 VHF transmitter in a single canister. This configuration of satellite collar has more battery power for the VHF transmitter than ST-18 satellite collars; however, the Mark 9 VHF transmitter requires more power to operate than earlier model VHF transmitters. Therefore, to maintain a minimum 36-month VHF transmitter life expectancy, we specified a 12-hours-on/12-hours-off duty cycle in conventional transmitters contained in satellite collars (‘on’ 8:00 a.m–8:00 p.m. daily). No duty cycle was used for conventional VHF collars. Dau (1997) reported the history and objectives of the WAH PTT program, configuration of satellite collars, PTT duty cycles, and use of data. We standardized all PTT data to a 1-day-on/5-days-off duty cycle for the entire year when depicting annual movement patterns because duty cycles vary among seasons and individual PTTs.

During 2004 we deployed 32 radio collars (23 conventional collars and 9 satellite collars) on 26 cows and 6 bulls. Four of the satellite collars deployed in 2004 were provided by the Selawik National Wildlife Refuge (SNWR), 1 (which never provided a satellite location and was never located by conventional means) was provided by the National Park Service-Gates of the Arctic (GAA) and the rest were purchased by the Department. All of the satellite collars purchased by the SNWR and GAA were deployed on cows, as were 2 of the PTTs purchased by the department.

In 2005 we deployed 44 radio collars: 29 conventional collars (25 cows and 4 bulls) and 15 satellite collars (9 cows and 6 bulls). In 2005 SNWR provided 8 satellite collars and GAA provided 1 satellite collar; all federal collars were deployed on cows. All of the PTTs purchased by the department were deployed on bulls.

In 2006 we deployed 33 radio collars: 17 conventional collars (11 cows and 6 bulls) and 16 satellite collars (14 cows and 2 bulls). In 2006, 8 of the PTTs were provided by the SNWR (all deployed on cows) and the rest were purchased by the department. Through 2005, all satellite collars provided by the SNWR were equipped with a breakaway device (Telonics Cr-2a) programmed to release 3 years after the manufacture date. Beginning in 2006, the breakaway device on SNWR PTTs was programmed to release in 7 years (their maximum duration) to minimize the likelihood of releasing collars with a functional VHF transmitter, and to increase our probability of retrieving them from mortalities. Most of the Telonics Cr-2a release

mechanisms have, in fact, released the collar. However, release dates seem to have varied by up to several months from their programmed date of release.

Population Size and Composition. Since 1986 we have determined population size using the aerial photo direct count extrapolation (photocensus) technique (Davis et al. 1979). We based a field camp with 1000 gal of 100LL avgas at the Eagle Creek strip during 1-13 July 2007. Fourteen staff from Regions II, III and V participated in the census. We photographed the herd on 2, 11 and 12 July using the department's DeHaviland Beaver and large format camera. A C-185, PA-18 and PA-12 conducted telemetry flights and visually searched for caribou throughout the project. HAS Images (Dayton, OH) developed and printed the film. Overlap lines were placed on the 9 in X 9 in black and white photos and redundant photos were eliminated during a Region V staff meeting in January 2008. We contracted Don Williams to count the 473 photos; he completed the counts in March 2008. From the time of the photocensus through mid May, 2008, we conducted extensive radiotracking flights from Barrow, Kotzebue, Fairbanks, Umiat and Nome to determine if any collared caribou not present during the photography were alive at that time. As in past WAH censuses, we calculated an expansion factor to adjust for caribou not present in the aggregations by determining a mean number of caribou per radio collar in peripheral groups.

Population composition for the WAH was estimated from calving surveys during June, fall composition counts during October–November, and short yearling surveys during April–May. We conduct calving surveys to: 1) delineate calving areas; 2) monitor initial calf production; and 3) contribute to our annual estimate of adult caribou mortality. Additionally, the neonate:cow ratio provides a way to assess body condition of mature cows the previous fall (Cameron and Ver Hoef 1994).

Since the mid 1990s we have attempted to conduct calving surveys during the first week of June. However, poor weather has often prolonged calving surveys into and even slightly past mid June. In all years we attempted to conduct calving surveys on or slightly before the date of peak calving (assumed to be roughly 3–10 June); however, survey dates were ultimately dictated by weather. In 2004, calving surveys were conducted in C-180 and PA-18 airplanes during 4–6 and 3 June. Calving surveys were conducted in a PA-18 airplane during 8–11 and 13 June 2005. In 2006, calving surveys were conducted in C-185 and PA-18 airplanes during 8–11 and 12–14 June. Calving survey techniques, criteria to determine maternal status, and geographic coverage were previously described (Dau 1997).

Caribou collared at Onion Portage tend to move en masse through their first year. Therefore, during the first year of deployment we use $\leq$4 newly collared individuals for collecting composition information to avoid over sampling that segment of the population. Satellite collar information indicates that fall-collared caribou are randomly mixed throughout the herd by early July of the following year. Formation of large, insect-induced aggregations probably facilitates mixing of caribou.

Fall composition surveys were conducted 2–3 October 2004, and on 18 October and 16–17 November 2006 using techniques previously described (Dau 1997). In both years survey dates were determined by the availability of an R-44 helicopter and weather.

Spring composition (short yearling or recruitment) surveys were conducted on 13 and 14 April, and on 16 and 20 May 2005. In 2006, these surveys were conducted on 20, 25 and 27–28 April, and on 24–25 May. In all years we used survey techniques previously reported (Dau 1997). The rationale for using this approach as well as its strengths and weaknesses were reported by Dau (2005).

Distribution and Movements. Distribution and movements of the herd were monitored through rangewide conventional telemetry surveys and through PTT data. Rangewide aerial surveys were conducted during spring (January–May), summer (June) and fall (August–December), often in conjunction with composition surveys. Flights were based out of Barrow, Kotzebue, Nome and Fairbanks using survey techniques previously described (Dau 1997).

We (Bente and Dau) extensively revised the master PTT database during October–December 2006. Because frequency of locations varies among PTTs, seasons and years, we standardized all PTT location data used to describe seasonal movements to a 1-day-on/5-days-off cycle. Caribou collared at Onion Portage during September tend to move en masse until they go through the period of insect harassment the following July. Therefore, location data from the time of initial deployment through 31 July of the subsequent year were excluded from data sets used to describe distribution and movements of this herd. We also excluded data having an ARGOS location quality index <10 (http://noaasis.noaa.gov/ARGOS/) as well as locations from known mortalities in the field.

Calving data was analyzed as reported by Dau (2005). I evaluated winter and summer range as described by Dau (2003). To evaluate distribution on winter range for the years following the 2003 photocensus, I estimated population size assuming the WAH grew 1% annually, as it did during 1990–2003. Values reported for winter range use differ slightly from those reported in the previous report (Dau 2005) because I incorporated PTT data into this analysis.

Mortality. Mortality rates for adult WAH caribou were estimated from cows with conventional or satellite collars on a collar-year basis. Estimated mortality includes all causes of death including hunting. Two collar years (2004–2005 and 2005–2006) span portions of this reporting period. Radiocollared bulls were not included in the sample of collared caribou to estimate mortality because we only collar large, adult individuals that may be approaching the end of their natural lifespan. We began using expandable collar sections on bulls in 2001 which seems to have improved retention of collars.

Mortality rates reported in consecutive management reports are inconsistent. This is because we retroactively adjust the sample of collared cows as we learn their fate. For example, radiocollared cows not located for 2 years are retroactively dropped from the sample of potentially active collars to the year they were last located. Also, when a hunter returns a collar to ADF&G that had been harvested a number of years prior to that time, or we learn that a caribou survived after its radio collar exhausted its batteries, we adjust our sample size accordingly. Inconsistencies in mortality estimates are most pronounced for the most recent 1–3 years included in these reports.

Harvest. We collected harvest information using 3 systems: 1) registration permits for residents of Nome; 2) statewide harvest tickets for nonlocal hunters (beginning in the 1998–1999 regulatory year, the Division of Wildlife Conservation resumed administering the statewide

caribou harvest ticket system); and 3) community-based harvest assessments for selected communities within the range of the WAH.

Community-based harvest assessments have been conducted in selected villages within the range of the WAH since 1985 (Table 1). As in past reports (Dau 2001, 2003) I used 2 approaches to estimate caribou harvests by local hunters. The first approach calculated annual per capita caribou harvest rates for individual communities and summed them to generate a rangewide harvest estimate (this method is described in more detail by Dau 2003). There are several problems with this approach. First, it does not provide confidence intervals around the estimate of total subsistence harvest. Perhaps more seriously, individual communities are not surveyed every year so mean per capita harvest rates using data from multiple years and sometimes multiple communities are used to estimate harvests. This reduces the sensitivity of the estimate to annual variability in caribou harvests among communities and years.

The second approach employed a statistical model based on analysis of covariance that considered the human population size of individual communities and their accessibility to caribou (Sutherland 2005). We developed this approach because it is more responsive to annual changes in caribou availability than the per capita approach. As we expanded the community harvest database, it became evident that harvest levels lacked independence through space and time. As a result, we based the estimation model on a generalized least squares technique because this approach does not require independent observations. Comparing estimates from the per capita approach vs. the statistical approach, in 2000–2001 the model estimate was within 0.4% of the per capita estimate, and in 2001–2002 within 2.4%. These differences are inconsequential considering the likely accuracy of either approach. Therefore, in this report I provide only estimates of local harvest based on the 'levels' model reported by Sutherland (2005). Harvests of WAH caribou in Game Management Units 21 and 24 were not incorporated into the model because they were inconsequential. The human population of communities was based on census data from the year 2000.

For communities in Unit 26A near areas where the CAH, TLH, and WAH mingled, we initially estimated total community caribou harvest as described above. The Unit 26A Area Biologist (G. Carroll) then estimated the percentage of total harvest composed of WAH caribou based on the distribution of collared caribou in each herd. Although there is uncertainty associated with assigning harvest levels to individual caribou herds where they mix, we felt this approach was better than ignoring mixing of herds altogether.

Disease. We collected blood samples from caribou while deploying radio collars at Onion Portage. Blood was collected from all caribou that were radiocollared as well as from additional individuals. Caribou were captured, restrained, and released as previously reported (Dau 1997). In 2004 we sampled 49 bulls and 33 cows; in 2005, 30 bulls and 36 cows; and in 2006, 14 bulls and 31 cows. Body condition (very skinny, skinny, average, fat, very fat), abnormalities, and presence of a calf were recorded for caribou from which a blood sample was collected. Since 2001, serum samples have been analyzed only to assess haptoglobin levels as a "red flag" indicator of disease (Dau 2001), and antibodies against *Brucella suis* bacteria.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The WAH numbered 377,000 caribou as of July 2007 which suggests it may have peaked around 2003 (Table 2, Figure 6). The components of the 2007 estimate are:

Number of Caribou	Source
373738	9X9 photo counts
1840	Direct counts from airplanes during photography
1532	Expansion for caribou not photographed
377110	Total estimate

This estimate means the WAH declined by approximately 113,000 caribou from July 2003 to July 2007 and constitutes a 6% average annual rate of decline. In comparison, during the previous population decline (1970 to 1976), this herd declined 18% annually. However, based on annual estimates of recruitment and adult mortality (Figure 7), the annual rate of change was probably not constant from 2003 to 2007. The unprecedented high mortality during October 2005-September 2006 alone (31%), or in combination with the relatively high mortality of 2004-2005 (22%), could have accounted for most or all of this decline. Considering the wide confidence intervals surrounding point estimates of adult mortality (Figure 8), and that these estimates do not include the male component of the population (which would likely raise estimates of adult mortality), a catastrophic decline during 2004-2005 and/or 2005-2006 seems possible. The high recruitment and relatively low adult mortality in 2007, which are consistent with a positive assessment of health (Dr. K. Beckmen, personal communication), suggest this herd may not have necessarily entered a period of persistent decline. However, a decline seems likely given long term trends in recruitment and adult mortality (Figure 7).

Population Composition

Calf production and survival. Antler status and distention of cows' bellies during calving surveys suggest that WAH calving probably peaks during the first week of June in most years. However, we have no May–June time-series data to quantify annual date of peak calving. Calving probably peaked early during 1990 based on the westerly geographic distribution of collared cows, their movement pattern, and their lack of antlers during the calving survey. The earliest reported peak calving for the WAH is May 26 in 1960 (Lent 1966). During 1987–2006 there has been no correlation between the median date of observation and the June calf:cow ratio (Spearman rank correlation=-0.12, n=19). Although we have no indication our estimates of parturition are biased through time, they probably are conservative because we do not record udder status for collared cows (Whitten 1995) and undoubtedly misclassify some cows that have lost their antlers and their calf as nonmaternal.

We observed 59 calves:100 cows in 2004, 69 calves:100 cows in 2005 and 65 calves:100 cows in 2006 (Table 3). Historical estimates of calf production suggest parturition rates were more variable from 1960–1970 than in recent years (Figure 9). However, sampling approaches varied

prior to 1987 when conventional telemetry techniques were adopted to locate calving caribou. Therefore, measurement error may have contributed to this early variability.

The strong negative correlation between the calf:cow ratio and the proportion of cows with velvet antlers during calving previously reported (Dau 2005) continued through this reporting period (Spearman rank correlation = –0.89, *n* = 19 years). The median proportion of cows with velvet antlers during years when the calf:cow ratio was ≥70:100 (2.6%, n=7) was significantly lower than during years when this ratio was <70:100 (14.4%, n=12, Kruskal-Wallis test statistic 9.78, P=0.002). This suggests low WAH parturition rates are real and not artifacts of sampling error. The calf:cow ratio has been >70 calves:100 cows in only 2 years since 1993 (72 calves:100 cow in 1994 and 78 calves:100 cows in 2002).

The fall calf:cow ratio increased during 1976–1982 but declined during 1992–2006 (Table 4, Figure 10). No fall composition information was collected during 1983–1990 that could enable us to determine the inflection point of these trends. Since 1992 the fall calf:adult ratio has ranged 24–33:100 (Table 4). This ratio is less vulnerable to misclassification than the calf:cow ratio because calves are easy to distinguish from adults. In contrast, inexperienced observers may misclassify young bulls as cows if they focus on antler and body characteristics rather than the presence of a vulva. Even so, spatial and temporal segregation of bulls and cows likely confounds even calf:adult estimates because we do not sample the entire WAH and the degree of sexual segregation varies among years.

We observed 19 short yearlings:100 adults in spring 2003, 22:100 in spring 2004, 12:100 in 2005, 20:100 in 2006, and 25 in 2007 (Table 5, Figure 11). Recruitment has slowly declined since the early 1980s. This trend would not be evident without a long-term data set.

Unweighted least squares linear regression indicates the June, fall and spring calf:cow ratios have all declined slowly and at similar rates during 1982–2006 (P=0.07, 0.02 and 0.0003, respectively; Figure 12). Calf:cow ratios were estimated during each of these seasons in 11 years during this period. There was no correlation between the June and subsequent fall calf:cow ratios (Spearman rank correlation = 0.22) but the fall and subsequent spring ratios were correlated (Spearman rank correlation=0.74). This suggests calf survival through summer has had a greater effect on recruitment than initial production. Calf production per se has probably had little effect on the population dynamics of this herd since at least the mid 1980s.

Bull:cow ratios. Like the fall calf:cow ratio, the fall bull:cow ratio increased during 1976–1982 and decreased since 1992 (Table 4, Figure 13). Since 1992, telemetry-based fall surveys indicate the bull:cow ratio has ranged 38–64:100 with a median of 50 bulls:100 cows (Table 4). Sexual segregation and our inability to sample the entire herd may account for more annual variability in this parameter than actual changes in population composition.

Distribution and Movements

Historical Summary. Our historical understanding of WAH distribution has been previously described (Dau 2001). Since we began conducting rangewide surveys in spring 1995, we've located through conventional telemetry techniques an average 75% (SD = 10, n = 12) of all potentially active collars during spring and 75% during fall (SD = 9, n = 12) surveys. Often, collars missed during one seasonal survey are located during the subsequent survey mixed with

caribou that had been found previously. This suggests long telemetry receiver scan times, topography, receiver programming errors and infrequent relocation flights are responsible for "missed" collars rather than incomplete coverage of the herds' range. The distribution of collars located during rangewide surveys is probably a reasonably accurate though rough approximation of overall WAH distribution.

General Movement Pattern: Pregnant cows and some nonmaternal caribou begin migrating from winter range toward the calving grounds in April (Figure 3). Typically, most pregnant cows reach the calving grounds by mid to late May. Bulls, nonmaternal cows, and immature caribou lag behind pregnant cows during the spring migration (see also Lent 1966) perhaps in part to exploit the northward progression of snowmelt and green-up. Most cows give birth in the Utukok uplands during late May through early June (Figures 1 and 2; see section below). By mid June, usually before the emergence of mosquitoes, large postcalving aggregations begin forming as cows with neonates move west toward the Lisburne Hills (Figure 4). As mosquitoes begin to appear in mid to late June, bulls and nonmaternal caribou move into the western North Slope and DeLong Mountains. Mosquito harassment intensifies and oestrid flies emerge in early July. During the first half of July, insect harassment causes WAH caribou to form aggregations sometimes numbering >100,000 individuals in this area. Even during the period of maximum insect harassment, WAH caribou begin moving east through the Brooks Range and its foothills toward Howard and Anaktuvuk passes (Figure 4). By early to mid August insect harassment begins to diminish. Some caribou disperse north and west onto the North Slope, some going as far as Cape Lisburne and Barrow, while other caribou remain in the mountains between Howard and Anaktuvuk passes. Prior to 2000, the fall migration began in mid August as caribou in the vanguard moved southwest toward Kotzebue and Norton Sounds (Figure 5). Since 2000, though, the fall migration hasn't begun until early to mid September. By late September, before some WAH caribou on the North Slope have even begun to migrate, caribou in the vanguard of the migration can reach the southernmost portions of winter range. The fall migration extends through mid to late November. Regardless of where WAH caribou are, directed and lengthy migratory movements generally cease by this time and they become relatively sedentary until April when the spring migration begins.

Calving grounds. As with most caribou herds in North America (Skoog 1968), the WAH has exhibited strong fidelity to its calving grounds in the Utukok hills. For example, the areas identified by Lent (1966) as calving areas in 1960 and 1961 are within the 95% fixed kernel delineated from 1987–2006 calving data (Figure 11). Although fixed kernel analyses of data from 1987–2006 show spatial variability in distribution of calving among years, in most years most calving occurs somewhere within the core calving area. When deviations from typical calving distributions have occurred, as in 2000 and 2001, they may have been attributable to late spring snow and weather conditions.

In 2005 we observed 84 collared cows during calving surveys (Table 3). Four were outside the calving grounds (95% adaptive kernel) but only 1, which was accompanied by a calf, was far outside its boundary (Figure 14). This cow was on a high ridge separating the Kallarichuk River and Timber Creek and is the farthest south we've ever observed a cow with a neonate. The other 3 cows outside the calving grounds were just outside its boundary; one was accompanied by a neonate and 3 were nonmaternal. Of the 80 cows within the calving ground, 24 (30%) were nonmaternal and 56 (70%) were maternal. In 2006 we observed 74 collared cows during calving

surveys (Table 3). Of these, 62 cows were within the calving grounds and 12 were south of it. Of the 12 individuals off the calving grounds, 7 were nonmaternal, 4 were maternal but did not have a newborn calf, and 1 was accompanied by a neonate. Of the 62 cows within the calving grounds, 19 (31%) were nonmaternal and 43 (69%) were maternal. Calf production in 2005 and 2006 was 69 and 65 neonates:100 cows, respectively, which is comparable to recent years (Table 3, Figure 9).

Adding the 2005 and 2006 calving survey locations had little effect on the adaptive kernel depictions of the calving grounds previously reported (Dau 2005; Figure 14). The kernel depiction produced from calving data agrees closely with the area qualitatively delineated on the seasonal range map (Figures 1 and 2).

Summer Range. Conventional telemetry relocation flights associated with calving surveys and photocensuses, as well as PTT data, all indicate the vast majority of WAH caribou use the western North Slope and Brooks Range during summer. The size of this area is about 43,000 mi^2 (111,400 km^2, Figures 1, 2 and 4). The importance of summer range to the WAH has been previously discussed (Dau 2003).

In recent years, up to several thousand WAH caribou, primarily bulls and immature cows, have reportedly summered on the Seward Peninsula (ADF&G biologist K. Persons, personal communication). During June 2005, 2 radiocollared bulls were located in 2 separate groups numbering approximately 150 caribou on the Seward Peninsula in the vicinity of Kougarouk Mountain.

Fall movements. During this reporting period, residents of Unit 23 expressed concerns about transporters placing large numbers of nonlocal hunters in fall movement corridors and deflecting caribou from important subsistence hunting areas. Caribou from this herd typically move throughout their entire range during fall (Figure 5), so I reviewed satellite collar location data (n_i=173, caribou years 1988-2006 combined) to determine whether corridors of high use exist in specific areas.

By late summer WAH caribou are widely scattered throughout the western portion of the North Slope (Unit 26A). However, by mid to late August the majority of the herd is usually in the eastern portion of its summer range (Figure 5). In most years caribou begin leaving this area by mid August. The first suggestion of a fall movement corridor occurs in the upper Noatak drainage. Caribou cross the Noatak River in this upper section and then move almost due west through the Baird Mountains. During this westward movement, caribou 'peel off' and move southwest through 3 corridors: 1) a broad area between roughly Ivishak Pass and Onion Portage; 2) a more concentrated area between the Salmon and Squirrel drainages; and 3) to a much lesser degree, the Agashashok and Eli drainages toward Hotham Inlet. Caribou that do not initially move into the upper Noatak drainage move west across the North Slope and, after reaching the Chukchi Sea coast, move southeast along the coast through a fourth corridor past Cape Krusenstern and around Hotham Inlet. All 4 of these southern trending corridors converge in the Selawik Flats and upper Buckland drainage. From the upper Buckland-Tagagawik drainages, caribou then move either directly south into the Nulato Hills or west onto the Seward Peninsula.

Since 2002, observations by department staff, hunters and commercial operators suggest that caribou have been 2–4 weeks late initiating fall migrations although this is not evident from satellite collar data. Although these delays have greatly affected local and nonlocal hunters, they have not substantially affected spatial migration patterns. There is insufficient location data to evaluate whether commercial operators and nonlocal hunters have deflected caribou from migration corridors.

Many people have speculated that late fall migrations have been caused by warm summer and fall temperatures. I plotted median weekly latitude of satellite-collared caribou and median weekly ambient air temperature for the period 16 August-23 November (fall migration) for each year during 1999-2005 (there were insufficient satellite-collared caribou prior to 1999). These plots show substantial annual variability in: 1) onset of directed, southerly movement; 2) period and rate of maximum movement; 3) duration of southerly movement; and 4) maximum southern extent of distribution. The onset of migration, defined as the first of 3 consecutive weeks when median latitude decreased, ranged from 15-31 August in all years except 2005 when it did not occur until 7 October. The onset of rapid movement south, defined as the first week when median latitude decreased by > 0.4 degrees/week, ranged from 31 August (2000) to 31 October (2004). The span of southerly movement ranged from 6 weeks (2000) to 14 weeks (2006). In some years, e.g. 2001–2003, the onset and end of the migration were gradual while, during 1999, the migration began and ended abruptly. In 2000 the median latitude of collared individuals on 30 September was 65.693° N latitude (slightly north of the community of Koyuk) while on that date in 2001 it was 68.198° N latitude and in 2005 it was 68.123° N latitude (both north of the Noatak River). There is no clear pattern in any of these results to indicate that the fall migration has shifted later in time.

As an alternative approach, I used stepwise linear regression to develop a 'best' model for each year to predict weekly median caribou latitude during 16 August–23 November. I used the independent weather variables median ambient air temperature, windchill, snow depth and wind direction for 1999–2005 (weather variables all measured in Kotzebue). In only 1 year (2004) did the 'best' model select >1 variable (snow depth and windchill, R^2=0.92). In 1999 and 2000 the best model selected median ambient temperature (R^2=0.69 and 0.89, respectively) and in 2002, 2003 and 2005 it selected median windchill (R^2=0.53, 0.77 and 0.76, respectively). In all models air temperature and windchill were positively correlated with median caribou latitude, while in 2004 snow depth was negatively correlated with latitude. Although simplistic and based on very small numbers of caribou and years, this approach suggests warm fall weather could delay caribou migrations. Alternatively, the relationship between median values of caribou latitude and air temperature (including windchill) may be nothing more than correlation rather than an indication of causation (i.e., caribou may move south for some reason entirely independent of lowering air temperature).

Winter Range. Winter range is the most difficult of all WAH seasonal ranges to delineate. The area identified as winter range on Figures 1 and 2 represents where most of the herd has wintered in most years since the mid 1980s. In reality, of course, caribou seasonal ranges are not mutually exclusive and, during winter, WAH caribou may occur anywhere within their total annual range albeit at very low densities in some areas (Tables 6 and 7). Although radio collars have been deployed in the WAH only since 1979 and sample sizes of collared caribou have always been small in relation to the size of the herd, telemetry data illustrates the importance of the Nulato

Hills, Kotzebue Sound and, since 1996–1996, the eastern half of the Seward Peninsula as important winter range for this herd.

After several years of light to modest use, most of the WAH used the Nulato Hills (subarea 8 in Figure 15; Tables 6 and 7) during winter 2004–2005. The herd hadn't concentrated in a single winter subarea to this degree since 1996–1997. Most of the rest of the herd wintered in Kotzebue Sound (subarea 4) or on the Seward Peninsula (subarea 7) during winter 2004–2005. During winter 2005–2006 most of the WAH wintered in Kotzebue Sound (subarea 4 in Figure 15) with secondary areas in the western Koyukuk Flats (subarea 6) and Nulato Hills.

The estimates of winter range density reported in Tables 6 and 7 do not include reindeer or caribou from the TLH or CAH that also use WAH winter range. Therefore, these estimates represent minimum densities. This would primarily affect densities reported for the central Brooks Range, the foothills of the Brooks Range east of the Utukok River, and the Seward Peninsula.

Satellite Collars. In 1987, when we began deploying satellite collars in the WAH, our primary objective was to improve our ability to locate radiocollared caribou through conventional (i.e., VHF) techniques. From 1987–1988 through 1997–1998 no more than 10 satellite collars were deployed in the WAH during any collar year. Given this small sample size, no one was tempted to use them as an independent sample for monitoring movements and distribution of the WAH. We first began to exceed 20 functional PTTs on living caribou in this herd during the 1999–2000 collar year. Since 2000, when the Selawik National Wildlife Refuge began to consistently purchase PTTs for deployment on WAH cows, ADF&G has mapped real-time locations of PTT-collared WAH caribou and distributed them via Internet to federal staff, the Reindeer Herder's Association and local government organizations. The PTTs provide a reasonably accurate depiction of general movement and distribution patterns and have been especially useful for notifying reindeer herders of potential conflicts with caribou. Even so, the maximum number of satellite collars ever deployed (35 individuals) constituted only 0.01% of the entire population (using a population size of 490,000 caribou) and we have never completed a collar-year with >5 satellite-collared bulls since the inception of this program. Although the master PTT data set now (as of 2007) includes approximately 180,000 locations, it is still based on only 87 individual caribou. Therefore, PTT data should be used cautiously as a representation of the entire WAH.

During fall 2006, 2 department staff (Bente and Dau) comprehensively reviewed and reorganized the WAH PTT data set. Missing data (several months) was appended and indicator fields were added to reflect mortality status, duty cycles, and whether a collar was in or out of the field.

MORTALITY

Our estimates of adult mortality are conservative because they exclude bulls which generally experience higher mortality rates than cows. Also, we do not collar emaciated, injured, or clinically diseased cows even though these individuals compose part of the population. Although these factors would elevate the WAH mortality curve, they should not affect its trends through time (Dau 1997). Some researchers have suggested that samples of radiocollared individuals tend to be older than wildlife populations overall. If this is true for the WAH, we think its effects are probably inconsequential compared to other factors, e.g. small sample sizes and our inability to

frequently cover the entire range of this herd during radiotracking surveys. We collar caribou every year, deploy approximately the same number of collars annually and do not select cows based on their age or calf status. Also, most collared caribou die before the batteries in their collar are exhausted. Therefore, we believe our estimates of adult caribou mortality are a reasonably accurate index for the entire herd, especially for showing trends through time.

The mortality rate for the 2005–2006 collar-year was the highest ever recorded (31%). Of course, given the small sample of collared caribou, it could be that this is an overestimate of actual mortality attributable to chance or some other cause; however, we have no evidence to suggest this was the case. During December 2005 northwest Alaska experienced about 4 days of above freezing temperatures and 2 days of rain. This was immediately followed by a prolonged period of deep cold which created a heavy, dense layer of ice-crusted snow that persisted throughout the rest of the winter. This heavy crust likely contributed to the high mortality in 2005–2006. Additionally, while conducting low-level recruitment surveys during April 2006, we observed more carcasses than in previous years, and many caribou were obviously emaciated.

Late January 2007 also experienced a mid winter thaw with 6-7 days of near-freezing temperatures and roughly 4 days of rain. However, in contrast to the previous year, caribou mortality was relatively low (14%). This may have been partly because many caribou in marginal condition, e.g. sick or old individuals, had been eliminated from the population the previous winter. More importantly, this may have been because heavy rain in the Nulato Hills, where most of the WAH wintered that year, completely melted the snow away. Additionally, the period of warm temperatures and rain was accompanied by persistently high winds. This wind likely dried the vegetation before it refroze into a hard glaze that could have been lethal to caribou. Rather than create difficult winter conditions as in 2005-2006, this mid winter thaw may have provided WAH caribou a 3-mo grace on winter.

Annual estimates of adult mortality have shown no statistically significant trend through time (R^2 = 0.10, Table 8, Figure 8).

Adult caribou mortality is most meaningful when expressed in relation to recruitment. The significance of Figure 7 is that these parameters have slowly trended toward convergence since the early to mid 1980s. As previously noted, uncertainty associated with estimates of adult mortality and calf recruitment could shift either of these relationships up or down; therefore, the point at which these lines cross may not necessarily indicate exactly when this herd will begin to decline. However, if these relationships are reasonably accurate, the WAH will probably soon begin to decline if it hasn't done so already.

Harvest

Season and Bag Limit. On state-managed lands the following seasons and bag limits were in effect throughout the reporting period:

2004–2005 and 2005–2006 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Remainder of Unit 21(D)		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May
Units 22(A) and 22(B)		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May
Unit 22(D), that portion in the Kuzitrin and Agiapuk River drainages, including tributaries		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May
Unit 22(E), that portion east of the Sanaguich River drainage		
Resident Hunters:		
5 caribou per day		

2004–2005 and 2005–2006 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May
Remainder of Unit 22		
Resident Hunters:		
5 caribou per day	Season to be	
Bulls	announced by	
Cows	emergency order	
Nonresident Hunters:		
5 caribou total per year		Season to be
Bulls		announced by
Cows		emergency order
Unit 23		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May
Remainder of Unit 24		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May

2004–2005 and 2005–2006 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 26(A)		
Resident Hunters:		
5 caribou per day		
Bulls	1 Jul–30 Jun	
Cows	1 Jul–15 May	
Nonresident Hunters:		
5 caribou total per year		
Bulls		1 Jul–30 Jun
Cows		1 Jul–15 May

Federal hunting seasons were identical to state seasons during this reporting period. However, the bag limit under federal subsistence regulations was 15 caribou per day in Unit 23, 10 caribou per day in Unit 26A, and 5 caribou per day in other units used by the WAH.

Board of Game Actions and Emergency Orders. During this reporting period no emergency orders (EOs) were issued for caribou hunting within the range of the WAH.

The BOG held a 2-hour informal, evening work session during the November 2005 meeting in Kotzebue to discuss conflicts among user groups in Unit 23. As a result of this meeting, the board generated a proposal to establish an orientation program for transporters and hunters who employ transporters to access hunting sites in the field. Guides, their clients and people engaged in traditional subsistence activities were intentionally excluded from this program. This proposal (number 150) was passed by the board at its March 2006 meeting in Fairbanks with an amendment to provide the department 1 year to develop the program. The orientation program, which will be voluntary, will be available through the department's web page by 1 July 2007.

The Big Game Commercial Services (BGCS) Board also discussed user conflicts in Unit 23 during its December 2005 meeting in Anchorage. A member of this board (Roy Ashenfelter) subsequently submitted a proposal (number 142) to the BOG with the intent of reducing conflicts in Unit 23. This proposal had 3 components: 1) reduce the nonresident caribou bag limit in Unit 23 (but not other units used by the WAH) from 5 to 2 caribou/yr; 2) prohibit hunters from boning out anything except the neck of moose or caribou taken in Unit 23 between 1 July and 30 September; and 3) create a new, 2-mile-wide controlled use area in the lower Squirrel and Kobuk Rivers to prohibit the use of airplanes and boats having >40 hp engines for the use of hunting during 5-14 September. During the March 2006 BOG meeting in Fairbanks, the proposal was passed after being substantially amended to: 1) reduce the nonresident caribou bag limit to 1 caribou/yr and 2) prohibit hunters from boning the ribs of moose and caribou taken prior to 1 October. The purpose of the reducing the nonresident caribou bag limit was to provide an incentive for them to hunt in other game management units besides Unit 23. The salvage

requirement was changed to reduce waste of meat. The board did not adjourn its March meeting; instead, it temporarily halted the meeting until May 2006. During the May meeting guides and transporters heavily lobbied the board to reverse its decision to reduce the nonresident caribou bag limit in Unit 23 to 1 caribou/yr. Because hunters had already booked hunts for which they expected a 5 caribou/yr bag limit, the board agreed to increase the nonresident caribou bag limit to 2/yr for the 2006–2007 regulatory year only. The board was clear that the nonresident bag limit would revert to 1 caribou/yr in Unit 23 beginning in the 2007–2008 regulatory year, as decided in March 2006. The board subsequently generated yet another proposal to establish a 2 caribou/yr nonresident bag limit in Unit 23. This proposal failed during the March 2007 BOG meeting in Anchorage.

Human-Induced Harvest. The total harvest of WAH caribou was approximately 16,000 caribou in 2004–2005 and 15,000 caribou in 2005–2006. This constituted about 3% of the population using the 2003 population estimate of 490,000 caribou. These harvest estimates do not include caribou killed but not retrieved. Each year some harvested caribou are left in the field when suspected to be diseased or found to be heavily parasitized or skinny. Additionally, some caribou are unintentionally wounded and later die. The number of caribou killed but not retrieved is unknown and virtually impossible to estimate; however, my observations in Units 22 and 23 suggest this number could be substantial each year.

Permit Hunts. By statute, all caribou hunting by residents that live north of the Yukon River and within the range of the WAH is by registration permit. Registration permits are available at license vendors and ADF&G offices in northwestern, western, and interior Alaska. The permits are free, and there is no limit to the number of permits issued each year. Comparisons of registration permit harvest data and community harvest assessments indicate only about 10% of the actual harvest is reported throughout most of the registration permit system (Georgette 1994). The exception to this is the community of Nome, where compliance with reporting requirements is believed to be much better (K. Persons, personal communication). As a result of low compliance with reporting requirements, the department has not requested harvest information from permit holders outside of Unit 22 since the year 2000.

Nonresidents and residents that live south of the Yukon River must carry a statewide caribou harvest ticket when hunting. Alaska Bureau of Wildlife Enforcement officers indicate that compliance with this requirement is almost 100% (C. Bedingfield, J. Rodgers and D. Hildebrand, personal communication). We think this system is reasonably accurate for monitoring caribou harvested by hunters who live outside the range of this herd.

Hunter Residency and Success. The harvest model (Sutherland 2005) estimated that hunters living within the range of this herd took 15,000 (95% c.i.=14,000–15,700) WAH caribou in 2004–2005 and 14,000 (95% c.i.=13,000–14,700) in 2005–2006 (Table 9). As in past years most of the subsistence harvest of WAH caribou came from Unit 23 (78% and 79%, respectively).

There has been no clear trend in numbers of nonlocal hunters who have pursued the WAH since 1998–1999 (Table 10); however, this may soon change. As of 2006 the size and bull:cow ratio of the Mulchatna caribou herd substantially declined compared to the mid 1990s (P. Perry, personal communication). Additionally, many hunters have reported that there are now relatively few trophy bulls in this population. Many nonlocal hunters report that these changes in the MCH are

causing them to hunt the WAH. Regulatory restrictions for the MCH will likely further contribute to this shift in effort. As in the past, most WAH caribou taken by nonlocal hunters were harvested in Unit 23 (75% in 2004–2005 and 85% in 2005–2006).

Combining harvest data from 1998–1999 through 2005–2006, 10% of nonlocal resident hunters took ≥1 cow/yr. In contrast, only 1% of nonresident hunters took 1 or more cows. Even with a 5 caribou/yr bag limit, 98% of nonresident hunters took ≤2 caribou/yr and only 1 individual out of 2465 nonresident hunters took the legal limit of 5 caribou/yr. Nonresident hunters had a higher success rate than nonlocal resident hunters (72% vs. 56%). With a 5 caribou/day bag limit, 93% of nonlocal resident hunters took ≤3 caribou/yr.

Harvest Chronology. Subsistence harvest patterns are primarily affected by seasonal movements and availability of caribou, and secondarily, by traveling conditions for hunting. For example, Point Hope and North Slope villages harvest Western Arctic caribou mainly during July and August while the WAH is on its summer range. In contrast, Shaktoolik and Unalakleet hunters primarily take WAH caribou during September through March. In Unit 23, harvests are typically high during fall and spring migration periods, and also when caribou winter near communities. Even so, caribou harvests all but cease during periods of freeze-up and breakup, when travel by boat or snowmachine is difficult. Unlike many subsistence activities that are seasonally specific, subsistence hunting of caribou occurs whenever they are available and accessible.

During early fall, most subsistence hunters select large bulls because they provide the best meat. Once bulls enter rut and become unpalatable, typically after 7–10 October, most subsistence hunters take cows until approximately March or April. In decades past, subsistence hunters resumed harvesting bulls in roughly mid to late December (W. Uhl, personal communication). During the rest of the year, subsistence hunters take caribou of both sexes based on availability and the body condition of individual animals.

Despite no closed season on bulls, most caribou taken by nonlocal hunters were harvested during late August through September (89% in 2004–2005 and 94% in 2005–2006). The distribution through time of resident hunters who lived outside the range of the WAH and nonresident hunters were similar: 94% of nonresident hunters hunted during late August through September while 87% of nonlocal Alaska residents hunted during this time. This temporal concentration of nonlocal hunters, combined with their disproportionate use of Unit 23, continued to frustrate residents of this unit. Residents of Anaktuvuk Pass have expressed similar concerns.

Transport Methods. Most subsistence hunters harvest WAH caribou using snowmachines during late October–early May and boats or 4-wheelers during the rest of the year. Few local hunters use aircraft to hunt caribou. In contrast, most nonlocal hunters use aircraft to initially access caribou hunting areas (70% during 1998–2005). Once in a hunting area, many nonlocal hunters use rafts to float rivers. Guides now rely heavily on 4-wheelers for hunting. This practice dramatically increased during the mid 1990s in Unit 23, and most guides now cache 4-wheelers at remote camps.

In Unit 23 some village residents transport nonlocal moose and caribou hunters via boats. This has proven divisive in some villages because many local residents feel: 1) nonlocal hunters compete with them for choice hunting locations; 2) nonlocal hunters leave litter behind when

they leave an area; 3) transporters disrupt and displace animals from river corridors when they use loud jet boats; and 4) nonlocal hunters want only trophies and waste meat.

Other Mortality

Disease. During 2004, the percentage of caribou with an elevated haptoglobin level was relatively low; however, in 2005 this value was one of the highest observed. We do not know why this was the case. Overall, about 8% of all caribou tested during 1992–2005 had an elevated haptoglobin level. There has been no temporal trend in the percentage of caribou with an elevated haptoglobin level (Table 11).

Levels of exposure to brucellosis continued to be low during this reporting period (Table 11). The primary impact of this disease on caribou populations is reduced reproductive success (Dieterich 1981). The low proportion of WAH cows exposed to this disease in recent years suggests brucellosis is probably not affecting the population dynamics of the WAH at this time.

The department is planning to collect 10 caribou during the course of the Onion Portage project in September 2007 to assess the feasibility of establishing a health assessment program for this herd.

HABITAT

Assessment

The department did not monitor WAH range condition during this reporting period. However, the department provided location data from satellite-collared caribou to BLM to assess use of areas burned by wildfires (Joly et al., in press). Using selection indices that compared caribou use of burns and buffers to availability, this study found that caribou strongly selected against burned areas within the tundra ecosystem. Areas burned within the previous 50 years were selected against at both large (rangewide) and intermediate (5658 m) spatial scales. Caribou particularly selected against 26–55-year-old burns and the interior (core) portions of all burns. We found that use of burned areas was greater in late fall and early spring than in midwinter. This may have been because caribou were traversing burned areas during spring and fall migrations rather than selecting them as feeding areas.

Additionally, the department identified areas of the Nulato Hills that had been intensely used by large numbers of caribou during April–May 2005. Range specialists with BLM later visited these areas via helicopter and found heavy or severely heavy use of lichens in 4 of 6 sites (Meyers, BLM, unpublished report).

Enhancement

There were no WAH habitat enhancement activities during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

WAH Cooperative Management

The Western Arctic Caribou Herd Working Group (CWG) was organized in 1997. The purpose of the working group is to ensure conservation of the Western Arctic caribou herd, safeguard the

interests of all users of the herd, and integrate indigenous knowledge with Western science. The working group consists of 20 voting chairs representing multiple stakeholders. It is a nonregulatory body that emphasizes shared decision-making. State and federal resource management agencies (ADF&G, BLM, FWS, NPS) support the CWG as nonvoting members.

During this reporting period, the CWG held 1 meeting each year and produced an annual newsletter, *Western Arctic Caribou Trails*, that was mailed to about 9000 box holders within the range of the WAH. The technical committee, composed of agency staff with at least 2 CWG members, met in January of 2004, 2005 and 2007 to discuss interagency cooperation. During this reporting period, the Resource Development subcommittee submitted scoping comments to BLM for the NPRA South Planning Area (October 2005) and the Kobuk-Seward Peninsula Resource Management Plan (September 2006). In both submissions, the CWG identified important seasonal habitats that should be protected for conservation of the WAH. Dr. John Walsh, a climatologist with the University of Alaska-Fairbanks, gave a presentation to the CWG during its January 2006 meeting regarding global warming in Alaska.

Resource development

As of this time, the WAH has had little contact with large-scale resource development structures throughout its entire range. The Red Dog mine, road and port site are located wholly within the northwestern portion of WAH range, but appear to have had only limited, localized effects on movements and distribution of this herd. This is partly because NANA-Teck Cominco policies have attempted to minimize impacts on subsistence resources, including caribou, and users. It is also partly because locally-hired truck drivers and other employees have voluntarily acted to minimize impacts on wildlife.

A number of new developments within the range of the WAH are currently being considered. These are:

1. Oil and gas development in NPR-A. Roughly 80% of the WAH calving grounds are within the NPR-A South Planning Area, and this area contains important insect relief habitat during summer as well. Caribou from this herd also use the Northeast and Northwest Planning Areas as well, but to a much lesser degree than the South Planning Area.

2. Coal development. Vast, high-grade coal deposits occur in a broad band beneath the northern foothills of the Brooks Range. Coal underlies virtually the entire WAH calving grounds. Arctic Slope Regional Corporation began another exploration project based at the Deadfall Syncline in March 2007 to assess the economic feasibility of developing this resource. The expected duration of this project is 5 years. If coal is eventually extracted from near this site, road or railroad transport to the Red Dog Mine and Port Site currently appears to be the most likely option for getting it to a deep water port. This would also allow the Red Dog Mine to reduce its fuel costs by providing a less expensive alternative to fuel oil.

3. Expansion of the Red Dog Mine complex.

    a. Test drilling for additional lead and zinc deposits as well as methane has been conducted in this area for several years.

    b. Expansion of the Red Dog Port Site.

4. New transportation.

    a. Construct a road linking the community of Noatak to the Red Dog Mine-Port Site road. This would reduce the cost of transporting fuel to this community and enable individuals to commute between their homes and jobs at Red Dog.

    b. Construct a new airport near the community of Noatak capable of handling large jet service (e.g., Boeing 737s). This is being considered to reduce risks associated with jet service to the Red Dog Mine in a mountainous area.

    c. Extend the Prudhoe Bay–Kuparuk oil field road system to Nuiqsut.

    d. Build a new, 100-mi road from Pump Station 2 to Nuiqsut.

    e. Build a road or railroad from the Dalton Highway to the Ambler-Bornite area. Two additional roads would then connect to the Red Dog Road and Nome-Council road system.

5. Hard rock mining.

    a. Nova Gold has conducted assessment work since the summer of 2003 to evaluate the feasibility of establishing a mine in the Ambler Mining District (near the old Bornite Mine).

    b. Nova Gold has also begun to establish the Rock Creek and Big Hurrah mines near Nome and Golovin. These would be open pit, cyanide leaching mines.

    c. Alaska Gold is planning to begin test drilling for gold in the Squirrel and Omar Rivers in summer 2007.

    d. Extensive mineral assessment work was conducted by BLM in the De Long Mountains during summer 2005.

More information about potential industrial development within the range of the WAH is provided by Schoen and Senner (2002).

School programs

In 2004 no schools participated in the Onion Portage collaring project after both Deering and Buckland schools cancelled because of staff turnover. In 2005 students from Selawik and Barrow high schools participated in the project. Each school brought 6 students accompanied by their science teacher and at least 1 other chaperone. In 2006 8 Shungnak students participated in the project with 2 teachers and several chaperones. Student involvement in this project has been a positive experience for the students, school district staff and agency staff since its inception in 1991.

Conflicts between the WAH and reindeer industry

As in the past (Dau 2001, 2003, 2005), the Seward Peninsula reindeer industry continued to lose deer to the WAH during this reporting period. Substantially fewer caribou have wintered on the Seward Peninsula during the winters of 2003–2004 through 2006-2007 compared to 1996-1997 through 2002-2003. Also, most of the reindeer herds on the eastern portion of the Seward Peninsula have been totally lost to the WAH. As a result, fewer reindeer have been lost to this caribou herd in recent years compared to the 1990s. Only the Davis (Nome), Kakaruk (Teller) and Ongtowasruk (Wales) herds are still commercially viable as of spring 2007. The department posts a Web page showing real-time locations of satellite-collared WAH caribou on the Seward Peninsula to help herders avoid conflicts with caribou.

User conflicts

Conflicts among nonlocal hunters, guides, transporters and local hunters continued in portions of WAH range during this reporting period. These conflicts were most pronounced in Unit 23 but also occurred near Anaktuvuk Pass. This complex issue involves all hunters, not just caribou hunters, and is affected by a variety of factors (Dau 2005). The limiting factor driving conflicts in Unit 23 is not inadequate numbers of wildlife, certainly not with regard to WAH caribou. Rather, the limiting factors are access points and space to accommodate all users. An interagency working group that includes members of the public, the Federal Subsistence Board, the Board of Game, and local organizations is being formed to address user conflicts in Unit 23.

CONCLUSIONS AND RECOMMENDATIONS

The WAH is still very large. However, converging trends in adult cow mortality and recruitment, isolated starvation events on the North Slope and near Cape Thompson, and occasional years of generally poor pre-rut (September) body condition suggest this herd could soon begin to decline. There is no evidence that any single factor, e.g., human harvests, predation, environmental contaminants, range degradation, or disease is currently limiting the size of this herd.

Our current level of investment in harvest assessment is probably adequate, as long as the WAH is large and relatively stable, because it documents levels of human demand when access to caribou is limited only by their distribution rather than population size. Once this herd begins to substantially decline, however, and harvests begin to potentially affect the size and status of this herd, community harvest assessments should be conducted more frequently and in more communities within the range of this herd than in recent years. The department should continue to monitor harvest of WAH caribou by nonlocal hunters through the statewide caribou harvest ticket system.

Seward Peninsula reindeer continue to be lost to the WAH, albeit more slowly now than in past years when reindeer were present on the eastern portion of the Seward Peninsula. The department should continue to provide real-time information regarding caribou movements and distribution to herders within the constraints of staff, weather, aircraft, and budgets.

The department should explore the feasibility of conducting a WAH health assessment program to monitor disease in this herd.

A number of large-scale developments are being considered for northwest Alaska. Potential impacts of individual projects on caribou and users should not be evaluated in isolation. Instead, the cumulative effects of all existing and proposed development should be considered collectively over the short and long term to predict impacts on people and caribou.

Conflicts between local subsistence hunters, nonlocal sport hunters, and commercial operators have intensified in portions of WAH range since 1992. The primary factor driving these conflicts is inadequate space to accommodate all users. A cooperative, interagency approach to reduce conflicts on a unitwide basis may be more likely to actually reduce conflicts than multiple efforts of individual agencies working only on their respective lands.

The department should continue to support the WAH Working Group and help identify management issues to focus on now that the Cooperative Management Plan has been finalized.

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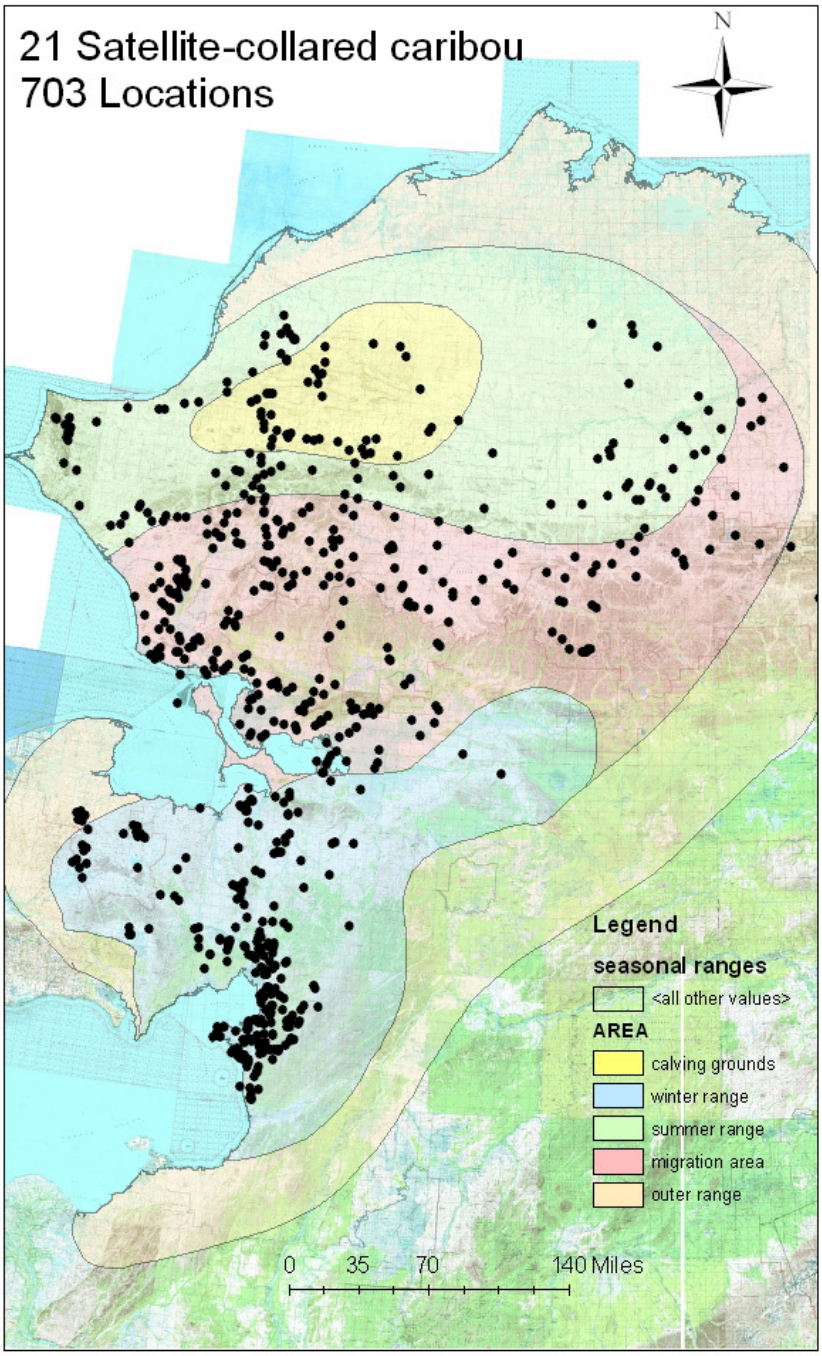

FIGURE 1 Seasonal ranges of the Western Arctic caribou herd with locations of satellite-collared caribou collected during the 2004–2005 regulatory year

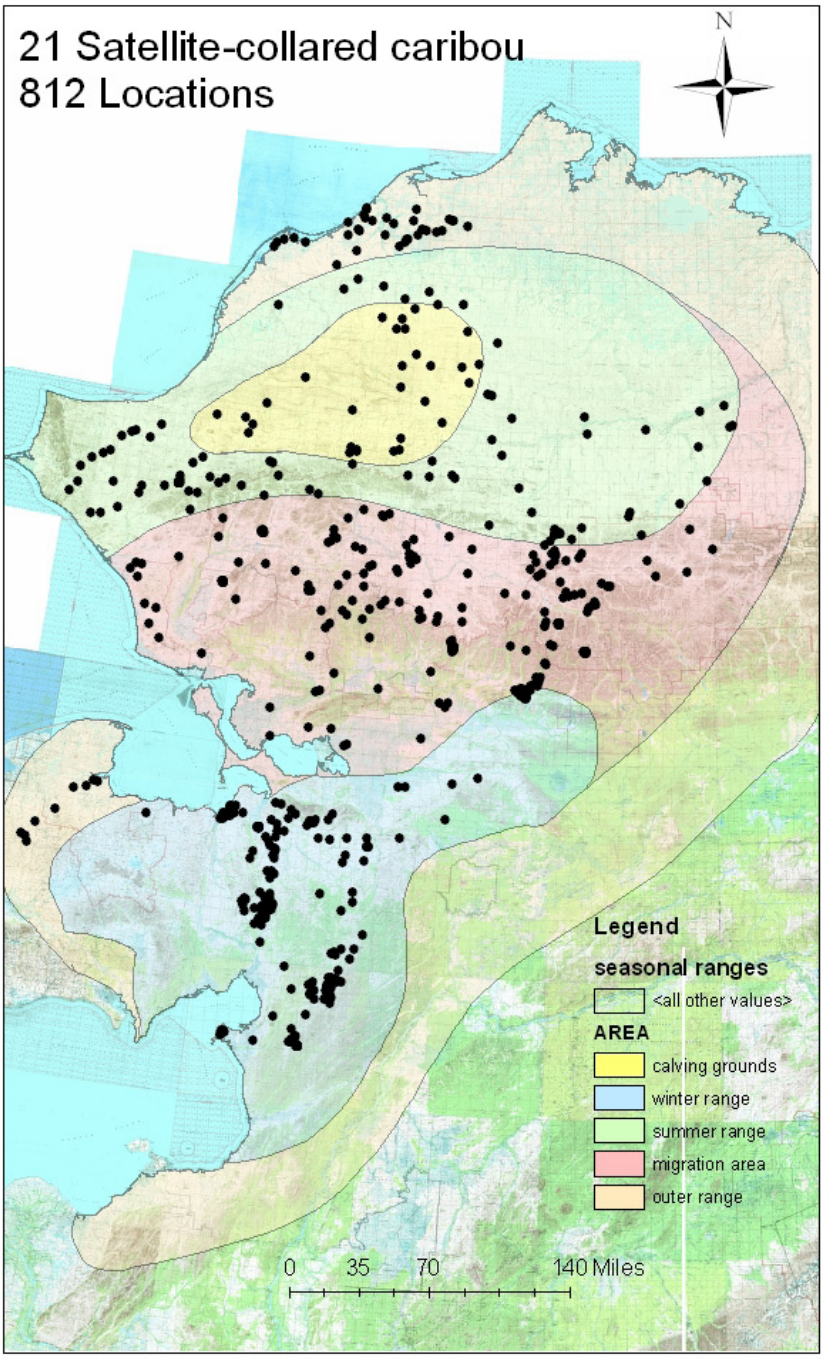

FIGURE 2 Seasonal ranges of the Western Arctic caribou herd with locations of satellite-collared caribou collected during the 2005–2006 regulatory year

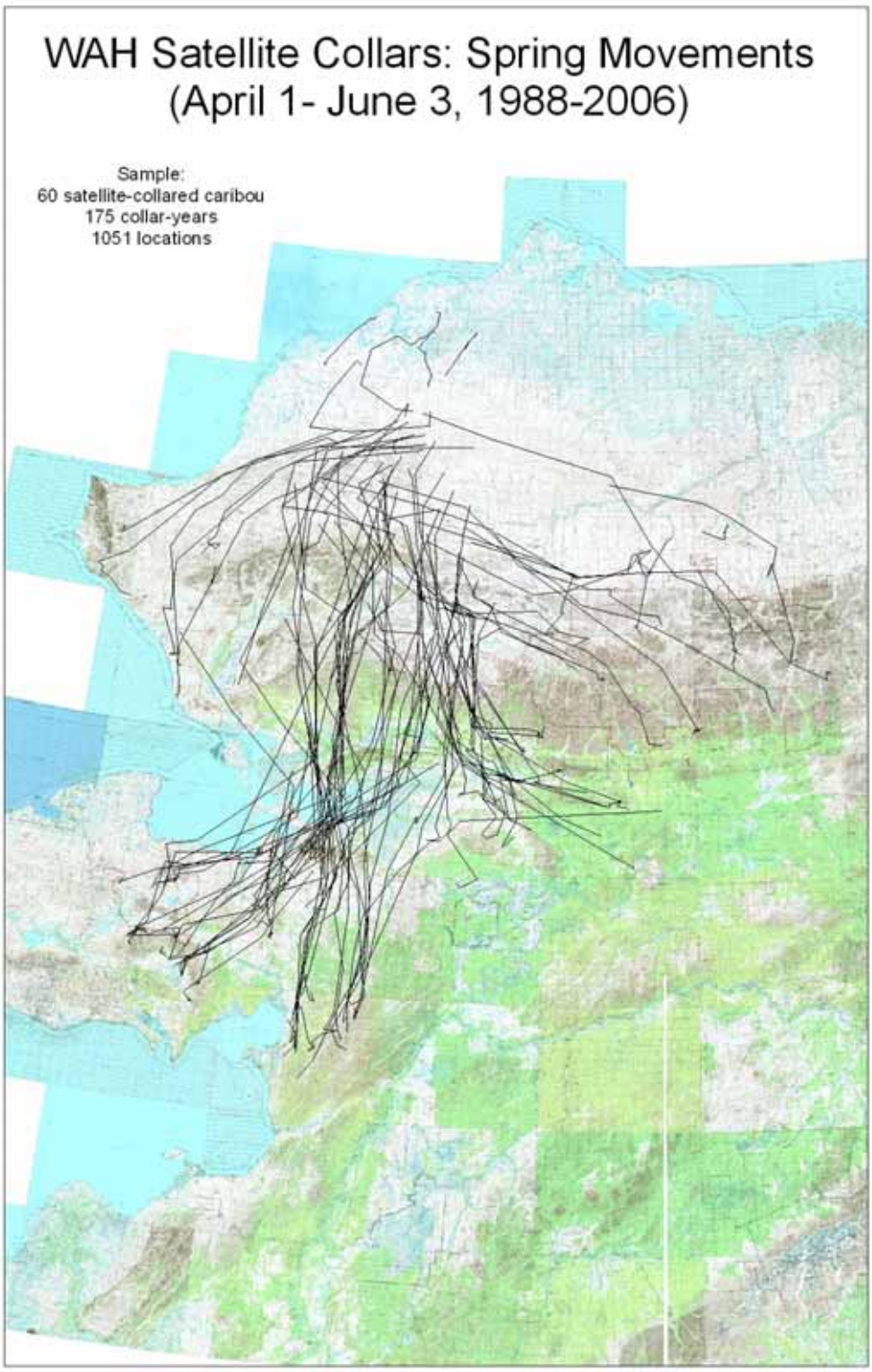

FIGURE 3 Spring movements of satellite-collared Western Arctic herd caribou, 1988–2006 (data excludes first year caribou was collared; all collars standardized to 1 location every 6 days)

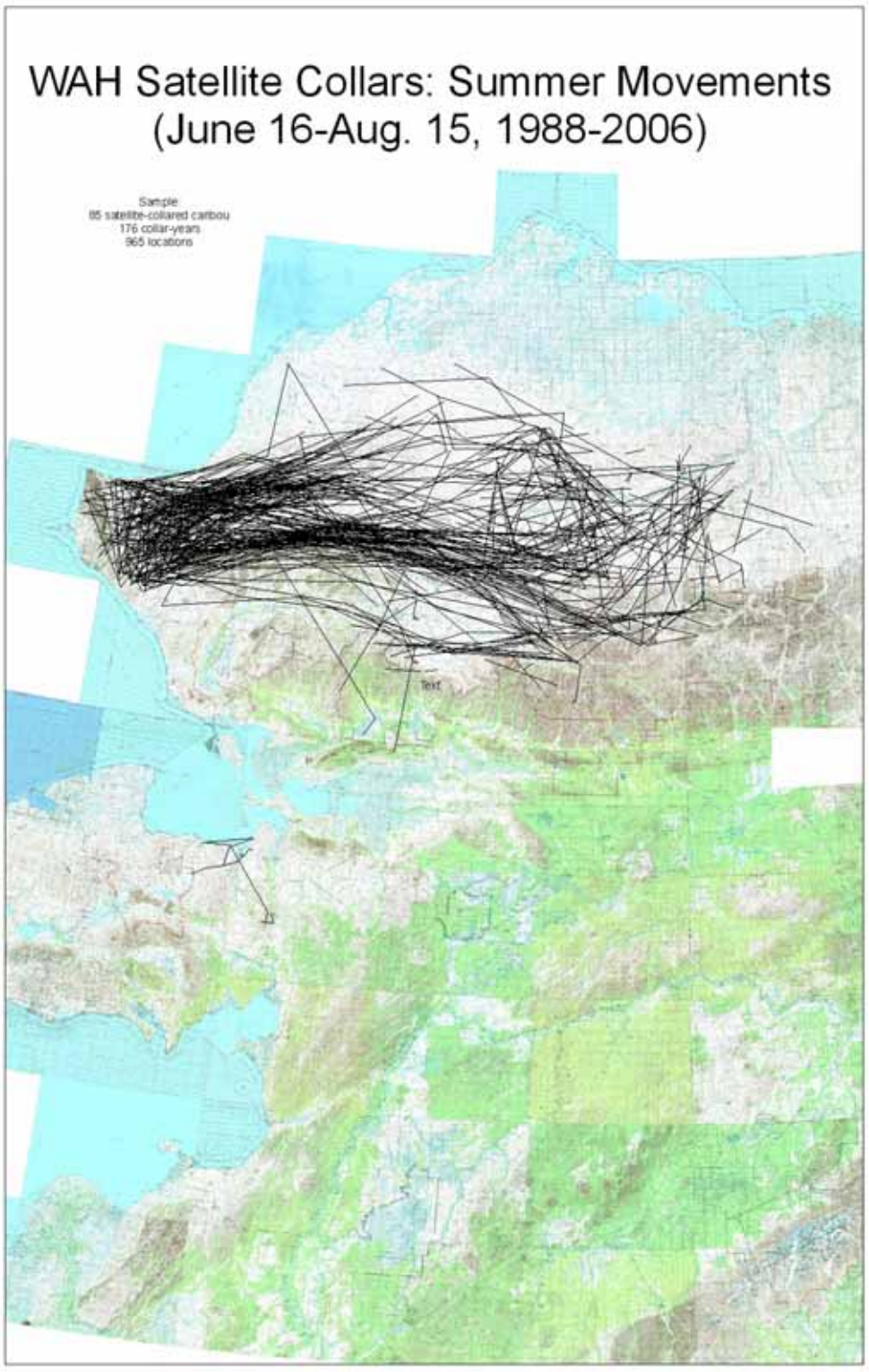

FIGURE 4 Summer movements of satellite-collared Western Arctic herd caribou, 1988–2006 (data excludes first year caribou was collared; all collars standardized to 1 location every 6 days

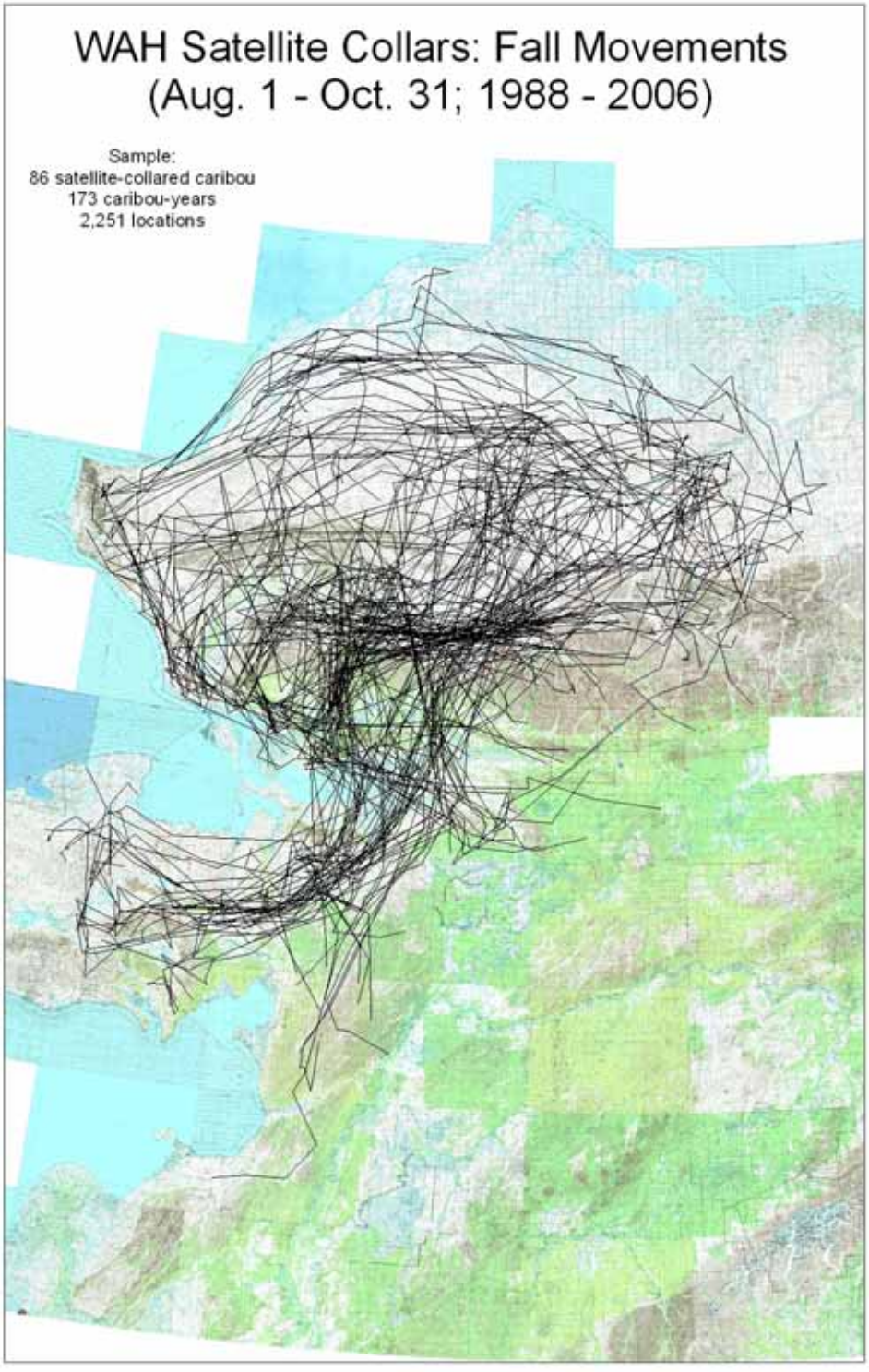

Figure 5 Fall movements of satellite-collared Western Arctic herd caribou, 1988–2006 (data excludes first year caribou was collared; all collars standardized to 1 location every 6 days)

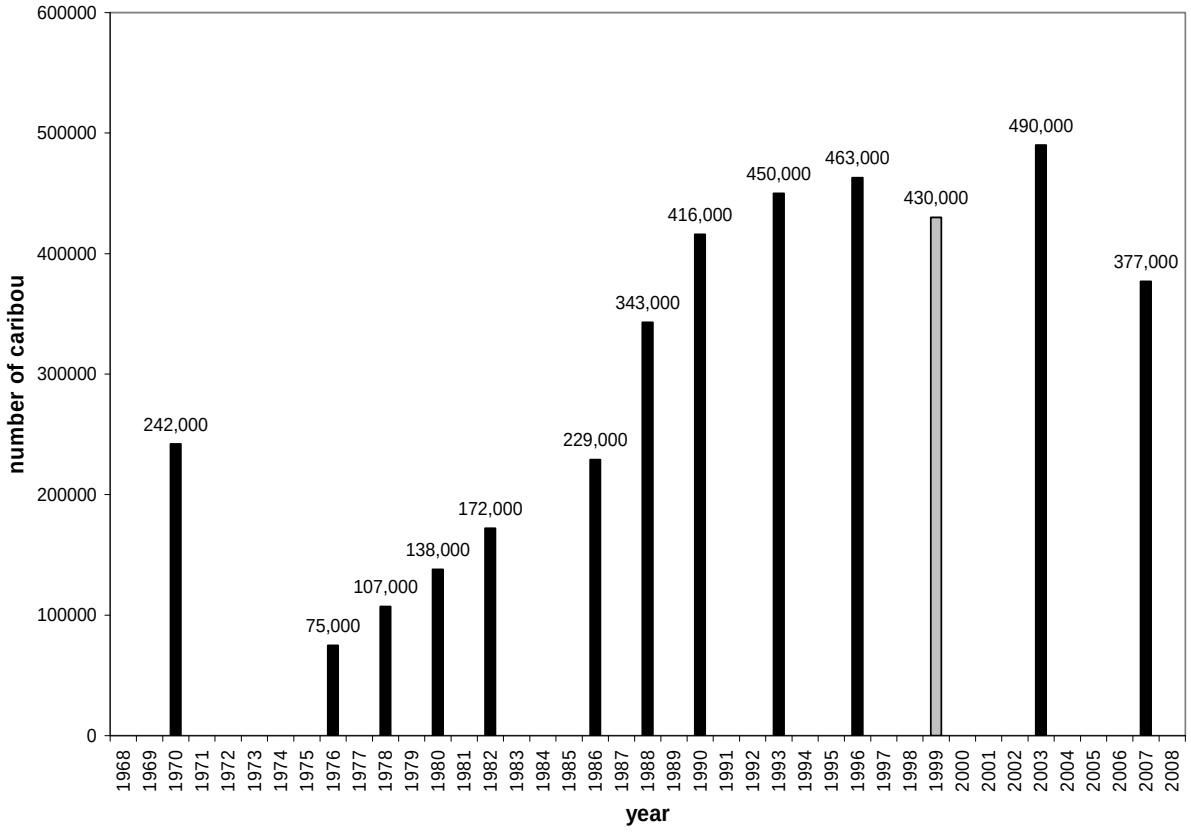

FIGURE 6 Western Arctic caribou herd photocensus results, 1970–2007 (1999 census probably underestimated population size)

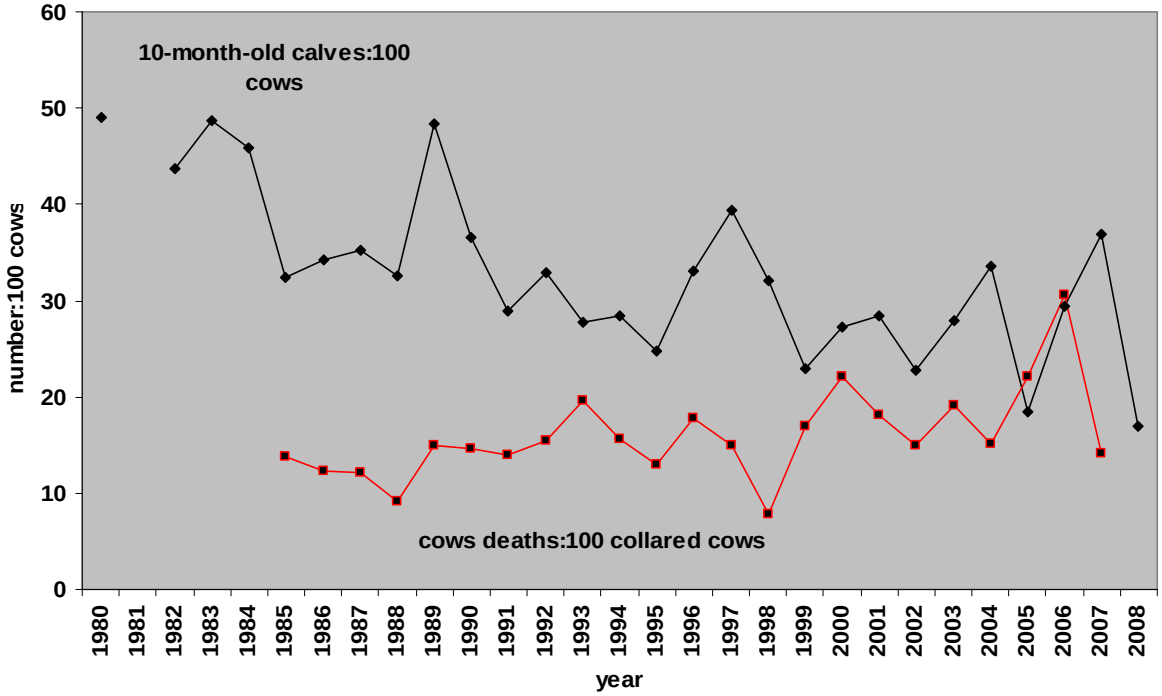

FIGURE 7 Recruitment of WAH calves in relation to adult cow mortality, May 1980 through May 2008

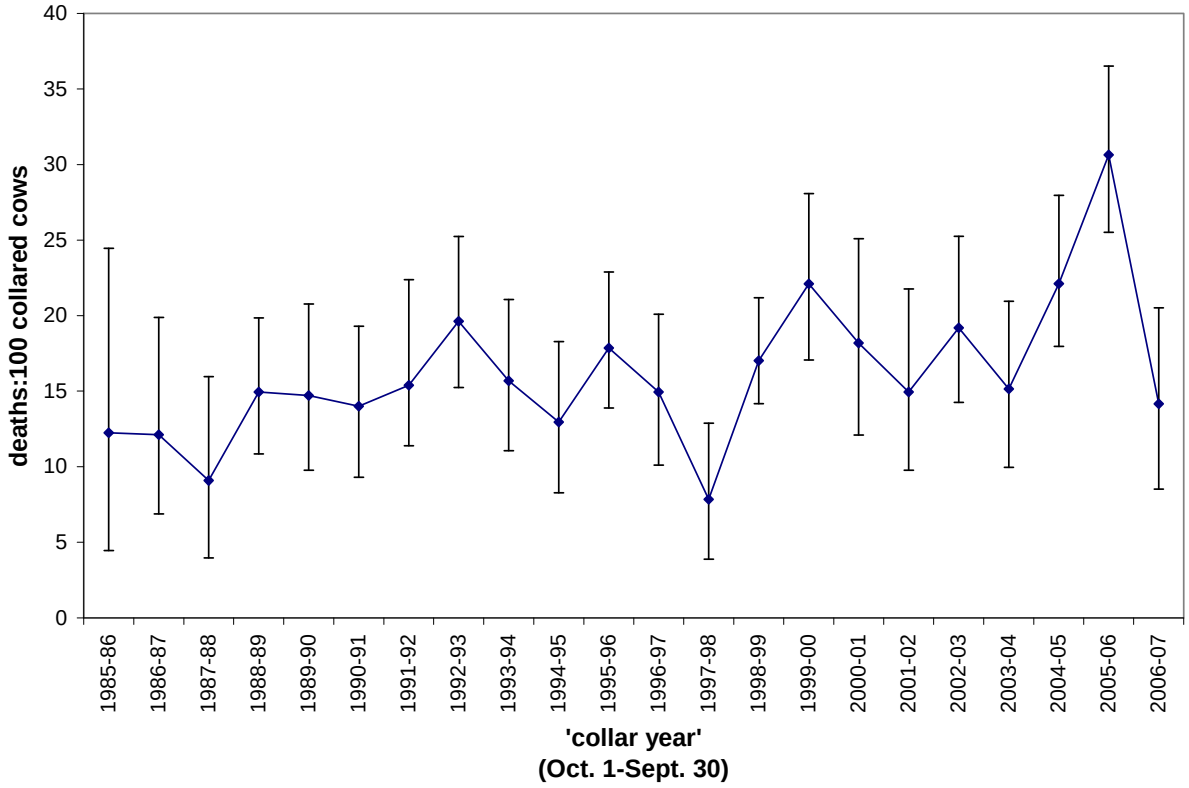

FIGURE 8 Adult cow mortality for the Western Arctic caribou herd, 1985-1986 through 2006-2007 (brackets represent 80% confidence intervals)

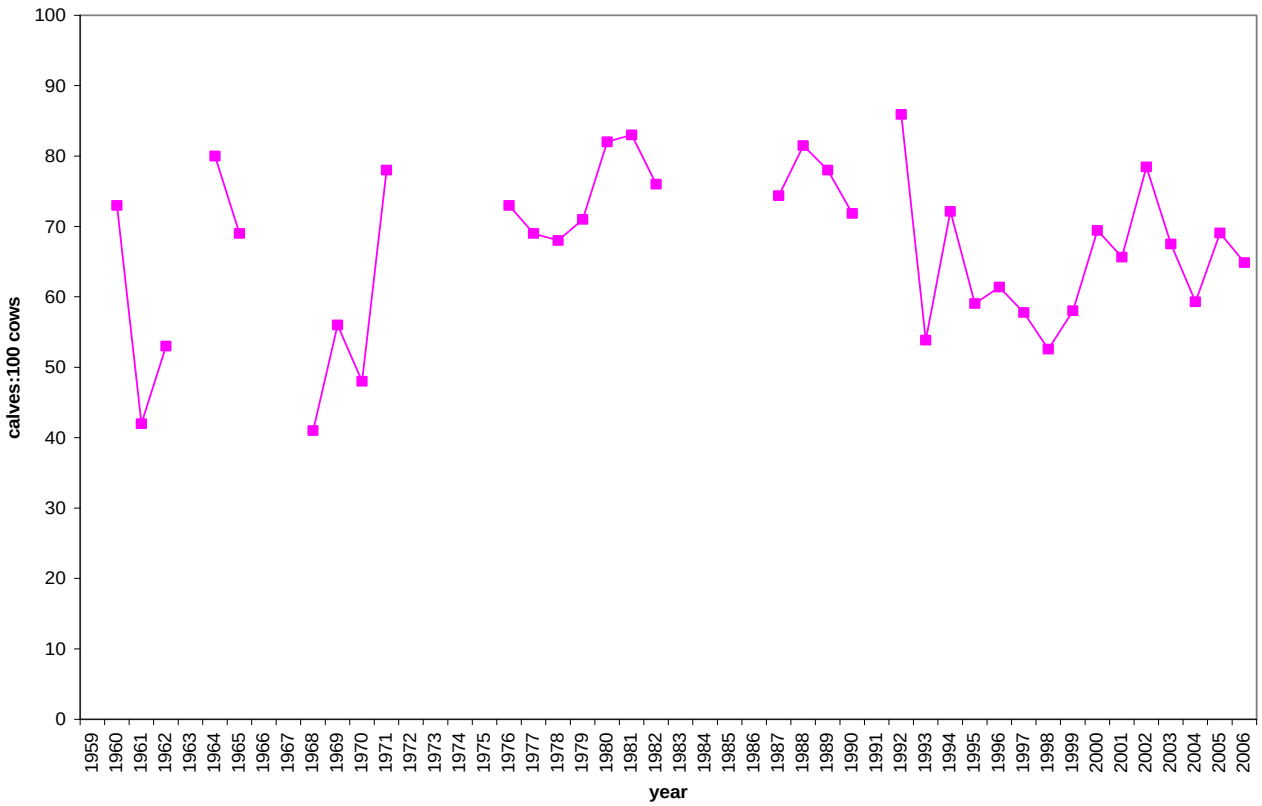

FIGURE 9 Western Arctic caribou herd calving survey results, 1960–2006 (telemetry-based surveys initiated in 1987)

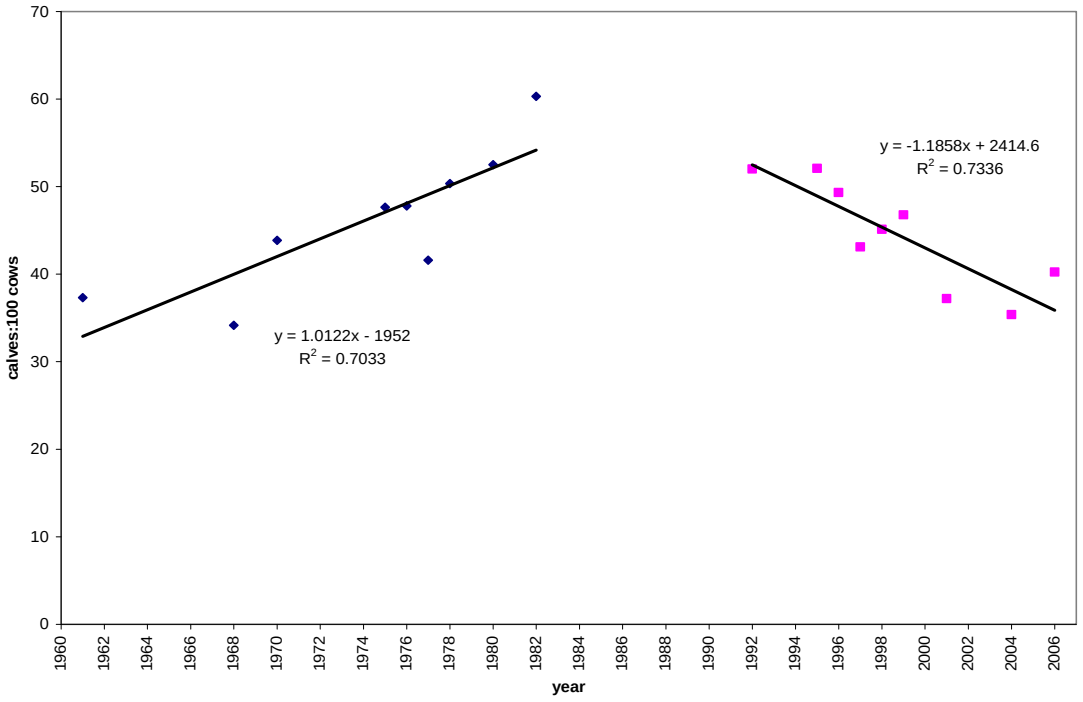

FIGURE 10 Fall calf:cow ratios for the Western Arctic caribou herd, 1961-2006

FIGURE 11 Number of short yearling (10-11-month-old) Western Arctic herd caribou through time, 1980-2008

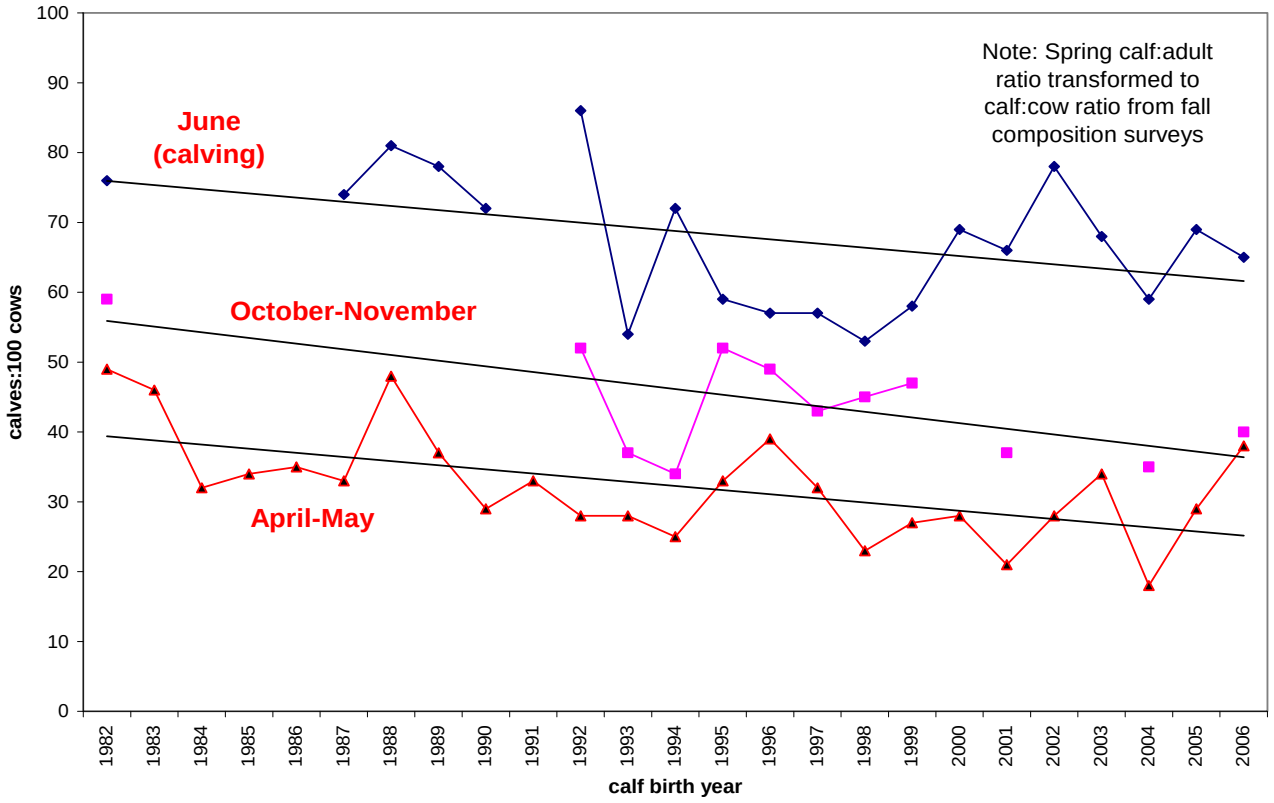

FIGURE 12 Unweighted least squares linear regression of calf:cow ratios during June, the subsequent fall (October-November) and following spring (April-May) for the Western Arctic caribou herd, 1982-2006

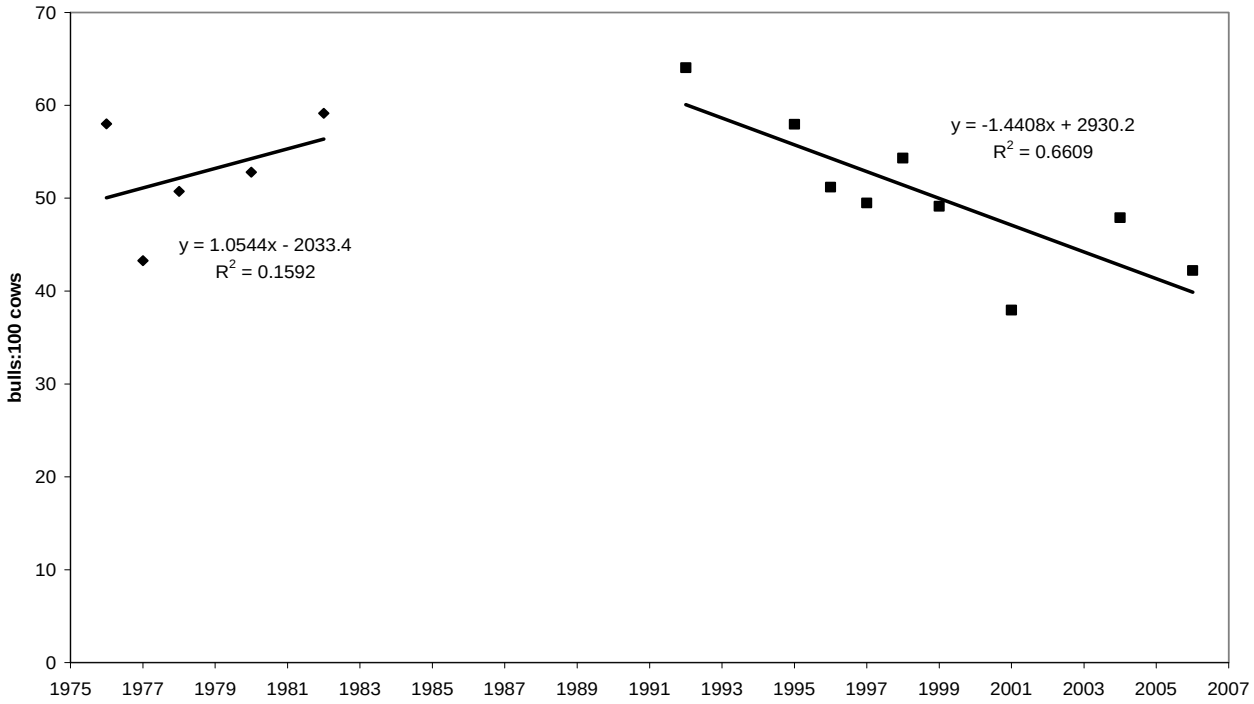

FIGURE 13 Fall bull:cow ratios for the Western Arctic caribou herd, 1976-2006

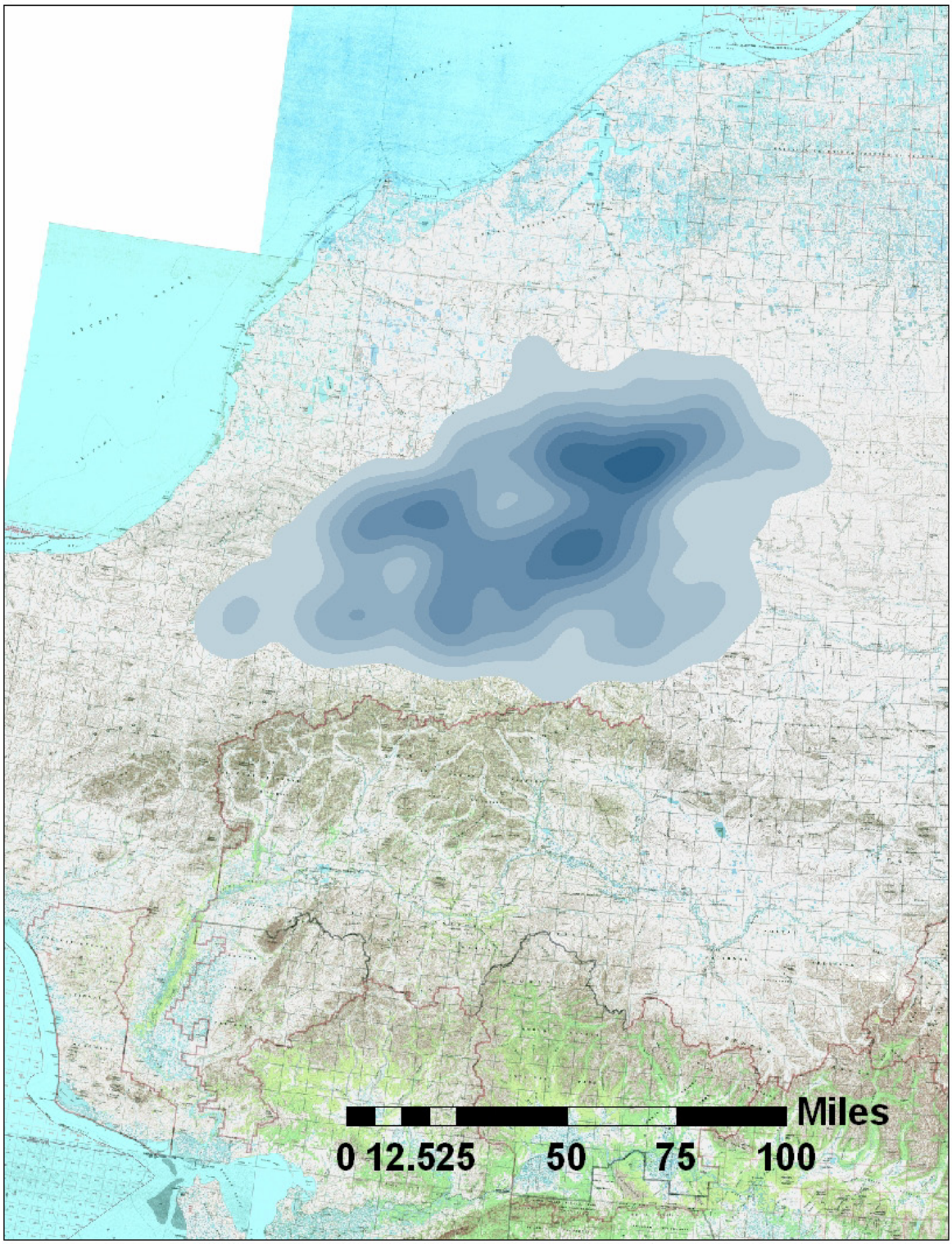

FIGURE 14 Adaptive kernel depiction of the WAH calving grounds, 1987-2006 (all years combined); darker blue indicates greater use (darkest blue is 50% kernel)

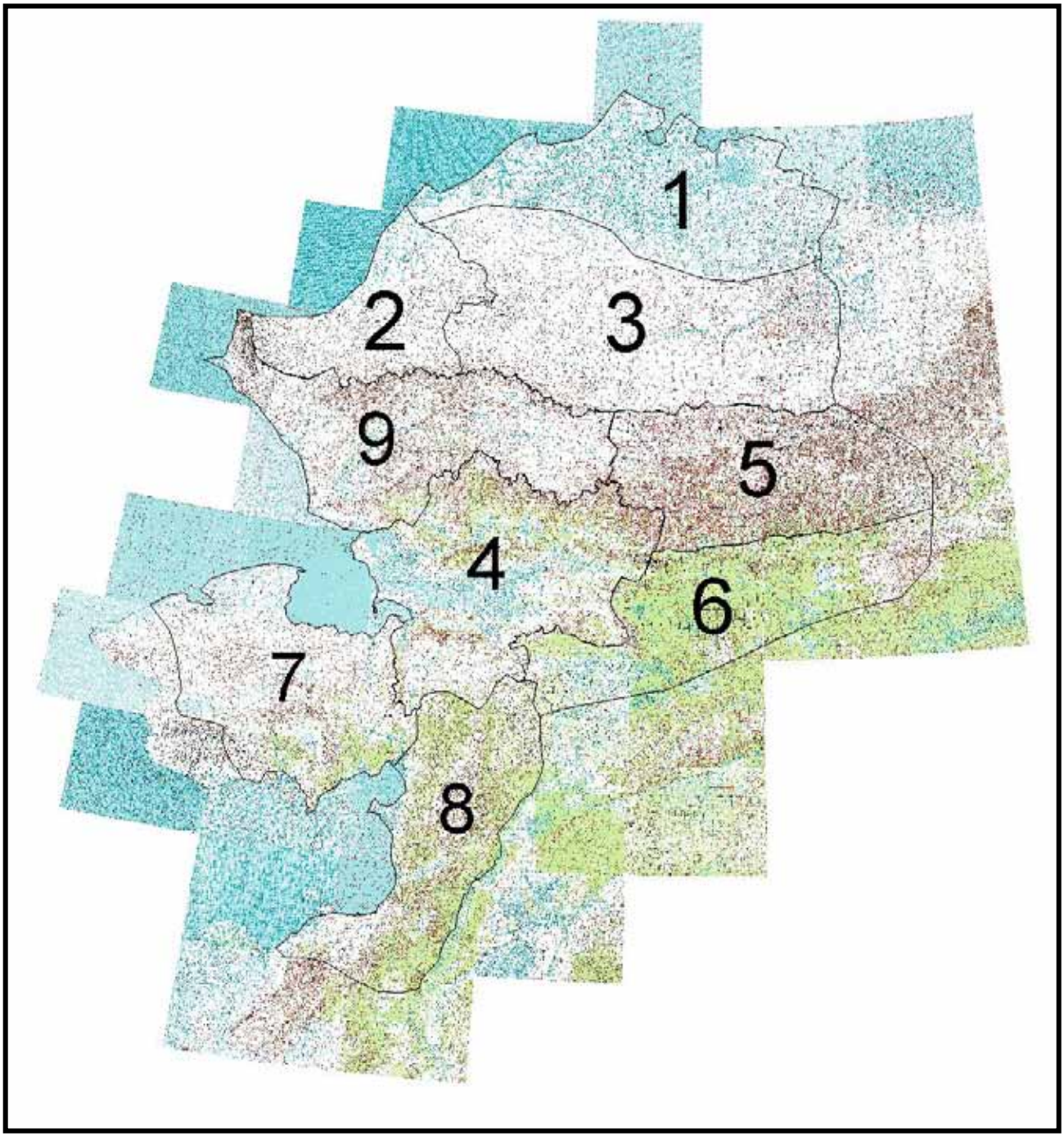

FIGURE 15 Subareas of Western Arctic herd range used to assess winter distribution

TABLE 1 Summary of community-based harvest assessments (conducted by ADF&G unless otherwise noted) for communities within the range of the Western Arctic caribou herd, 1985–2005.

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
21					
	Galena	1996	548	40	ADF&G[b]
	Galena	1997	536	39	ADF&G[b]
	Galena	1998	481	7	ADF&G[b]
	Galena	1999	592	8	ADF&G[b]
	Galena	2001	675	0	ADF&G[b]
	Kaltag	1996	227	16	ADF&G[b]
	Kaltag	1997	247	8	ADF&G[b]
	Kaltag	1998	227	6	ADF&G[b]
	Kaltag	1999	251	0	ADF&G[b]
	Kaltag	2001	227	0	ADF&G[b]
	Nulato	1996	328	13	ADF&G[b]
	Nulato	1997	311	3	ADF&G[b]
	Nulato	1998	282	5	ADF&G[b]
	Nulato	1999	347	0	ADF&G[b]
	Nulato	2001	341	0	ADF&G[b]
	Ruby	1999	179	1	ADF&G[b]
	Ruby	2001	192	0	ADF&G[b]
22					
	Brevig Mission	2000	286	76	ADF&G[b]
	Golovin	1989	169	40	ADF&G[b]
	Golovin	2001	148	94	ADF&G[b]
	Koyuk	1998	280	263	ADF&G[b]
	Koyuk	2005	376	426	Pedersen et al. 2006
	Shaktoolik	1998	235	167	ADF&G[b]
	Shaktoolik	1999	216	125	ADF&G[b]
	Shaktoolik	2004	223	198	Pedersen et al. 2006
	Shismaref	1989	472	197	ADF&G[b]
	Shishmaref	1995	560	342	ADF&G[b]
	Shishmaref	2000	589	286	ADF&G[b]
	Wales	1993	152	4	ADF&G[b]

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
	Wales	2000	159	0	ADF&G[b]
	Elim	1999	313	227	ADF&G[b]
	Teller	2001	241	21	Pedersen et al. 2006
	White Mountain	1999	203	93	ADF&G[b]
	St. Michael	2004	413	48	Pedersen et al. 2006
	Stebbins	2003	586	0	Pedersen et al. 2006
	Unalakleet	2003	725	167	Pedersen et al. 2006
	Unalakleet	2005	705	723	Pedersen et al. 2006
23					
	Deering	1994	147	142	ADF&G[b]
	Ambler	2003	291	325	Pedersen et al. 2006
	Kivalina	1992	344	351	ADF&G[b]
	Kotzebue	1986	(2681)	1917	ADF&G[b]
	Kotzebue	1991	2751	3782	ADF&G[b]
	Noatak	1994	379	615	ADF&G[b]
	Noatak	1999	423	683	ADF&G[b]
	Noatak	2002	455	410	Pedersen et al. 2006
	Shungnak	1998	255	561	ADF&G[b]
	Kiana	1999	398	488	ADF&G[b]
	Point Hope	1992	699	225	Fuller and George 1997
	Selawik	1999	767	1289	ADF&G[b]
	Noorvik	2002	677	988	ADF&G[b]
	Kobuk	2005	128	134	Pedersen et al. 2006
24					
	Alatna	1997	25	21	ADF&G[b]
	Alatna	1998	25	11	ADF&G[b]
	Alatna	1999	34	0	ADF&G[b]
	Alatna	2001	36	0	ADF&G[b]
	Allakaket	1997	176	11	ADF&G[b]
	Allakaket	1998	191	43	ADF&G[b]
	Allakaket	1999	197	13	ADF&G[b]
	Allakaket	2001	97	9	ADF&G[b]
	Allakaket	2002	136	106	ADF&G[b]
	Anaktuvuk Pass	1990	314	592	Pedersen and Opie 1990
	Anaktuvuk Pass	1991	272	545	Pedersen and Opie 1991

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
	Anaktuvuk Pass	1992	270	566	Fuller and George 1997
	Anaktuvuk Pass	1993	318	574	Pedersen and Opie 1993
	Anaktuvuk Pass	1994–95	318	322	Brower and Opie 1996
	Bettles	1997	23	0	ADF&G[b]
	Bettles	1998	31	25	ADF&G[b]
	Bettles	1999	36	21	ADF&G[b]
	Bettles	2002	31	0	ADF&G[b]
	Evansville	1997	44	3	ADF&G[b]
	Evansville	1998	28	4	ADF&G[b]
	Evansville	1999	24	2	ADF&G[b]
	Evansville	2002	24	0	ADF&G[b]
	Huslia	1997	218	56	ADF&G[b]
	Huslia	1998	245	264	ADF&G[b]
	Huslia	1999	283	78	ADF&G[b]
	Huslia	2001	285	0	ADF&G[b]
	Huslia	2002	217	82	ADF&G[b]
26					
	Barrow	1987	3016	1595	Braund et al. 1991
	Barrow	1988	3379	1533	Braund et al. 1991
	Barrow	1989	3379	1656	Braund et al. 1991
	Barrow	1992	3908	1993	Fuller and George 1997
	Barrow	2002–03	4581	494	Pedersen 2005
	Barrow	2003–04	7769	777	Pedersen 2005
	Atqasuk	1994–95	237	262	Hepa et al. 1997
	Atqasuk	2002–03	228	52	Pedersen 2005
	Atqasuk	2003–04	228	42	Pedersen 2005
	Nuiqsut	1985	337	513	Pedersen 1995
	Nuiqsut	1992	418	278	Fuller and George 1997
	Nuiqsut	1993	361	672	Pedersen 1995
	Nuiqsut	1994–95	418	258	Brower and Opie 1997
	Nuiqsut	1999	468	413	Pedersen 2001
	Nuiqsut	2000–01	468	600	Pedersen 2001
	Nuiqsut	2002–03	433	36	Pedersen 2005
	Nuiqsut	2002–04	433	54	Pedersen 2005
	Point Lay	1987	(121)	157	Pedersen 1989

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
	Wainwright	1988	506	505	Braund et al 1993
	Wainwright	1989	468	711	Braund et al 1993
	Wainwright	1992	584	748	Fuller and George 1997

[a] Human population figures from Alaska Department of Commerce and Economic Development, Alaska Community Database (www.dced.state.ak.us/mra/CF_CUSTM.htm); human population numbers in parentheses were estimated from household interviews rather than by the Alaska Department of Commerce and Economic Development

[b] Alaska Department of Fish and Game Community Profile Database

TABLE 2 Photocensus population estimates of the Western Arctic caribou herd, 1970–2007

	Minimum population size	Mean annual growth rate[a]	Estimated population size[b]
1970	242,000		
1971		-18	200,000
1972		-18	164,000
1973		-18	135,000
1974		-18	111,000
1975		-18	91,000
1976	75,000		
1977		19	89,000
1978	107,000		
1979		14	121,000
1980	138,000		
1981		12	154,000
1982	172,000		
1983		7	185,000
1984		7	198,000
1985		7	213,000
1986	229,000		
1987		22	280,000
1988	343,000		
1989		10	378,000
1990	416,000		
1991		3	427,000
1992		3	438,000
1993	450,000		
1994		1	454,000
1995		1	459,000
1996	463,000		
1997		1	466,800
1998		1	470,600
1999[c]	(430,000)	1	474,400
2000		1	478,200
2001		1	482,100
2002		1	486,000
2003	490,000		
2004		-6	458,000
2005		-6	429,000
2006		-6	401,000
2007	377,000		

[a] Mean annual rate of change = e^r ;e = 2.7183; $r = [\ln(N_{t2}) - \ln(N_{t1})]/t$; t = number of years between censuses; N_{t1} = pop. estimate at $time_1$; N_{t2} = pop. estimate at $time_2$

[b] Estimated population size assumes a constant average annual rate of change between censuses; in reality, this probably rarely occurs; [c] 1999 census probably underestimated population size; therefore, annual rate of change computed from 1996 to 2003.

TABLE 3 Aerial calving surveys from observations of radiocollared cows in the Western Arctic caribou herd, 1987–2006

Year	Median June survey date	With Calf	No Calf ≥1 hard antler	No Calf soft antlers	No Calf no antlers	Total	Maternal	Non-Maternal	Calves: 100 Cows
1987	16	29	0	1	9	39	29	10	74
1988	5	27	17	1	9	54	44	10	81
1989	12	34	5	2	9	50	39	11	78
1990	11	51	0	5	15	71	51	20	72
1991	Fogged out								
1992	12	55	6	0	10	71	61	10	86
1993	14	39	3	17	21	80	42	39	52
1994	11	42	15	2	21	80	57	23	71
1995	11	47	2	13	21	83	49	34	59
1996	6	38	16	13	21	88	54	34	61
1997	5	39	13	16	22	90	52	38	58
1998	13	36	5	16	21	78	41	37	53
1999	12	47	0	11	23	81	47	34	58
2000	13	39	11	5	17	72	50	22	69
2001	16	8	34	9	13	64	42	22	66
2002	2	13	38	8	6	65	51	14	78
2003	6	16	38	7	19	80	54	26	68
2004	6	38	13	17	18	86	51	35	59
2005	10	45	13	8	18	84	58	26	69
2006	10	37	11	8	18	74	48	26	65

TABLE 4 Fall population composition of the Western Arctic caribou herd, 1961–2006

Year	Bulls	Cows	Calves	Total	Calves: 100 Cows	Calves: 100 Adults	Bulls: 100 Cows
1961	276	501	187	964	37	24	55
1970	1748	2732	1198	5678	44	27	64
1975	720	2330	1116	4166	48	37	31
1976	273	431	222	926	52	32	63
1980	715	1354	711	2780	53	34	53
1982	1896	3285	1923	7104	59	37	58
1992	1600	2498	1299	5397	52	32	64
1993	859	2321	859	4039	37	25	37
1994	1354	3284	1118	5756	34	24	41
1995	1176	2029	1057	4262	52	33	58
1996	2621	5119	2525	10265	49	33	51
1997	2588	5229	2255	10072	43	29	49
1998	2298	4231	1909	8438	45	29	54
1999	2059	4191	1960	8210	47	31	49
2001	1117	2943	1095	5155	37	27	38
2004	2916	6087	2154	11157	35	24	48
2006	1900	4501	1811	8212	40	28	42

Table 5 Short yearling[a] survey results of the Western Arctic caribou herd, 1980–2007

Year	Number of caribou			Number		SY[a]:100 adults	3-yr moving average
	Adults	SY[a]	Total	Groups	Radio-collared cows		
1980	7823	2559	10382			33	
1981							31
1982	3988	1164	5152			29	31
1983	5079	1648	6727			32	31
1984	1646	503	2149			31	28
1985	2776	600	3376			22	25
1986	5372	1227	6599			23	23
1987	4272	1003	5275			23	23
1988	6047	1312	7359	31	45	22	26
1989	5321	1718	7039	29	37	32	26
1990	5231	1278	6509	25	36	24	25
1991	7111	1371	8482	47	48	19	22
1992	7660	1678	9338	49	52	22	20
1993	4396	814	5210	19	33	19	20
1994	8369	1587	9956	44	53	19	18
1995	13283	2196	15479	53	86	17	19
1996	5044	1111	6155	32	36	22	22
1997	9298	2438	11736	40	56	26	23
1998	7409	1585	8994	34	46	21	21
1999	6354	975	7329	34	36	15	18
2000	8568	1559	10127	42	48	18	18
2001	6814	1294	8108	32	33	19	17
2002	8268	1258	9526	38	42	15	18
2003	8748	1633	10381	43	50	19	19
2004	7262	1627	8889	34	43	22	18
2005	8376	1026	9402	35	40	12	18
2006	7727	1517	9244	37	42	20	19
2007	10398	2554	12952	44	57	25	

[a] Short yearlings are 10–11-month-old caribou.

TABLE 6 Geographic distribution of radiocollared Western Arctic herd caribou during winter (Nov–Mar); numbers represent percentage of radiocollared caribou located in each subarea; bottom row is number of collared caribou found (Note: 9 subareas[a] are shown in Figure 5)

	Winter Years																							
	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Area[a]	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07
1	14	13	6	12	0	0	0	5	5	9	0	1	10	4	6	9	0	5	5	4	2	0	1	0
2	0	16	6	0	0	0	0	0	1	0	0	1	0	0	0	0	9	0	0	0	0	0	0	0
3	7	13	0	0	0	0	11	0	1	2	4	0	5	0	5	1	1	5	0	4	0	0	2	1
4	24	32	12	38	49	28	20	2	52	6	1	26	33	12	5	11	42	12	22	23	12	16	49	22
5	14	11	18	0	8	1	9	0	9	6	8	3	26	4	25	31	5	6	9	16	31	5	9	5
6	0	0	0	0	0	1	1	0	6	19	4	1	2	2	0	2	12	0	3	8	20	0	13	0
7	2	0	0	0	1	5	2	3	4	4	7	6	9	59	29	24	17	42	31	38	14	19	5	11
8	17	5	53	38	39	65	56	89	20	54	75	54	16	20	29	20	5	29	5	0	20	53	18	29
9	21	11	6	12	3	1	2	0	2	0	0	9	1	0	1	1	9	2	25	7	1	6	2	0
n_i[b]	14	19	17	34	38	77	57	75	61	70	90	78	63	81	88	67	72	63	58	69	86	78	69	68

[a] Areas: 1 North Slope coastal plain west of Colville drainage; 16,378 mi^2

2 Foothills of Brooks Range west of Utukok River; 8817 mi^2

3 Foothills of Brooks Range east of Utukok River and west of Dalton Highway; 24,082 mi^2

4 Kobuk drainage below Selby River; Squirrel drainage below North Fork; Selawik drainage; Buckland drainage; 18,928 mi^2

5 Kobuk drainage above Selby R; central Brooks Range north of Koyukuk R & west of Dalton Hwy; Noatak drainage above Douglas Crk; 12,436 mi^2

6 Koyukuk drainage south of Brook Range mountains, including Kanuti Flats, Galena Flats; 13,089 mi^2

7 Seward Peninsula west of Buckland and Koyukuk villages; 15,436 mi^2

8 Nulato Hills; 14,418 mi^2

9 Noatak drainage below Douglas Creek; Squirrel drainage above North Fork; Wulik and Kivalina drainages; Lisburne Hills; 16,541 mi^2

[b] Number of radiocollared caribou; excludes the year in which a caribou was initially collared; when a collared caribou wintered in >1winter range, we assumed time was spent equally among ranges and included appropriate fractions of use

TABLE 7 Caribou density (number/mi^2) in 9 subareas (Figure 5) of Western Arctic Caribou Range during winter (1 Nov–31 Mar)

	Winter Year																							
	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Area[a]	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07
1	1.73	1.71	0.82	2.01	0.00	0.00	0.00	1.39	1.32	2.55	0.00	0.18	2.69	1.06	1.63	2.59	0.00	1.40	1.53	1.30	0.70	0.00	0.44	0.00
2	0.00	3.81	1.53	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.33	0.00	0.00	0.00	0.00	4.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.59	1.16	0.00	0.00	0.00	0.00	1.82	0.00	0.15	0.40	0.73	0.00	0.92	0.00	0.89	0.29	0.28	0.95	0.00	0.74	0.00	0.00	0.50	0.15
4	2.49	3.55	1.42	5.66	8.82	5.58	4.43	0.55	12.14	1.53	0.27	6.22	7.96	2.89	1.37	2.80	10.52	3.03	5.53	5.88	3.04	4.06	12.96	8.55
5	2.27	1.80	3.25	0.00	2.18	0.39	2.93	0.00	3.18	2.07	3.04	0.95	9.75	1.39	9.47	11.66	1.87	2.15	3.37	6.18	12.49	2.06	3.60	3.25
6	0.00	0.00	0.00	0.00	0.00	0.19	0.28	0.00	1.92	6.38	1.54	0.45	0.56	0.88	0.00	0.81	4.31	0.00	1.28	2.90	7.40	0.00	4.98	0.00
7	0.30	0.00	0.00	0.00	0.29	1.11	0.47	0.86	1.16	1.25	2.12	1.91	2.62	17.74	8.78	7.33	5.38	13.13	9.77	12.11	4.54	6.23	1.56	5.24
8	2.30	0.78	8.41	7.43	9.39	17.02	16.20	26.39	6.23	16.72	23.62	17.14	5.10	6.40	9.59	6.62	1.61	9.55	1.74	0.16	6.79	18.67	6.20	14.79
9	2.57	1.36	0.81	1.99	0.55	0.15	0.44	0.00	0.43	0.00	0.00	2.49	0.22	0.00	0.32	0.43	2.61	0.69	7.35	2.15	0.35	1.94	0.73	0.00
N[b]	*198*	*213*	**229**	*280*	**343**	*378*	**416**	*426*	*438*	**450**	*454*	*459*	**463**	*467*	*471*	*474*	*478*	*482*	*486*	**490**	*495*	*500*	*500*	*500*

[a] Areas: 1 North Slope coastal plain west of Colville drainage; 16, 378 mi^2

2 Foothills of Brooks Range west of Utukok River; 8,817 m

3 Foothills of Brooks Range east of Utukok River and west of Dalton Highway; 24,082 mi^2

4 Kobuk drainage below Selby River; Squirrel drainage below North Fork; Selawik drainage; Buckland drainage; 18,928 mi^2

5 Kobuk drainage above Selby River; central Brooks Range north of Koyukuk R & west of Dalton Hwy; Noatak drainage above Douglas Crk; 12,436 mi^2

6 Koyukuk drainage south of Brook Range mountains, including Kanuti Flats, Galena Flats; 13,089 mi^2

7 Seward Peninsula west of Buckland and Koyukuk villages; 15,436 mi^2

8 Nulato Hills; 14,418 mi^2

9 Noatak drainage below Douglas Creek; Squirrel drainage above North Fork; Wulik and Kivalina drainages; Lisburne Hills; 16,541 mi^2

[b] Western Arctic Herd population size in thousands. Numbers in italics are interpolations based on population growth rates; extrapolations beyond 2003-2004 were capped at 500,000 caribou. Numbers in bold are census estimates. Census from 1990 excluded because estimate was probably low.

TABLE 8 Annual mortality rate and binomial confidence intervals for Western Arctic caribou herd cows collared with conventional or lightweight satellite radio collars[a], 1985–1986 through 2006–2007 collar years (1 Oct–30 Sep)

				Binomial Confidence Level		
Collar year	Sample size	Nr died	Mortality rate[b] (%)	80%	90%	95%
1985–1986	49	6	12	7–20	5–23	5–25
1986–1987	66	8	12	7–19	6–21	5–22
1987–1988	88	8	9	5–14	5–16	4–17
1988–1989	87	13	15	10–21	9–23	8–24
1989–1990	102	15	15	10–20	9–22	8–23
1990–1991	100	14	14	10–21	9–22	9–24
1991–1992	104	16	15	11–21	10–22	9–24
1992–1993	107	21	20	15–25	14–27	13–28
1993–1994	102	16	16	11–21	10–23	9–24
1994–1995	108	14	13	9–18	8–20	7–21
1995–1996	112	20	18	13–23	12–25	11–26
1996–1997	107	16	15	11–20	10–22	9–23
1997–1998	102	8	8	5–12	4–14	3–15
1998–1999	94	16	17	12–23	11–25	10–26
1999–2000	86	19	22	16–29	15–31	14–32
2000–2001	77	14	18	13–25	11–27	10–29
2001–2002	87	13	15	10–21	9–23	8–24
2002–2003	99	19	19	14–25	13–27	12–28
2003–2004	99	15	15	11-21	10-22	9-24
2004–2005	104	23	22	17-28	16-30	15-31
2005-2006	111	34	28	25-37	23-39	22-40
2006-2007	106	15	14	10-19	9-21	8-22

[a] Sample size = number of potentially active conventional or lightweight satellite radio collars active on adult cows at the beginning of the collar year

[b] Mortality rate = (Number caribou died/Sample size)100

TABLE 9 Annual harvests of Western Arctic herd caribou by game management unit and hunter residence[a]

		Residents within WAH range		All other hunters		Total harvest	
Reg. year	GMU	# Caribou	%	# Caribou	%	# Caribou	%
1999–00	21	16	0	3	0	19	0
	22	2128	14	36	0	2164	14
	23	10,478	69	439	3	10,917	72
	24	582	4	58	0	640	4
	26A	1340	9	53	0	1393	9
	Total	14,544	96	589	4	15,133	
2000–01	21	7	0	2	0	9	0
	22	2612	17	32	0	2644	17
	23	10,424	68	412	3	10,836	71
	24	447	3	13	0	460	3
	26A	1386	9	53	0	1439	9
	Total	14,876	97	512	3	15,388	
2001–02	21	0	0	0	0	0	0
	22	2326	16	43	0	2369	16
	23	10,279	69	402	3	10,681	72
	24	418	3	8	0	426	3
	26A	1381	9	55	0	1436	9
	Total	14,404	97	508	3	14,912	
2002–03	21			0	0		
	22	2247	15	69	0	2316	16
	23	9979	68	533	4	10,512	71
	24			19	0	19	0
	26A	1783	12	76	1	1859	13
	Total	14,009	95	697	5	14,706	
2003–04	21			0	0		
	22	1860	16	32	0	1892	16
	23	7268	63	406	4	7674	67
	24			17	0	17	0
	26A	1899	16	94	1	1993	17
	Total	11,027	95	549	5	11,576	

TABLE 9 (continued)

		Residents within WAH range		All other hunters		Total harvest	
Reg. year	GMU	# Caribou	%	# Caribou	%	# Caribou	%
2004–05	21			0	0	0	0
	22	2021	13	46	0	2067	13
	23	11,787	75	603	4	12,390	79
	24			34	0	34	0
	26A	1201	8	116	1	1317	9
	Total	15,009	95	799	5	15,808	
2005–06	21			2	0	2	0
	22	1433	10	21	0	1454	10
	23	10883	74	657	4	11540	78
	24			8	0	8	0
	26A	1666	11	84	1	1750	12
	Total	13,992	95	772	5	14,764	

[a] "%" is percent of total annual harvest; estimates of caribou harvested by residents living within the range of this herd made using 'levels' model (Sutherland 2005) while number of caribou taken by 'All other hunters' based on harvest ticket reports

TABLE 10 Number of hunters residing outside the range of the Western Arctic caribou herd and number of caribou they harvested by sex, regulatory year, and game management unit

		Hunters			Caribou Harvested		
Year	GMU	Succ.	Unsucc.	Total	Bulls	Cows	Total
2000–01	21	0	5	5	0	0	0
	22	38	15	53	67	3	70
	23	383	102	485	595	28	623
	24	12	46	58	15	2	17
	26A	44	19	63	65	3	68
	Total	477	187	664	742	36	778
2001–02	21	0	2	2	0	0	0
	22	22	57	59	34	9	43
	23	252	172	424	377	25	402
	24	6	36	42	7	1	8
	26A	35	21	56	52	3	55
	Total	315	288	603	470	38	508
2002–03	21	0	4	4	0	0	0
	22	42	30	72	62	7	69
	23	343	164	507	501	32	533
	24	8	37	45	14	5	19
	26A	50	15	65	73	3	76
	Total	443	250	693	650	47	697
2003–04	21	0	1	1	0	0	0
	22	20	36	56	26	6	32
	23	236	146	382	381	25	406
	24	10	43	53	12	5	17
	26A	65	16	81	91	3	94
	Total	331	242	573	510	39	549
2004-05	21	0	0	0	0	0	0
	22	24	22	46	36	10	46
	23	351	121	472	564	39	603
	24	24	41	65	28	6	34
	26A	61	15	76	100	14	116
	Total	460	199	659	728	69	797
2005-06	21	2	0	2	2	0	2
	22	15	10	25	19	2	21
	23	397	159	556	613	38	657
	24	5	30	35	8	0	8
	26A	56	26	82	76	8	84
	Total	473	227	700	718	48	766

TABLE 11 Percent positive results for brucellosis, haptoglobin levels and sample sizes (in parentheses) from serology analyses of the Western Arctic caribou herd, 1962–2005 (Note: for brucellosis, a positive result only indicates exposure to the bacteria rather than an actual infection)

	Brucellosis[a]		Elevated Haptoglobin Level[b]	
Year	%	(*n*)	%	(*n*)
1962	30	(56)		
1963	19	(74)		
1964	14	(37)		
1965	12	(149)		
1975	14	(14)		
1981	39	(23)		
1986	19	(37)		
1992	4	(52)	0	(14)
1993	12	(51)	4	(25)
1994	11	(47)	19	(27)
1995	12	(34)	5	(19)
1996	3	(76)	1	(73)
1997	0	(76)	11	(62)
1998	7	(113)	16	(112)
1999	5	(77)	10	(77)
2000	6	(115)	10	(116)
2001	2	(85)	0	(83)
2002	1	(92)	3	(92)
2003	6	(107)	5	(108)
2004	6	(80)	5	(80)
2005	2	(66)	17	(58)

[a] Brucellosis = *Brucella suis* type 4
[b] Haptoglobin level

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

GAME MANAGEMENT UNITS: 25A, 25B, 25D, and 26C (59,400 mi^2)

HERD: Porcupine

GEOGRAPHIC DESCRIPTION: Eastern portions of the Arctic Slope, Brooks Range, and northeastern Interior Alaska

BACKGROUND

The Porcupine caribou herd (PCH) migrates between Alaska and the Yukon and Northwest Territories in Canada. Most of the herd's 130,000-mi^2 range is remote, roadless wilderness. The PCH typically calves on the coastal plain of the Arctic National Wildlife Refuge (ANWR), which is also the most promising onshore petroleum prospect in the United States (Clough et al. 1987). Both industry and government have an interest in developing potential oil resources on the coastal plain. Therefore, various state and federal agencies and their Canadian counterparts are cooperating to carry out baseline ecological studies of the PCH. These studies are expected to provide the basis for mitigation of any adverse effects of petroleum development on caribou.

In 1987 the United States and Canada established the International Porcupine Caribou Board (IPCB) to coordinate management and research among government and user groups. The board includes a representative from the Alaska Department of Fish and Game (ADF&G), representatives of the governments of the United States, Canada, Yukon and Northwest Territories, and members of communities and Native organizations from Alaska and Canada. Additionally, ADF&G is a member of the Porcupine Caribou Technical Committee (PCTC), an ad hoc committee operating under the IPCB with representatives of the various management and research agencies with responsibilities for the PCH. These include the U.S. Fish and Wildlife Service, Yukon Department of Environment, Northwest Territories Department of Environment and Natural Resources (NWT), Canadian Wildlife Service (CWS), Parks Canada, and U.S. Geological Survey Biological Resources Division. The PCTC meets annually to coordinate research and management activities and set priorities for future work.

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

A variety of factors affect PCH management, including board recommendations, biological studies, and congressional actions regarding the potential opening of ANWR to petroleum exploration and development.

The PCH remained more stable than other Alaska herds during the 1960s and 1970s at about 100,000 caribou (Table 1). In 1979 the population began a steady increase and reached 178,000 caribou by 1989. Annual rates of growth averaged about 5% from 1979 to 1989. The PCH then decreased to 160,000 caribou in 1992, probably in response to lower yearling recruitment after harsh winters. The herd continued to decline to an estimated 129,000 animals in 1998 and 123,000 in 2001, probably due to increased adult mortality (Arthur et al. 2003).

MANAGEMENT DIRECTION

In the early 1990s, research on the Porcupine caribou herd was reduced substantially. Efforts were focused on monitoring population parameters and their relationship to management objectives. The following goals, proposed by the IPCB in 1998 (IPCB 1998), were used to guide management activities during recent years.

MANAGEMENT GOALS

- Conserve the PCH and its habitat through international cooperation and coordination so the risk of irreversible damage or long-term adverse effects as a result of the use of caribou or their habitat is minimized.

- Ensure opportunities for customary and traditional uses of the PCH.

- Enable users of the PCH to participate in international efforts to conserve the PCH and its habitat.

- Encourage cooperation and communication among governments, users of the PCH, and others to achieve these objectives.

MANAGEMENT OBJECTIVE

- Maintain a minimum population of 135,000 caribou.

    - Conduct censuses every 2–3 years.

    - Estimate parturition rates and late June calf:cow ratios of radiocollared females.

    - Monitor herd movements by periodically relocating radiocollared caribou.

    - Monitor the harvest through field observations, hunter reports, and contact with residents.

METHODS

POPULATION STATUS AND TREND

Population Size

Personnel from ADF&G, ANWR, and Yukon Department of Environment (YDOE) cooperate to estimate population size with aerial photocensuses conducted at intervals of 2–3 years, using the modified aerial photo-direct count technique (Davis et al. 1979; Valkenburg et al. 1985). Postcalving aggregations of caribou were located by radiotracking collared animals. These aggregations usually occurred when temperatures were >55°F and wind was <8 mph. Groups of caribou were photographed with a Ziess RMK-A aerial camera mounted in a DeHavilland Beaver aircraft. Caribou were counted directly from photographs. No population estimates were conducted since 2001 due to weather and lack of aggregations.

Parturition and Early Calf Survival

Parturition rate was determined by observing radiocollared females ≥2 years old from a fixed-wing aircraft during the first half of June. Caribou observed with calves, hard antlers, or distended udders were classified as parturient (Whitten 1995*a*). Parturient caribou may have been missed because the cow did not have hard antlers, the udder was not distended, calves were born early and died, or calves were born late and not observed.

The proportion of calves:100 cows (early calf survival) was determined by observing radiocollared females ≥2 years old from a fixed-wing aircraft in late June, after most calving should have occurred. If a cow was observed with a calf, she was classified as "with calf." If distended udders were detected but no calf was seen, we assumed the cow had recently lost a calf and she was classified as "without calf."

Population Composition

Personnel from YDOE have conducted composition counts from a helicopter on the PCH winter range in March since 1991. Caribou were classified as adult cow; calf; and immature and mature bulls.

Composition of postcalving groups was conducted during 1971–1992. Caribou were classified as adult bull, adult cow, yearling, and calf from a helicopter or the ground in July (Stephenson 2005).

A fall composition count was conducted during rut in October 1980 in Alaska and Canada. Caribou were classified as adult bull, adult cow, yearling, and calf from a helicopter or the ground. No fall composition counts were conducted since 1980 because homogeneity of sex and age classes during the rut observed in previous surveys (1972–1978) was variable between years and areas (Whitten 1981). Distribution of caribou in 1980 was ideal for conducting reliable composition counts.

Distribution and Movements

Personnel from ADF&G, ANWR, and YDOE cooperated to monitor distribution of the PCH during calving, postcalving, summer, rut, and winter by relocating radiocollared females and using satellite radio collars.

HARVEST

Harvest and hunting pressure by Alaska residents who lived south of the Yukon River (nonlocal) and by nonresidents were monitored using harvest reports submitted by hunters. This represents a very small proportion of the harvest (<2%).

Alaska residents who lived north of the Yukon River were not required to obtain caribou harvest tickets/report cards. However, they were required to register with ADF&G or an authorized vendor. This local harvest was estimated based on knowledge of local hunting patterns and the availability of caribou near communities. Local harvest depends largely on the relative availability of caribou. Canadian harvest was obtained from YDOE. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 July 2002 through 30 June 2003).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Population size was not estimated in 2005 or 2006. Adverse weather and failure of caribou to aggregate prevented a photocensus during 2003–2006. The most recent estimate of 123,052 caribou in 2001 indicated a steady decline since 1989, when 178,000 caribou were estimated (Table 1). The herd declined by 3–4% per year from 1989 to 1998 and 1.5% per year from 1998 to 2001 (Table 1). Based on recent June and March composition surveys (see below in this section and Table 2), a 3-year study on survivorship of radiocollared adult females (see below in *Natural Mortality* section), and population modeling, it is likely that the PCH has continued to decline and may number between 110,000–115,000 caribou (S. Arthur, ADF&G files).

Parturition and Early Calf Survival

Parturition rates of radiocollared females ≥4 years old in 2005 and 2006 were 65% (n = 55) and 79% (n = 66) compared with the 1987–2004 average of 82% (Table 2). Most recently, the 2005 parturition rate was significantly lower (95% binomial confidence limit) than parturition rates in 2002 and 2003. The low parturition rates observed in 2005 may have been related to calving distribution because parturition is generally greater for cows that are in Alaska during the peak calving period. In 2005, 73% (n = 33) of cows in Alaska in early June were parturient whereas the parturition rate for adult cows in Yukon was 53% (n = 32). In 2006, only 2 radiocollared cows (3% of those located) were in Alaska on the coastal plain and both were parturient. Parturition rate for adult cows in Canada (n = 64) was 78%.

Parturition rates for 3-year-olds were 60% (n = 10) in 2005. Only one 3–year old was observed in 2006 and was found pregnant. The peak of calving was approximately 1–4 June in 2005 and 2 June in 2006, consistent with years 2002–2004.

Late June calf:cow ratios of radiocollared females ≥4 years old were 49:100 (n = 57) in 2005 and 58:100 (n = 65) in 2006. The late June calf:cow ratios for females ≥4 years old have been variable since 1987, ranging 44–74:100 (Table 2). This ratio was not estimated in 2004 because of dense smoke from extensive wildfires. The low value observed in 2005 is partially a reflection

of the low parturition rate. Nonetheless, the 2005 cohort likely did not contribute much to overall recruitment to the PCH. In 2005 the late June calf:cow ratio for 3-year-olds was 30:100 (n = 10) and in 2006 the single 3-year old observed was not accompanied by a calf.

Population Composition

March composition surveys in 2005 indicated a calf:cow ratio of 24:100 compared with a range of 31–56:100 during the previous 5 years (Table 2; D. Cooley, Yukon Department of Environment, Yukon Territory Canada, personal communication). No surveys were conducted in March 2006 because the PCH was mixed with the Hart River herd in central Yukon and with the Central Arctic herd near Arctic Village, Alaska.

In March 2007, YDOE staff observed 40 calves:100 cows compared with a mean of 35 calves:100 cows during 1995–2004. Calf survival appeared to be higher in some areas than others. For example, calf survival in the Richardson Mountains was considerably higher than in lower lying areas (D. Cooley, unpublished data).

Results of postcalving composition counts conducted during 1971–1992 can be found in Whitten (1993a) and Stephenson (2005). Sample sizes ranged 2500–33,000 caribou. Bull:cow ratios were variable because sexes were segregated (range: 5–95:100). Calf:cow ratios were less variable, ranging 38–73:100 during those years, indicating that calf production was probably good. Percentage of yearlings was low and ranged 5–15%. These surveys were discontinued because data on calf production and early calf survival were also being collected using radiocollared caribou, and at the time there was little concern about the bull:cow ratios because the herd had been lightly harvested and bull:cow ratios were variable from year to year.

Results of the 1980 fall composition surveys indicated a bull:cow ratio of 60:100 and a calf:cow ratio 54:100 (n = 10,339 in Alaska and 3532 in Canada; Whitten 1981, 1992). No fall composition counts were conducted after 1980 because degree of segregation by sex and age classes during the rut observed in previous surveys (1972–1978) was variable between years and areas (Whitten 1981). Distribution of caribou in 1980 was thought to be ideal for conducting reliable composition counts.

Distribution and Movements

Calving Distribution. In 2005 the PCH caribou began moving toward the calving grounds during late April. Snow was mostly gone on the migration route by the end of May but remained on the coastal plain in northeast Alaska until the first week of June. As a result, many of the pregnant cows stopped their migration temporarily in Canada. Some did reach the traditional calving areas by the peak of calving. At the time of the survey, 59% (n = 24) of the radiocollared parturient cows were within ANWR and 20% (n = 8) were within the traditional calving area on the coastal plain. By the end of June, most of the PCH had moved into ANWR, and the largest concentration of caribou was along the Hulahula and Sadlerochit Rivers.

In 2006 the PCH began moving toward the calving grounds during mid May, about 2 weeks later than most years; although the coastal plain was relatively snow free. Consequently, almost all calves were born on or near the coastal plain in northern Yukon. There was no obvious explanation for the delayed migration in 2006, other than the fact that much of the herd had

wintered farther south than during most years. By late June, most of the PCH had moved into ANWR, and the largest concentration of caribou was between the Kongakut River and the Canadian border.

Migration and calving distribution varied in the past 10 years. During 1997, 1998, and 2002, snowmelt and new plant growth occurred earlier than in some other years, and, due to relatively light snow cover, caribou began their spring migration to the coastal plain earlier; most reached ANWR and the coastal plain by 1 June. In contrast, during 1999–2001, 2003, and 2004, deep snow and/or cool, cloudy weather delayed the spring migration and prolonged the calving period. This was especially pronounced in 2000 and 2001, when calving occurred over a much wider area than usual, including parts of northwestern Yukon and northeastern Alaska, and most calves were born south and east of the traditional calving area. However, caribou generally still moved to the traditional calving area for a short period of time even when calves were born prior to arrival.

Summer Distribution. In summer 2005 and 2006, several weeks of cool, cloudy weather during the end of June and beginning of July resulted in the failure of the herd to aggregate. In 2005, much of the herd dispersed southward through the Brooks Range, passing northeast of Arctic Village, before moving eastward into Canada to the northern Richardson Mountains during July. In early July 2006, much of the herd dispersed to the south and southeast into the Brooks Range and then into Canada north of Old Crow Flats. They did not leave the summer range until after the rut in October. During most years since 1999, the PCH spent the summers in the mountains of northern Yukon.

Fall Distribution. In fall 2004, few caribou returned to Alaska and most of the PCH moved south towards the Olgivie and Hart River basins in Yukon Canada. In fall 2005, most of the PCH remained in Canada until later in the winter. In Canada, they migrated south to the Olgivie and Hart River basins, similar to what was observed in 2004, except they moved farther south to just north of Dawson. In fall 2006 the PCH began their fall migration later than usual (the last 2 weeks of October). At this time, some caribou moved westward into Alaska. However, most arrived on the Dempster Highway between Sheep Creek and the Yukon/NWT border in large numbers, and remained north of the Olgivie and Hart River basins.

PCH caribou frequently return to Alaska during their fall migration in late August and September. This occurred most recently in 1999, 2001, and 2003, when a substantial proportion of the PCH returned to Alaska during late August and September. During this period, most PCH in Canada spent the fall in the Olgivie and Hart River basins, except in 1999, when most of the PCH were at the Alaska/Canada border near Eagle, Alaska.

Winter Distribution. During winter 2004–2005, few radiocollared PCH caribou wintered in Alaska, and those that did remained east of the Colleen River, near the Canadian border. The PCH wintered mainly in the Ogilvie and Hart River basins in Yukon, Canada, extending northeastward to the southern Richardson Mountains. During winter 2005–2006, approximately half the herd did return to Alaska and wintered along the East Fork Chandalar River and surrounding hills near Arctic Village, Alaska. Of the PCH caribou that wintered in Canada, the majority wintered mainly in the Ogilvie and Hart River basins of Yukon, but farther south than recorded during the last 20 years. During winter 2005–2006, the western group of the PCH

overlapped with the Central Arctic herd in Alaska, while the eastern segment overlapped with the Hart River herd in Canada.

During winter 2006–2007, a small number of PCH caribou (1 of 15 satellite-collared caribou was in this group) wintered east of Arctic Village in Alaska. Most of the PCH wintered north of Ogilvie and Hart River basins and Peel River and remained farther north than recorded in the past 10 years.

Winter distribution has also varied the past few years. During winter 1999–2000, 2001–2002, and 2003–2004, a substantial proportion of the PCH wintered in the vicinity of Arctic Village. Few caribou wintered in Alaska during 2000–2001 or 2002–2003. Since 1999–2000, the largest proportion of the PCH wintered in Yukon, mostly in the Ogilvie and Hart River basins, and in some years extended northeast into the Richardson Mountains.

Historical information on movements and distribution of the PCH was summarized by Garner and Reynolds (1986), Whitten (1987, 1993*b*, 1995*b*), Whitten and Regelin (1988), Fancy et al. (1989), Golden (1989, 1990), Whitten and Fancy (1991), and Griffith et al. (2002).

MORTALITY

Harvest

Season and Bag Limit. The State of Alaska hunting season for all hunters during RY02–RY06 was 1 July to 30 April; in addition, hunters could take only bull caribou during 23–30 June in Unit 26C. The bag limit for all Alaska residents was 10 caribou. The bag limit for nonresidents was 5 caribou.

Alaska Board of Game Actions and Emergency Orders. The Alaska Board of Game took no regulatory action and there were no emergency orders issued regarding the PCH during RY04–RY06.

Hunter Harvest. We do not have an estimated total harvest for the PCH because harvest data from northern Yukon were not available for RY99–RY05. Harvest by nonlocal and nonresidents in Alaska was 65 in RY04 and 42 in RY05 (Table 4). Few PCH caribou were available in fall 2005, and this was reflected in the smallest reported harvest observed during the past 15 years (Table 3). Most of the reported harvest occurred in Unit 25A (Table 4). The 132 hunters who reported in RY04 and 133 who reported in RY05 were comparable to numbers observed during RY95–RY03 (range: 76–181; Table 4). In addition, in RY04 and RY05, 42% and 19% of the harvest was taken by nonresidents, who represented 36% and 35% of the hunters. Overall, harvest and hunting pressure by nonresidents remained low. During RY00–RY05, nonresident harvest ranged 8–47 caribou and the number of hunters ranged 39–62. The reported harvest by nonlocal Alaska residents and nonresidents combined represents a small proportion of the estimated harvest in Alaska (<20%) and in Alaska and Canada combined (<2%). Thus, because of their wide-ranging movements and the difficulty and expense of traveling to the area, the PCH has not been subject to a substantial harvest by nonlocal and nonresident hunters in Alaska.

We estimated that approximately 150 caribou were harvested by local residents of Units 25 and 26 in RY04 because in summer 2005 some caribou were present briefly during the end of June

near Arctic Village. However, in general, few caribou returned to Alaska in the fall and those that did remained east of the Colleen River, making them inaccessible to most Alaska villages during fall and winter. In RY05, we estimated approximately 500 caribou were harvested based on their proximity to villages (primarily Arctic Village) during winter. During most years, caribou were available to Kaktovik residents primarily in early summer. and were briefly available to most villages south of the Brooks Range during late summer and fall.

Harvest in Canada probably continued to be relatively high because caribou often moved through the Old Crow area several times each year and frequently wintered along the Dempster Highway. Additionally, hunters from Gwich'in communities in Canada took small numbers of caribou along the Porcupine River near the Alaska–Yukon border in fall.

Hunter Success. In RY04 and RY05, reported success rates by nonlocal Alaska residents and nonresident combined were 49% and 32% (Table 4). Few PCH caribou were present in August and September 2005, thus success rates were low for these hunters. However, success rates were generally high (Table 4).

Local hunter success depended on herd distribution. In June 2005 and 2006, PCH caribou were available for Kaktovik residents primarily during late June. In winter 2004–2005, few PCH caribou were available for residents south of the Brooks Range because they did not winter in the vicinity of the villages. In 2005–2006, however, success rates were good, particularly for Arctic Village residents, as several thousand caribou wintered in the vicinity of that village.

Harvest Chronology. Nearly all nonlocal Alaska resident and nonresident harvest of the PCH in Alaska occurs during August and early September. Local harvest near Kaktovik primarily occurs in June if traveling conditions are good. Harvest by local residents south of the Brooks Range primarily occurs during winter. However, harvest chronology depends on availability of caribou near villages, and harvest occurs whenever caribou are present.

Transport Methods. Traditionally, nonlocal Alaska resident and nonresident hunters fly into the PCH range, and a few travel by boat up the Porcupine River. Local residents in Alaska use boats or all-terrain vehicles (ATVs) in summer and snowmachines in winter when the predominant harvest of the PCH in Alaska occurs.

Natural Mortality

Since the late 1980s, a study on the causes of natural mortality on the PCH has not been conducted. However, wolves, grizzly bears, and golden eagles were determined to be the 3 most common predators, with golden eagles being a significant source of mortality on PCH calves on the calving grounds (Whitten et al. 1992).

Although we do not have recent information on the cause of mortalities; staff from ANWR estimated survival/mortality rate on adult radiocollared females in the PCH from 1 June through 31 May during RY03–RY05 (T. Wertz, ANWR, Project Report submitted to the Porcupine Caribou Management Board, 2007). In RY03, RY04, and RY05, 12% (n = 75), 23% (n = 79), and 20% (n = 65) of the radiocollared females died. Staff determined that much of the mortality occurred prior to late winter or spring. Indeed, over the 3-year period of monitoring 116 caribou,

40 caribou died and 30% of the mortalities occurred during summer (1 June–mid July; n = 12), 26% in fall (mid July–early October; n = 10), 36% in winter (early Oct–mid Apr; n = 14), and 8% in spring (mid April–31 May; n = 3). Annual survival rate averaged 0.826. Population models developed by researchers (Griffith et. al. 2002; Arthur et al. 2003) indicated that an annual survival rate of less than 0.84 would cause a population decline such as that observed in the PCH since 1989 (T. Wertz, ANWR, Project Report submitted to the Porcupine Caribou Management Board, 2007).

HABITAT

Studies on the calving grounds indicate calving caribou select areas with rapid plant growth, rather than specific sites or habitats. Areas with the most rapid plant growth vary each year, but rapid growth tends to occur most frequently in the region identified by previous research as the primary calving area of the PCH (Fancy and Whitten 1991). This study indicates that, over time, all of the traditional calving area is important for caribou. Thus, preserving or protecting only portions of the calving area may not adequately protect the herd from declines caused by human disturbance associated with development.

CONCLUSIONS AND RECOMMENDATIONS

The Porcupine caribou herd probably peaked at 178,000 caribou in 1989 and declined to 123,000 by 2001. No census has been completed since 2001 due to weather and lack of aggregation; however it is likely that the herd has continued to decline. Although the PCH experienced moderate parturition rates for the 3 years following 2001, the late June calf:cow ratios were mostly lower than average, indicating low early calf survival (Table 2). In 2005, parturition rates and subsequent late June calf:cow ratios were the lowest observed since 2000 (64% and 49%; Table 2). In 2006, the parturition rate and late June calf:cow ratio were higher compared with 2005, but were still lower than the 1987–2004 average (82% parturition rate and 60 calf:100 cow ratio). Mortality of adult radiocollared caribou cows was moderately high and similar to the rate estimated during the early years of the population decline (Walsh et al. 1995). If the herd has continued to decline at the rate observed from 1998–2001, the PCH may number approximately 110,000–115,000 caribou (S. Arthur, ADF&G, personal communication). Although no habitat studies were conducted during the report period on PCH range in Alaska, long-term data on calving distributions indicate all of the ANWR coastal plain and adjacent areas in Canada may be important to the herd over the long term (Fancy and Whitten 1991; Griffith et al. 2002).

The PCH was lightly hunted in Alaska; thus, harvest in Alaska probably played a relatively small role in recent population changes. There is little information about the harvest in Canada; however, existing harvest levels will have a greater influence on population dynamics if the herd continues to decline. Thus, more information about this harvest is necessary to make management decisions. At the minimum, a continuing decline could make it necessary to reduce harvest of females. Initially, I recommend that for the spring 2008 Alaska Board of Game meeting that ADF&G propose restricting the harvest of female caribou in the Porcupine herd by nonresident hunters.

ADF&G met the goal to conserve the PCH and its habitat through international cooperation and coordination with ANWR/FWS and Canadian government agencies (YDOE, NWT, CWS and

Parks Canada), to assess population parameters (parturition rates, early calf survival, adult survival, overwinter survival, population size, seasonal distribution) of the PCH, and the importance of the ANWR coastal plain to the PCH. We met annually with these agencies as part of the PCTC.

ADF&G met the goal to ensure opportunities for customary and traditional uses of the PCH by providing liberal seasons and bag limits. The goal to enable users of the PCH to participate in international efforts to conserve the PCH was not met because the IPCB, which includes members from local communities, did not meet during the report period.

Based on the most recent census and estimates from population modeling, we probably did not meet our management objective of 135,000 animals. ADF&G should continue to work with other agencies to identify factors affecting population dynamics of the PCH and evaluate potential effects of development on the coastal plain.

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TABLE 1 Porcupine caribou herd population estimates, 1961–2006

Year	Population estimate[a]	Technique[b]
1961	110,000	Calving ground census
1972	99,959	APDCE
1977	105,000	APDCE
1979	105,683	Modified APDCE
1982	125,174	APDCE
1983	135,284	APDCE
1987	165,000	APDCE
1989	178,000	APDCE
1992	160,000	APDCE
1994	152,000	APDCE
1998	129,000	APDCE
2001	123,000	APDCE
2002–2006[c]		

[a] All estimates include calves except for the 1961 estimate.
[b] Calving ground census data presented by R. O. Skoog at the 1962 Alaska Science Conference; APDCE is aerial photo-direct count extrapolation (Davis et al. 1979; Valkenburg et al. 1985).
[c] No estimates because of weather or poor aggregation.

TABLE 2 Porcupine caribou demographic data, 1987–2006

	Radiocollared females[a]		All females >1 year old
Birth year	Parturition rate (*n*)	Late June calves:100 cows (*n*)	March calves:100 cows (*n*)
1987	0.78 (51)	55	
1988	0.84 (91)	55	
1989	0.78 (74)	58	43
1990	0.82 (74)	74	
1991	0.74 (77)	61	22
1992	0.86 (78)	49	33
1993	0.81 (63)	45	32
1994	0.91 (98)	70	40
1995	0.69 (95)	59	41
1996	0.89 (74)	72	46
1997	0.75 (48)	58	38
1998	0.83 (58)	68 (22)	27
1999	0.92 (25)	70 (46)	56
2000	0.79 (43)	44 (45)	28
2001	0.83 (70)	51 (71)	31 (7093)
2002	0.87 (68)	56 (77)	38
2003	0.87 (70)	69 (67)	33 (5189)
2004	0.82 (74)	–[b]	24
2005	0.64 (55)	49 (57)	–[c]
2006	0.79 (66)	58 (65)	39 (9585)

[a] Ages of most cows were unknown; however, most were thought to be ≥4 years old.
[b] No survey conducted because of dense smoke from wildfires.
[c] No survey conducted because the Porcupine caribou herd was mixed with the Hart River and Central Arctic caribou herds in March.

TABLE 3 Porcupine caribou herd harvest, regulatory years 1984–1985 through 2005–2006

Regulatory	Reported				Estimated unreported			
year	M	F	Unk	Total	Alaska	Canada	Total	Total
1984–1985	49	4	0	53	500–700	4000	4500–4700	4553–4753
1985–1986	52	12	1	65	500–700	4000	4500–4700	4565–4765
1986–1987	70	14	0	84	1000–2000	500–1000	1500–3000	1584–3084
1987–1988	106	22	1	129	<500	2000–4000	2500–4500	2629–4629
1988–1989	82	7	0	89	<500	2000–4000	2500–4500	2589–4589
1989–1990	104	8	0	112	500–700	2000	2500–2700	2612–2812
1990–1991	19	1	0	20	100–150	1680	1780–1830	1800–1850
1991–1992	101	3	0	104	100–150	2774	2874–2924	2978–3028
1992–1993	78	1	0	79	658	1657	2315	2394
1993–1994	77	5	0	82	250	2934	3184	3266
1994–1995	72	3	0	75	200	2040	2240	2315
1995–1996	61	7	0	68	200	2069	2269	2337
1996–1997	76	2	0	78	200	2159	2359	2437
1997–1998	58	4	1	63	300	1308	1608	1671
1998–1999	83	11	1	95	300	–[a]		
1999–2000	84	4	0	88	400	–[a]		
2000–2001	62	10	0	72	300	–[a]		
2001–2002	105	9	0	114	400	–[a]		
2002–2003	72	3	1	76	300	–[a]		
2003–2004	120	8	0	128	500	–[a]		
2004–2005	60	7	0	67	150	–[a]		
2005–2006	32	10	0	42	500	–[a]		

[a] Canadian data unavailable.

TABLE 4 Porcupine caribou herd nonlocal[a] and nonresident hunter success, regulatory years 1991–1992 through 2005–2006

Regulatory year/ Hunters	Unit				Total for Units 25 and 26C
	25A	25B	25D	26C	
1995–1996					
Total hunters	57	9	1	21	88
Successful	32	2	0	10	44
% Successful	56	22	0	48	50
1996–1997					
Total hunters	47	20	0	9	76
Successful	29	16	0	2	47
% Successful	62	80	0	22	62
1997–1998					
Total hunters	56	10	3	17	86
Successful	34	5	0	6	45
% Successful	61	50	0	35	52
1998–1999					
Total hunters	85	12	3	17	117
Successful	63	3	2	9	77
% Successful	74	25	67	53	66
1999–2000					
Total hunters	80	23	16	6	125
Successful	55	14	5	3	74
% Successful	69	61	31	50	59
2000–2001					
Total hunters	91	13	12	6	122
Successful	56	0	2	2	60
% Successful	61	0	17	33	49
2001–2002					
Total hunters	121	27	14	14	176
Successful	85	5	2	9	101
% Successful	70	18	14	64	57
2002–2003					
Total hunters	98	21	23	12	154
Successful	65	5	2	4	76
% Successful	66	24	9	33	49
2003–2004					
Total hunters	127	29	12	13	181
Successful	95	19	0	9	123
% Successful	75	66	0	69	68

Regulatory year/ Hunters	Unit				Total for Units 25 and 26C
	25A	25B	25D	26C	
2004–2005					
Total hunters	85	11	16	20	132
Successful	54	0	3	8	65
% Successful	64	0	19	40	49
2005–2006					
Total hunters	80	11	12	30	133
Successful	24	0	0	18	42
% Successful	30	0	0	60	32

[a] Nonlocal includes Alaskans residing outside Units 25, 26B, and 26C.

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. Box 115526
Juneau, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

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 animals from the 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, these caribou 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 (P. Valkenburg, ADF&G, personal communication). The federal Bureau of Land Management (BLM) estimated the herd's size at around 1000 caribou in the mid 1980s (Valkenburg 1988), although 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 radiocollared animals 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 (Table 1). Since 1992 the herd appears to have been in a slow decline to 600–800 by 2000 and 500–700 by 2005.

The White Mountains National Recreation Area is managed by BLM and encompasses most of the White Mountains caribou herd's range. 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 herd movements and

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

distribution. The White Mountains caribou 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. BLM continues to improve access and increase recreational opportunities through development of roads, 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 provide opportunity to hunt caribou in 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 and 1994 (RY = 1 July through 30 June; e.g., RY93 = 1 July 1993 through 30 June 1994). 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 from 1 bull to 1 caribou, and RC877 and RC878 were combined to create RC879, with season dates of 1 November through 31 March and no motorized restrictions. However, the area open to hunting the White Mountains caribou herd was reduced because the FCH hunt boundary was moved northwest from the Steese Highway to Preacher and American Creeks, removing a portion of the eastern area for hunting White Mountains caribou.

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 stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows.

METHODS

POPULATION STATUS AND TREND

Population Size

ADF&G estimated population size using the radio-search technique (Valkenburg et al. 1985). We photographed groups of caribou from an aircraft with a handheld Olympus Stylus 400 digital camera (4.0 megapixel, 3× lens). The herd was surveyed on 22 June 2005 using a radiotelemetry-equipped Bellanca Scout fixed-wing aircraft. The minimum count was 514

caribou, and the population size was estimated to be 600. All 8 radio collars were accounted for during the survey.

In our attempt to maintain at least 20 radiocollared caribou in the White Moutains herd to aid in estimation of herd dynamics, we deployed radio collars on 1 female calf on 5 October 2004 and 6 female calves on 3 May 2006, bringing the total number of active radio collars to approximately 10 by June 2006. The calf radiocollared in 2004 weighed 153 lb, but the 2006 calves were not weighed.

Population Composition

We conducted composition surveys on 5 October 2004 and 6 October 2005 using an R-44 helicopter and a Bellanca Scout aircraft. The biologist in the fixed-wing aircraft located the radiocollared caribou. Observers in the R-44 helicopter classified caribou that were in groups with radiocollared animals 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 321 and 391 caribou in 2004 and 2005 respectively (Table 1).

MORTALITY

Harvest

We estimated harvest by using data from returned harvest tickets and registration permit report cards. For RY04 and RY05, caribou harvested west of Preacher and American Creeks and north of the Steese Highway were considered White Mountains herd animals; caribou harvested east of these drainages and/or south of the Steese Highway were considered FCH animals. To separate the White Mountains herd from the Ray Mountains herd harvest in Unit 20F, caribou killed south of the Yukon River were considered White Mountains herd animals. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The June 2005 population estimate of 514–600 caribou was similar to the 2004 estimate of 642 to 733, but the 2005 minimum count was down 128 or 20% from 2004. Only 8 radio collars were present in the herd in 2005 and one of the large groups had only one collar. Thus the apparent decrease could be attributed to groups not discovered during the survey flight and not an actual decrease in the herd. However, over the winter of 2004–2005, 5 of 12 collared caribou died. These were cow caribou of ages 1–4 years, not calves or old animals that are most susceptible to mortality. With this evidence, the decrease could also be attributed to a high rate of caribou mortality over winter 2004–2005. Cool, wet weather conditions in June 2006 in the White

Mountains apparently reduced harassment from biting insects and precluded grouping of the White Mountains caribou, and no survey was completed in RY05. With the reduced quality of the 2005 survey, the White Mountains herd population level could be considered stable during RY04 and RY05, but considerable effort should be applied to accomplish a survey in 2007.

Population Composition

Fall calf:cow and bull:cow ratios in the White Mountains herd have been variable (Table 1). However, productivity and early calf survival appeared insufficient (<25 calves:100 cows) to suggest herd growth during RY04 and RY05. Bull:cow ratios remained relatively high and met objectives. Variation in bull:cow ratios (23–62:100) for the White Mountains herd over the years probably reflects biased sampling because bulls are often segregated after the rut (e.g., surveys conducted in 1991 and 1995). Surveys conducted early in the fall (i.e., 29 September–6 October) yielded higher bull:cow ratios than surveys conducted later. Differences in composition among years may also be attributed to the behavior of the White Mountains caribou herd. Because these caribou are usually in small scattered groups, and in timbered areas, it is easy to miss groups that could affect the overall composition estimates.

Distribution and Movements

Radiocollared White Mountains herd caribou were located infrequently; therefore, data concerning their movements were minimal. Limited data suggest the herd calves primarily in the higher elevations 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 east of Beaver Creek to Mount Prindle. In August or September, White Mountains caribou often move north of Beaver Creek and winter in upper Hess and Victoria Creeks and the upper Tolovana River drainages, although some winter in the Preacher Creek drainage west of Circle. Most of the herd wintered in the Preacher Creek drainage in RY04 and RY05. The western wintering area burned in 1988 and was followed by a perceived shift of caribou away from the western wintering area. Twenty to 50 caribou can still be found in the western wintering area during most months of the fall and winter.

MORTALITY

Harvest

Season and Bag Limit.

Season/Hunt conditions	RY90–RY97	RY98–RY99	RY00–RY01	RY02–RY05
Fall general season[a]	10 Aug–20 Sep			
Hunt area	Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.		Units 20B and 20F north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway, and Unit 25C west of Preacher and American Creeks.	
Bag limit	1 bull		1 caribou	1 bull

Season/Hunt conditions	RY90–RY97	RY98–RY99	RY00–RY01	RY02–RY05
Motor vehicle restrictions	None			
Winter season[a]	Drawing; 1 Feb–31 Mar	Registration; 1 Nov–31 Mar		Registration; 1 Dec–31 Mar
Hunt area	Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.		Units 20B and 20F north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway, and Unit 25C west of Preacher and American Creeks.	
Bag limit	1 caribou			
Motor vehicle restrictions	Yes		No	

[a] Residents and nonresidents.

Alaska Board of Game Actions and Emergency Orders. No emergency orders were issued by the department during RY04–RY05.

There were no board actions for the White Mountains caribou herd during RY04 and RY05. Previous board actions are addressed in the Background section of this report.

Hunter Harvest. Harvest during fall hunts was low from RY87 to RY99 (range 6–26). Fall harvest peaked in RY00 at 51 (Table 2) when Fortymile caribou herd animals came north of the Steese Highway and may have been the source of many of the caribou taken. Additionally, RY00 was the first year that cow caribou were legal in the fall hunt, and harvest of cows contributed 20 of the 51 caribou in the reported harvest. The bag limit was changed back to bull only in RY02, and the FCH has not returned to the area in large numbers during the general seasons since RY00. Due to these factors, the fall harvest declined to normal levels and remained there in RY04 and RY05.

Permit Hunts. Participation was high and harvests were low for registration hunt RC879 (Table 3) in RY04; 137 permits were issued and 2 caribou were reported harvested. In RY05, 186 permits were issued, with a reported harvest of 1 caribou.

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 caribou herd could sustain a maximum total fall and winter harvest of 40 bulls and 25 cows. The higher-than-average harvest in RY00 approached sustainable limits with 34 bulls and 26 cows taken, but harvest has remained well below sustainable limits during RY04–RY05.

Tracking the ratio of large bulls:100 cows can provide an indication of bull harvest with respect to sustainable limits. The proportion of large bulls per hundred cows averaged 12 during RY92–RY03 (Table 1), as well as during RY04–RY05. Based on reported harvest and population

modeling, the lower large bull:100 cow ratio seen in RY02 and RY04 is likely a result of caribou distribution during composition surveys rather than overharvest. With the increase to 18 large bulls per 100 cows in RY05, it appears that the large bull segment of the White Mountains caribou herd is not in danger of overharvest.

Hunter Residency and Success. The majority of White Mountains caribou were harvested by local resident hunters (Table 4). Success rates were usually quite low in both fall and winter hunts. The low success rates were probably due to the inaccessibility of caribou during both seasons, but may have been further reduced in recent years due to the popularity of the FCH hunts nearby. Many FCH hunters who traveled the Steese Highway also obtained a general season harvest ticket, or a RC879 permit, for the chance to take a caribou as they passed through the range of the White Mountains caribou herd. This tended to artificially reduce success rates for the White Mountains caribou herd hunts.

Harvest Chronology. From RY90 (when the winter seasons were opened) to RY03, 58–100% of the harvest occurred during the fall season (10 August–20 September). In RY04 and RY05, 86% of the harvest occurred during the fall season.

Transport Methods. The most common method of transportation used by successful hunters during the fall seasons in RY04 and RY05 was 3- or 4-wheelers, which accounted for 44% of transportation use in both years (Table 5). Because of limited participation and low harvests, transportation methods for the winter hunts have little meaning, but in hunts where motorized access was allowed, the vast majority of the harvest was 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 caribou frequent dense spruce forest in winter, making hunting difficult.

CONCLUSIONS AND RECOMMENDATIONS

We met the objective for this reporting period, which was to maintain a stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows. The photocensus suggests that the population is stable, and the latest fall composition count indicated a bull:cow ratio of 44:100.

When the FCH harvest was liberalized, hunting pressure on the White Mountains caribou herd seemed to decrease. However, with BLM's improved access in this area, increased hunter effort and harvest during fall may occur in the future if opportunities to hunt other Interior caribou herds decline.

Population data for the White Mountains caribou herd are generally limited to annual composition counts with an occasional census. To obtain a better understanding of population dynamics of the White Mountains caribou herd we need to allocate more funds to more intensive census efforts. Relatively low herd size and hunter success have made funding allocations for this herd a low priority compared to other Interior caribou herds.

By working closely with BLM, we monitored increases in recreational uses and development. We should continue to participate in agency and public meetings about development of BLM lands in the range of the White Mountains caribou herd. This cooperation will help effect better management strategies for White Mountains caribou.

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.

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TABLE 1 White Mountains caribou herd fall composition counts and estimated population size, 1983–2005

Date	Bulls:100 Cows	Large 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	19	31	18	57	26	29	44	25	135	
10/85	36		31	18	60				22	65	
9/29/88	43	14	33	19	57	51	16	33	24	211	
10/06/89	50	11	36	19	54	46	33	22	27	744	750–1000
10/11/91	23	5	24	16	68	44	35	21	15	312	
10/29/91[a]				15						324	761[b]–1000
10/13/92	39	12	23	14	62	52	18	30	24	247	832[b]–1200
9/27/93	48	21	22	13	59	34	23	43	28	497	
10/04/94	39	16	25	15	61	34	24	42	24	418	
10/16–17/95	36	10	31	19	60	44	27	29	22	418	
10/2/96	44	9	54	27	50	60	20	20	22	513	
10/2/97	34	11	38	22	58	50	19	31	20	341	
10/2/98	50	11	18	11	60	42	37	21	30	759	
9/30/99	62	16	39	20	47	33	40	26	31	644	
9/29/00	54	11	13	8	60	40	40	20	32	399	687[b]–800
9/25/01	57	11	26	14	55	46	36	19	31	441	700–800
9/24/02	34	7	29	18	61	44	35	21	21	405	
10/5/03	30	11	17	11	68	40	22	38	20	308	
10/5/04	35	6	23	15	63	32	49	18	22	321	642[b]–733
10/6/05	44	18	21	13	61	33	27	40	27	391	514[b]–600

[a] Conducted with fixed-wing aircraft instead of helicopter.

[b] Minimum count from summer census.

TABLE 2 White Mountains caribou harvest during fall general season[a], regulatory years 1987–1988 through 2005–2006

Regulatory year	General season harvest			
	Bull	Cow	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	30	20	1	51
2001–2002	15	8	0	23
2002–2003	11	0	1	12
2003–2004	6	0	0	6
2004–2005	12	0	0	12
2005–2006	6	0	0	6

[a] Excludes winter permit hunt harvest.

TABLE 3 White Mountains caribou herd harvest by permit hunt, regulatory years 1990–1991 through 2005–2006

Hunt	Regulatory year	Permits issued	Did not hunt (%)[a]	Unsuccessful hunters (%)	Successful hunters (%)	Bulls	Cows	Unk	Harvest
DC877 & DC878	1990–1991	89	66 (74)	18 (86)	3 (14)	2	1	0	3
	1991–1992	100	88 (88)	12 (100)	0 (0)	0	0	0	0
	1992–1993	100	76 (76)	19 (86)	3 (14)	1	2	0	3
	1993–1994	150	120 (80)	26 (100)	0 (0)	0	0	0	0
	1994–1995	149	116 (78)	26 (90)	3 (10)	1	2	0	3
	1995–1996	137	98 (72)	37 (100)	0 (0)	0	0	0	0
	1996–1997	106	86 (81)	17 (100)	0 (0)	0	0	0	0
	1997–1998	67	46 (69)	20 (95)	1 (5)	1	0	0	1
RC877 & RC878	1998–1999[b]	74	25 (34)	49 (98)	1 (2)	0	1	0	1
	1999–2000	119	28 (24)	91 (88)	13 (13)	3	10	0	13
RC879	2000–2001	333	137 (41)	178 (95)	10 (5)	4	6	0	10
	2001–2002	405	252 (62)	128 (88)	17 (12)	15	1	1	17
	2002–2003	313	200 (64)	111 (98)	2 (2)	2	0	0	2
	2003–2004	259	198 (76)	60 (98)	1 (2)	1	0	0	1
	2004–2005	137	94 (69)	26 (93)	2 (7)	1	1	0	2
	2005–2006	186	142 (76)	37 (97)	1 (3)	1	0	0	1

[a] Includes those that did not report.

[b] First year of registration hunts with an unlimited number of permits available.

TABLE 4 White Mountains caribou herd hunter residency and success during fall general seasons, regulatory years 2000–2001 through 2005–2006

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
2000–2001	45	38	6	89 (38)	106	29	9	144 (62)	233
2001–2002	22	13	1	36 (18)	127	31	6	164 (82)	200
2002–2003	9	2	1	12 (7)	107	41	11	159 (93)	171
2003–2004	4	1	1	6 (4)	98	39	3	140 (96)	146
2004–2005	12	0	0	12 (8)	83	51	1	135 (92)	147
2005–2006	5	1	0	6 (4)	73	61	4	138 (6)	144

[a] Residents of Units 20 and 25C.

TABLE 5 White Mountains caribou herd harvest[a] by transport method during fall general seasons, regulatory years 1990–1991 through 2005–2006

Regulatory year	Harvest by transport method								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Other/Unk	*n*
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
2000–2001	1	1	2	37	2	6	2	0	51
2001–2002	0	0	0	17	0	1	5	0	23
2002–2003	0	1	0	10	0	1	0	0	12
2003–2004	0	0	1	5	0	0	0	0	6
2004–2005	0	1	0	5	0	2	4	0	12
2005–2006	1	0	0	3	0	0	1	1	6

[a] Excludes winter permit hunts.

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. BOX 115526
JUNEAU, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006

LOCATION

GAME MANAGEMENT UNIT: 26A (56,000 mi^2)

HERD: Teshekpuk

GEOGRAPHIC DESCRIPTION: Western North Slope

BACKGROUND

The presence of old drive sites near Teshekpuk Lake indicates that caribou have been hunted in the area since at least late prehistoric times (Silva et al. 1985). The area was used extensively for reindeer herding in the 1930s and 1940s, and local residents report observing caribou in the area since the 1930s. Davis and Valkenburg (1978) documented the Teshekpuk caribou herd (TCH) in the mid 1970s as a separate herd from the Central Arctic (CAH) and the Western Arctic (WAH) caribou herds.

Alaska Department of Fish and Game (ADF&G) and U.S. Bureau of Land Management (BLM) staff completed visual counts during 1978–1982 and estimated that 3000–4000 caribou inhabited the Teshekpuk Lake area (Davis and Valkenburg 1979; Reynolds 1981; Silva et al. 1985). In an effort to assess the size and distribution of the TCH, 12 cows and 8 bulls were instrumented with radio collars in 1980 and monitored jointly by ADF&G and BLM. During July 1984, the first photocensus of the herd was completed using a modified aerial photo-direct count extrapolation (APDCE) technique; ADF&G and BLM staff counted 11,822 animals from photographs. Trent and Toovak made a visual count in 1985 and counted 13,406 caribou (ADF&G files). We completed photocensuses and counted 16,649 caribou in 1989 (Carroll 1992), 27,686 in 1993 (Carroll 1995), 25,076 caribou in 1995 (Carroll 1997), 28,627 in 1999 (Carroll 2001), and 45,166 in 2002 (Carroll 2003).

The TCH is an important subsistence resource to hunters from several North Slope villages. Approximately 2766 caribou were estimated as harvested from the TCH during 2000–2001 (Carroll 2003) and 4463 during 2002-2003 (Carroll 2005).

MANAGEMENT DIRECTION

MANAGEMENT GOALS

- Maintain stable or increasing numbers of caribou in the TCH.

- Provide continued hunting opportunity on a sustained yield basis.

MANAGEMENT OBJECTIVES

- Determine the population size of the herd every 2–3 years.
- Monitor recruitment and calf production through late winter recruitment and summer calving ground surveys each year.
- Define critical habitat areas, such as calving, insect relief, and wintering areas.
- Identify and map the movements and distribution of the herd throughout the year using aerial survey, radiotelemetry, and satellite telemetry data.
- Encourage local participation in research and management decisions.
- Work with the North Slope Borough and the ADF&G Subsistence Division to collect harvest information.
- Determine the hunter-induced mortality rate and significant sources of nonhunter mortality.
- Monitor mortality events through radiotelemetry, field observations, and sample collection.
- Work with management agencies, oil companies, and caribou users to minimize conflicts between the herd and major exploration and development projects.
- Collar caribou every 1–2 years to maintain a sample size of around 40 operational collars. Capture caribou without the use of drugs.
- Weigh measure and collect blood, fecal, and hair samples from all captured caribou to gain information about disease, parasites, contaminants, and condition.
- Conduct composition surveys during midsummer and fall to determine relative numbers of bulls, cows, and calves.
- Involve students in caribou research operations, work with students to track satellite-collared caribou movements, and lecture to school classes about caribou biology.

METHODS

A modified APDCE photocensus (Davis et al. 1979) of the TCH was successfully completed in 2002. Photographs were taken from a DeHavilland Beaver (DHC-3) aircraft with a floor-mounted camera on 16 July while TCH caribou were in insect relief aggregations. Cessna 185 and Piper PA 18 aircraft with telemetry equipment were used to detect how many radiocollared TCH animals were in the photographed groups and if there were any instrumented WAH or CAH caribou in the area. Images of caribou on the photographs were counted during the

following winter. A census was attempted in 2004, 2005, and 2006, but was unsuccessful due to weather conditions and logistics.

Spring short yearling surveys were flown using a Bellanca Scout on 12 and 13 April 2005 and on 6 and 7 April 2006. Fall composition surveys were flown using a Piper PA 18 on 28 October 2004 and on 2 and 4 November 2005. We used telemetry equipment to locate radiocollared cows and counted approximately 100 adults and calves in the area surrounding the collared animals. Locating the radiocollared animals helped us distribute our sampling effort throughout the range of the TCH.

Calving surveys were flown using a Piper PA 18 on 4–13 June 2005 and 6–13 June 2006. Weather permitting, we flew surveys every 1 to 3 days over most of the TCH range and used telemetry equipment to locate as many collared cows as possible. The cows were observed at close range to determine the success, timing, and location of calving. For each observation we recorded the location using a Garmin Global Positioning System (GPS) receiver; recorded presence or absence of a calf; and recorded antler condition (hard, soft, or none) and presence or absence of a visible udder. Cows with soft antlers (covered with velvet) were listed as nonparturient. We continued to observe other collared cows until they were seen with a calf, and that was recorded as the approximate calving location. During analysis of the data we estimated parturition rate by summing all the collared cows seen with live or dead calves plus cows that were not seen with a calf but had hard antlers and/or an extended udder and dividing the sum by the number of collared cows observed during the calving survey. We also calculated the number of cows that calved successfully, which were defined as those that were seen with a live calf by the end of the calving survey divided by number of collared cows observed during the calving survey. ArcView GIS was used to map locations of cows that calved successfully and those that did not. For cows that were not seen with a calf, we recorded their location midway through the observation period as their location during calving.

Through a cooperative effort with the North Slope Borough and BLM, we captured 13 female caribou in the vicinity of Teshekpuk Lake on 4 and 5 July 2004. We removed expired radio collars from 3 caribou and attached radiocollars with VHF transmitters and Global Positioning System (GPS) satellite-linked receivers to 10 caribou. The GPS satellite-linked receivers were programmed to collect location data every 3 hours and store it onboard. The location data was relayed by satellite uplink weekly using the ARGOS system. When the GPS collars were retrieved in July 2005 we were able to download more detailed location data.

During 3–4 July 2005 we captured 36 caribou (6 males and 30 females) around Teshekpuk Lake and attached 26 radiocollars with VHF transmitters and Platform Transmitter Terminals (PTT = satellite radiocollar transmitters) and 10 standard VHF radio collars. We removed collars from 17 caribou including the 10 GPS collars that had been attached in 2004. The PTTs were designed to transmit on a 6-hour per 48-hour duty cycle. We received satellite location data from the Service Argos Data Collection and Location System (ARGOS) in Landover, Maryland using 2 methods. We retrieved current location information from ARGOS, using a computer and modem as needed. Otherwise, we used monthly summaries of all locations distributed on microcomputer files by ARGOS.

We captured caribou using a hand-held net gun fired from a Robinson R44 helicopter and restrained them using hobbles, ropes, and blindfolds. We collected blood, fecal, and hair samples and measured, weighed, and assessed the body condition of the captured caribou. The radio collars were used to aid in population, productivity, and movement studies. In addition to receiving caribou locations from PTT and GPS collars, we completed periodic VHF radiotracking flights to collect information on caribou mortality, movements, and distribution.

In order to determine hunter harvest of TCH caribou, we examined data from harvest surveys that have been done in villages within the range of the TCH. Harvest surveys have been done in Atqasuk, Barrow, and Nuiqsut by the ADF&G Subsistence Division during the last 2 years, so we were able to use their estimates for the total number of caribou harvested. For the other villages we used the estimated harvest from past survey reports and the human population for the year of the survey to calculate the number of caribou harvested per person per year. We obtained current human population estimates from the Department of Commerce, Community and Economic Development and multiplied this by the per capita harvest for each village to estimate the total caribou harvest for 2002–2003. Because villages harvest caribou from more than one herd, we had to use telemetry information to estimate the percentage of caribou from each herd that were in the village hunting areas when hunting was taking place, and therefore, the percentage of Teshekpuk caribou harvested in each village We multiplied the total number of caribou harvested times the percentage of caribou that were estimated to be from the TCH to determine the total number of TCH caribou harvested by each village, and then totaled these to calculate the total TCH harvest. We recognize that the harvest estimates (calculated above) are based on approximate proportions of caribou from respective herds in the local hunting areas. Increased confidence in the estimation procedure is possible in the future with more VHF radiotracking flights and more analysis of satellite collar information to determine when caribou from the various herds are present in village hunting areas.

We determined mortality rates of radiocollared caribou by examining radiotracking survey data. The VHF transmitters attached to all the collars were configured with MS6 mortality sensors that doubled their rate of transmission when the caribou stopped moving for over 5.5 hours (mortality mode). We totaled the number of caribou found on mortality mode for each collaring year, which ran from when collars were attached one year to when they were attached the next year, approximately 1 July–30 June. We then divided this by the number of active radio collars that were on the air at the beginning of the collar year to calculate the mortality rate for each year. From 1990 to 1998 we did not include data collected from caribou instrumented with PTTs because they had a higher mortality rate than those collared with VHF collars. Beginning in 2000, improvements in the design of the PTTs eliminated the difference in mortality rates; since then, we used data from both types of collars. We began collaring males as well as females in 2001, so mortality information for both males and females is included beginning in 2001–2002.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

From census photographs taken on 16 July 2002, we counted 45,166 caribou. Previous censuses in 1989 (16,649 caribou), 1993 (27,686 caribou), 1995 (25,076 caribou), and 1999 (28,627)

indicated that the TCH increased at a rate of 14% per year during the period 1989–1993, and then the counts appeared to stabilize from 1993 until 1999 (Table 1).

It seems unlikely that the herd could have achieved the growth rate of 16% per year that would have been required to increase from 29,000 in 1999 to 45,000 caribou in 2002, particularly when there was poor recruitment (9%) in 2001–2002 and mediocre recruitment (15%) in 2000–2001 (Table 3). It is more probable that the census in 1999, and possibly the census in 1995, undercounted the population and that the herd has been steadily increasing through the 1990s. There were several years of good calf survival between 1995 and 1999. We recorded 24% and 21% short yearlings during the springs of 1996 and 1999; and 20% calves during the fall count in 1998, and it seems quite possible for the herd to have achieved the growth rate that would have been required. We attempted a census in 2004, 2005, and 2006 but were unsuccessful due to unfavorable weather conditions and logistics.

Population Composition

Calving. In 2005 calving surveys were flown on 4, 5, 6, 7, 9, 10, 11, 12, and 13 June. We located 30 mature collared cows and 17 of these had live calves, for a calving success rate (cows with live calves during the calving period / mature collared cows observed) of 56%. Two cows had calves that died at or shortly after birth and 3 others had at least one hard antler and/or a distended udder for a parturition rate (number of births / mature collared cows observed) of 73% (Table 3).

In 2006 surveys were flown on 6, 7, 8, 9, 10, 11, and 13 June. We located 40 collared cows, of which 34 were mature animals (3 years or older) and 28 had live calves by the end of the calving period for a calving success rate of 82%. Two other cows had calves that died at or shortly after birth, so the parturition rate was 88%. Of the other 4 cows, 3 had no antlers or distended udder and one had soft antlers. This was the highest calving success rate we have had since 2000. (Table 3, Figure 1)

Fall composition counts. Fall composition surveys were flown on 28 October 2004. We located 9 collared caribou, including 1 bull, 5 cows without calves, and 3 cows with calves (38 calves:100 collared cows). We classified 658 caribou in the vicinity of the collared animals and counted 37 calves, which computed to 6% calves and 6 calves:100 adults (Table 2). This was the lowest percentage of calves we have ever recorded during a fall survey and followed a season of very poor calving success.

In 2005 fall composition surveys were flown on 2 and 4 November. We located 15 collared caribou, including 1 bull, 10 cows without calves, and 4 cows with calves (29 calves:100 collared cows). We classified 1700 caribou in the vicinity of the collared animals and counted 309 calves, which computed to 18% calves, or 22 calves:100 adults (Table 2).

Short yearling counts. Short yearling counts were flown 12 and 13 April 2005. We located 13 collared cows, none of which had short yearlings at heel. We also classified 1564 caribou in the areas surrounding the collared animals and counted 1436 adults and 128 short yearlings. This computes to 9% short yearlings and 9 short yearlings:100 adults (Table 3). This is the lowest short yearling count we have recorded and follows the poor calving success in 2004.

In 2006 we flew short yearling counts 6 and 7 April and located 18 collared caribou. Of the 14 mature females 4 were cows with calves, and 10 were cows without calves (29 short yearlings:100 collared cows). We also classified 2177 caribou in the areas surrounding the collared animals and counted 1822 adults and 355 short yearlings. This computes to 16% short yearlings or 19 short yearlings:100 adults. (Table 3)

Distribution and Movements

Most TCH caribou move toward Teshekpuk Lake during May, and most of the pregnant females move into the area surrounding Teshekpuk Lake, particularly the area northeast, east, and southeast of the lake to calve in early June (Figure 2). During late June through July, caribou of both sexes seek relief from insect harassment along the Beaufort Sea coast from Dease Inlet to the mouth of the Kogru River, around the edges and on islands of Teshekpuk Lake, and on sand dunes along the Ikpikpuk River and south of Teshekpuk Lake. Fall and winter movements are highly variable. Most TCH caribou winter on the coastal plain in most years, particularly in the areas around Atqasuk and south of Teshekpuk Lake. However, they may also winter in the foothills and mountains of the Brooks Range, as far south as the Seward Peninsula, and as far east as ANWR.

Satellite collar information indicates that TCH caribou winter in varied locations (Philo et al. 1993; Prichard 2001). In 1990–1991 about half of the herd wintered south of the Brooks Range and half were on the Chukchi coast. In 1991–1992 most of the herd wintered within 30 miles of Teshekpuk Lake. In 1992–1993 the herd was split between the northern foothills of the Brooks Range and the coastal plain. During 1993–1994, icing on the coastal plain caused most of the TCH to move into the area between Umiat and Anaktuvuk Pass, with a portion of the herd moving to the south side of the Brooks Range. During 1994–1995, most of the herd was along the Chukchi Sea coast from Wainwright to Cape Lisburne. In 1995–1996 the TCH wintered on the coastal plain, mostly between Dease Inlet and Wainwright. During 1996–1997 most of the herd traveled south of the Brooks Range and were distributed between Cape Lisburne and the Seward Peninsula.

During 1997–1998 most of the herd wintered in the Atqasuk and Wainwright area, with some scattered as far east as the Teshekpuk Lake area. In 1998–1999 most of the herd wintered on the coastal plain between Atqasuk and Teshekpuk Lake. During 1999–2000, most of the herd wintered between Wainwright and Atqasuk, with another segment wintering south of Umiat. During 2000–2001 most of the herd wintered in the Atqasuk/Wainwright/Barrow area, with others spread across the coastal plain and south of Anaktuvuk Pass. Snow melt-off was very late, and the spring migration was delayed by 2 to 3 weeks. During 2001–2002 most of the cows wintered in the Atqasuk/Wainwright area, with some wintering near Teshekpuk Lake. Four of 7 collared bulls moved away from the TCH cows in early October and wintered in the CAH wintering area southeast of Anaktuvuk Pass. In 2002–2003 most of the cows wintered on the coastal plain between Teshekpuk Lake and Umiat. During November and December, 4 of the 6 radiocollared bulls moved into the mountains, but stayed west of the CAH wintering area. The other 2 collared bulls remained with the cows. In 2003–2004 the herd split in October, with some moving west, some south, and about 1/3 of the herd traveling east about 250 miles to ANWR. The herd was extremely scattered during the winter; some were south of the Brooks Range, some were near the Atqasuk area, and some wintered in ANWR.

In 2004–2005 several thousand TCH caribou that had spent the previous winter in ANWR remained in Unit 26B with CAH caribou. Even the ones that had been in western Unit 26B traveled east with the CAH in July and many traveled as far east as the ANWR area. The segment of the herd that was in Unit 26A moved back and forth between coastal areas and areas farther inland during July. During August some TCH animals, including 2 satellite-collared caribou, remained in ANWR, while 3 other satellite-collared caribou were in Unit 26B. The TCH caribou in Unit 26A were primarily scattered south of Teshekpuk Lake in August and September. During September, 2 of the satellite-collared TCH caribou that spent the winter in ANWR moved south of the Brooks Range into Unit 24 and 3 remained in Unit 26B. During October, most of the TCH caribou that had been in Unit 26A moved east, with some of them traveling into Unit 26B. Another segment of the population, including 2 satellite-collared caribou traveled down the Chukchi Sea coast. Most of the herd spent the winter on the eastern side of the TCH range southeast of Teshekpuk Lake and in Unit 26B. In May and June most of the TCH caribou returned to Unit 26A with the females moving to the calving area and the males staying farther south. At least one former TCH caribou remained in the CAH calving area during calving time. The movement of TCH caribou to the east, with many of them remaining with the CAH represented by far the largest emigration of caribou from this herd that we have witnessed. Person et al. (2007) calculated that 6.9% of satellite-collared Teshekpuk caribou emigrated from the herd from 1990–2005, with most of the emigration taking place during 2003–2004.

In 2005–2006 most of the TCH moved back and forth between coastal areas and areas farther inland during July. During August and September they were scattered across the coastal plain. In October many TCH animals moved a short distance south and east. Most of the herd wintered between Umiat and Teshekpuk Lake with others wintering in the hills and mountains north and south of the crest of the Brooks Range in Units 26B and 25. During May and early June all the collared caribou moved toward the calving area, but some of the caribou that wintered in Unit 26B and 25 had trouble crossing the Colville River. Most of the collared cows calved in the TCH calving area, but one satellite collared cow calved east of the Colville River. At the end of June all of the satellite-collared caribou were along the coast north and west of Teshekpuk Lake.

MORTALITY

Harvest

Season and Bag Limit. The hunting seasons and bag limits were the same for both regulatory years of the reporting period.

2004–2005 and 2005–2006 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 26A Resident Hunters: 5 caribou per day; cow caribou may not be taken 16 May–30 Jun	1 Jul–30 Jun	

2004–2005 and 2005–2006 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Nonresident Hunters: 5 caribou total; cow caribou may not be taken 16 May–30 Jun.		1 Jul–30 Jun

Board of Game Actions and Emergency Orders. There were no Board of Game actions or emergency orders for the TCH during the reporting period.

Human-Induced Harvest. It has been difficult to determine TCH harvest because not all hunters report their harvest and because each North Slope village harvests caribou from more than one herd. However, using the information provided by several harvest monitoring projects, as described in Methods we have been able to make a reasonable estimate of harvest from the TCH. Based on these harvest-monitoring studies, we estimate that 3996 TCH caribou were harvested in 2004–2005 and 4129 were harvested in 2005–2006 (Tables 4 and 5). This represents a harvest rate of between 8.8% and 9.1% of the herd. This is a considerable increase over the estimate of 2766 caribou harvested in 2000–2001, but is not as high as the 2002–2003 estimate of 4463 caribou. We will gain more confidence in this estimate as more harvest monitoring projects are completed, and as we increase analysis of telemetry information.

Permit Hunts. There were no permit hunts for caribou in Unit 26A during the reporting period.

Hunter Residency and Success. Most TCH harvest is from local subsistence hunters because the area is remote and largely inaccessible to nonlocal hunters. Nonlocal resident and nonresident hunters took a small proportion of TCH caribou, primarily from the Colville River drainage. No quantitative data are available on hunter success, but we believe success rates were high.

Harvest Chronology. Caribou are harvested throughout the year, but most harvest is during July through October (Table 6 and Table 7).

Transport Methods. Caribou hunters in Unit 26A used a wide variety of transport methods. Most residents of the unit used boats and all-terrain vehicles (ATVs) during July, August, and September; and they used snowmobiles during the remainder of the year. Some use of aircraft occurs throughout the year, primarily by nonlocal residents and nonresidents. Hunters occasionally used highway vehicles when caribou moved near the limited road systems, particularly the gas well road near Barrow.

Other Mortality

We reviewed radiotracking data beginning in 1990 to determine how many collared caribou died each year and used these figures to estimate the annual TCH mortality rate. Until 2000 we had only information for collared cows, but we began collaring bulls in 2001 and have had mortality

information for both sexes since then. During most years the mortality rate ranged from 11% to 17% with the average rate for all years being 16% (Table 8).

The mortality rate in 2004–2005 was 20%. Two out of 5 collared bulls died, giving them a mortality rate of 40%. Mortality rate among cows was 17%, which was midrange for most years.

The overall mortality rate for 2005–2006 was 16%. Four out of 6 collared bulls died (67%), which is the highest bull mortality we have seen. There is no obvious explanation for high bull mortality. It may just be a matter of a small sample size of collared bulls. The mortality rate for cows was quite low at 9%.

We have recorded sizable caribou die-offs in past years within the range of the TCH. During the winter of 1989–1990, many dead and lethargic caribou were found in an area between Teshekpuk Lake, the Ikpikpuk River, and the Colville River. We estimate approximately 2000–3000 caribou died in this area, but it is impossible to determine how many were from the TCH since caribou from the WAH and the CAH were also present in the area (Carroll 1992). During the winter of 1992–1993 at least several hundred, and probably over 1000, caribou died in the area to the east of Teshekpuk Lake and south of the Kogru River during a period of extremely cold, windy weather. Radio collars indicated that most of these animals were from the TCH (Carroll 1995).

HABITAT

Assessment

Results of satellite telemetry studies (Philo et al. 1993; Prichard et al. 2001), VHF radiotracking flights, and composition surveys have indicated that the area around Teshekpuk Lake, particularly south, east, and north of the lake, is crucial for calving; the area to the north of the lake is crucial for insect relief and grazing; and the narrow corridors of land to the east and northwest of the lake are very important for migrating to and from the insect relief area.

In 1997 BLM began a process of opening the National Petroleum Reserve-Alaska (NPR-A), which encompasses much of the TCH range, to oil exploration and development. The first area to be considered was a 4.6-million-acre planning area in the northeast corner of NPR-A, which includes the important TCH calving, insect relief, grazing, and migration habitats located near Teshekpuk Lake. After a compilation and review of the available data and many public meetings, it was decided that 87% of the planning area would be available for oil and gas leasing. In recognition of the importance of the land around Teshekpuk Lake as crucial habitat for caribou and geese, much of it was protected. No leasing was allowed in the area north and east of the lake, and no surface structures were allowed in a strip of land to the west and south of Teshekpuk Lake and around the Kogru River (BLM 1998). BLM is currently reassessing the previous decision and considering whether to open more of the important caribou habitat to leasing and surface structures.

Enhancement

There were no habitat enhancement activities during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The issue of whether to open important caribou habitat to development in northeast NPR-A is a very important management issue and will be determined as part of an ongoing process. This process will involve public input, agency recommendations, and executive decisions. ADF&G will play an important role in providing information and recommendations in this process.

CONCLUSIONS AND RECOMMENDATIONS

We counted 45,166 caribou in a July 2002 photocensus, which represented an all-time high for the TCH (Carroll 2003). Estimated recruitment rates of 20% (2003), 18% (2004), 8% (2005), and 16% (2006) and estimated mortality rates of 20% (2003), 25% (2004), 20% (2005), and 16% (2006) indicate that the population has probably declined since the 2002 census.

Emigration of TCH animals has probably also contributed to a decrease in the size of the herd. In 2004–2005 five collared caribou and, probably, several thousand other TCH caribou that had spent the previous winter in ANWR, remained in Unit 26B with CAH caribou. This was by far the largest emigration of Teshekpuk caribou that we have witnessed. Person et al. (2007) reported that, from 1990–2005, 6.9% of satellite-collared caribou emigrated from the herd, with most of the emigration taking place during 2003–2004.

During the last 2 seasons the TCH wintering area has shifted to the east. During 2004–2005 most of the herd spent the winter on the eastern side of their normal range southeast of Teshekpuk Lake and in Unit 26B. In 2005–2006 most of the herd wintered between Umiat and Teshekpuk Lake, with others wintering in the hills and mountains north and south of the crest of the Brooks Range in Units 26B and 25. This is a change from between 1990 and 2003 when most TCH caribou wintered on the coastal plain, with the majority wintering near the Atqasuk area. During both 2004–2005 and 2005–2006 very few caribou wintered near Atqasuk. If this eastward shift in wintering area continues it could have a variety of consequences on the herd and on North Slope hunters. Caribou have been relatively scarce for Barrow and Atqasuk hunters and have been more plentiful for Nuiqsut hunters and, in 2005-2006, plentiful for Anaktuvuk Pass hunters. This shift in wintering area may reduce hunting pressure on the herd from the largest subsistence community (Barrow), but it may increase hunting pressure from people that travel up the Dalton Highway. This shift to the east may also result in more wolf predation.

The results of several harvest monitoring projects, human population numbers, and caribou distribution data were used to estimate that approximately 3996 TCH caribou were harvested in 2004–2005 and 4129 in 2005–2006. This is a considerable increase over the estimate of 2766 caribou harvested in 2000–2001 and results mainly from an increase in the Barrow harvest estimate. The surveys used in the 2000–2001 estimate of the Barrow harvest were all done before 1993, so this larger estimate probably results from using more recent information, rather than a large increase in the harvest between 2000–2001 and 2004–2005. These numbers would indicate a 9% harvest of the herd, so fairly high recruitment will be required to sustain this level of harvest in addition to other natural mortality. This relatively high harvest emphasizes the importance of this herd as a subsistence resource and the importance of making sure that development activities do not reduce its productivity.

Due to federal regulations and local opposition to drug use in wildlife capture, helicopters with net guns have been used to capture TCH caribou since 1990. Since 2001 we have used a handheld net gun (as opposed to a skid-mounted net gun), which allowed the helicopter pilot to cut in front of caribou, causing the animals to hesitate, and making it possible to shoot the net when the caribou were not running full speed. There were no capture mortalities among the TCH caribou we captured from 2001 to 2004, but we had 1 mortality in 2005 and 1 mortality in 2006.

Radiotelemetry has been very useful in all aspects of monitoring the TCH. Satellite collars (PTTs) have been used to describe the range and movements of the TCH and have revealed movements within the herd that were previously unknown. PTTs have shown that during most years most of the collared caribou winter on the North Slope coastal plain, but that during other years some or most of the herd may winter in a variety of places, such as the Anaktuvuk Pass area, near Cape Lisburne, as far south as the Seward Peninsula, and as far east as ANWR. GPS collars are used to look at detailed movements of TCH caribou and will provide important information about habitat use and interactions with industrial infrastructure. VHF collars have been useful in conducting censuses, composition surveys, and productivity studies.

Satellite collars were attached to TCH bulls for the first time in 2001 and have shown that bulls tend to winter farther south than the cows, and often winter in the mountains. They are also often farther south than the cows during calving. During insect relief periods most bulls join the cows along the coast north and east of Teshekpuk Lake, but some stay farther south, even on buggy days. During 2004–2005 and 2005–2006 some collared bulls wintered on the coastal plain while most were in the mountains or hills north and south of the crest of the Brooks Range.

BLM is currently in the process of amending its Integrated Activity Plan/Environmental Activity Statement for the northeast section of the NPR-A, which includes much of the crucial habitat for the TCH. There are several issues that must be considered when developing the management plan for this area: 1) The TCH is a very important subsistence resource for most North Slope villages, and the herd is harvested at a relatively high rate. If development or other factors reduce productivity, it is more likely to result in a decrease in herd numbers than in herds that are not hunted as heavily. If herd numbers decline, there will be an impact on many North Slope residents. 2) The TCH has shown great fidelity to its calving area, and any activity that displaces caribou from this area could have negative population effects. There are strong selective pressures, such as avoiding predation, consuming newly emergent vegetation, and being close to the insect relief area, that make the calving area very important. Studies have shown that the CAH calving area has shifted away from developed areas, and that parturition rates of cows calving in the more developed western portion of the calving ground are lower than those for those calving in the relatively undeveloped eastern portion of the calving ground. 3) Most parturient TCH cows migrate through the narrow corridor between the east side of Teshekpuk Lake and Kogru Inlet. Caribou cows will avoid development and activity, and there has been no way found to mitigate for this impact. Development in this corridor could easily affect the most important segment of the population. 4) Both males and females of the TCH use the insect relief area along the coast, particularly the area north of Teshekpuk Lake. Free access to and from this area must be maintained to allow caribou to escape insects and get to important grazing areas. It is important to use the best available information and to continue surveys in this area so resource managers can make informed decisions regarding the habitat of the TCH.

We have provided a variety of educational opportunities for North Slope students. Students have assisted in caribou capture operations, collected samples from captured caribou, and helped with necropsy work. Several school classes have tracked the movements of satellite-collared caribou. In addition, we have given lectures to middle school, high school, and college classes on the biology and population dynamics of caribou.

Although the TCH population may have declined since 2002, we feel that it is capable of withstanding current harvest levels and do not recommend any regulatory changes.

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TABLE 1 Population estimates and average annual rate of change of the Teshekpuk caribou herd, 1978–2002

Year	Population estimate	Average annual rate of change
1978–1982	3000–4000[a]	N/A
1984	11,822[b]	N/A
1985	13,406[a]	N/A
1989	16,649[b]	7.1%
1993	27,686[b]	13.5%
1995	25,076[b]	-4.8%
1999	28,627[b]	3.4%
2002	45,166[b]	16.2%[c]

[a]Derived from visual estimate.
[b]Derived using aerial photocensus.
[c]It is unlikely that the herd increased at this rate. The 1999 count was probably an underestimation, and the herd has increased since 1995.

TABLE 2 Teshekpuk caribou herd postcalving and fall composition counts, 1991–2006

	Postcalving (July) Helicopters Surveys						Fall (November) Fixed-wing Surveys		
Date	Bulls:100 cows	Percent bulls	Calves:100 cows	Percent calves	Percent cows	N	Calves:100 adults	Percent Calves	N
1991	25	13	6	6	35	52	3673		
1992	93	34	8	0	29	37	3047		
1993	98	37	3	9	15	38	2959		
1994							38	27	1681
1995	68	29	7	3	30	41	1987	36	27	1931
1996									
1997	32	18	4	6	26	56	3771		
1998	75	31	6	7	28	41	3302	25	20	458
2000	49	23	6	3	30	47	3921		
2001							13	11	1458
2002							26	21	3510
2004							6	6	658
2005							22	18	1700
2006							34	25	3281

TABLE 3 Teshekpuk caribou herd calving and short yearling counts, 1990–2006

Calving counts				Short yearling counts			
Date	Cows observed	Percent Parturition[a]	Percent live calves during calving[b]	Date	Short yearlings: 100 adults	Percent short yearlings	N
				April 1990	27	21	352
				April 1991	31	24	700
				April 1992	35	26	858
				April 1993	22	18	1462
June 1994	14		63	April 1994	16	14	1486
June 1995	15		73	April 1995	18	16	1637
June 1996	28		86	April 1996	32	24	2362
June 1997	19		50	April 1997			
June 1998	27		56	April 1998			
June 1999	36		67	April 1999	27	21	2040
June 2000	29		85	April 2000	25	20	1985
June 2001	36		44	April 2001	17	15	1369
June 2002	32	94	71	April 2002	10	9	2270
June 2003	34	94	65	April 2003	26	20	2141
June 2004	36	58	48	April 2004	22	18	2692
June 2005	30	73	56	April 2005	9	9	1564
June 2006	40	88	82	April 2006	19	16	2177
				April 2007	23	19	2357

[a]Number of collared cows with calf + collared cows with no calf with but hard antler and/or udder / number of mature collared cows observed.

[b]Number of collared cows with live calves at the end of calving surveys / number of mature collared cows observed.

TABLE 4 Summary of community-based harvest assessments for communities within the range of the Teshekpuk Caribou Herd, 1985–2006

Community	Survey year	Human population	Nr of caribou harvested	Harvest information reference
Anaktuvuk Pass	1990	314	592	Pedersen and Opie 1990
Anaktuvuk Pass	1991	272	545	Pedersen and Opie 1991
Anaktuvuk Pass	1992	270	566	Fuller and George 1997
Anaktuvuk Pass	1993	318	574	Pedersen and Opie 1993
Anaktuvuk Pass	1994–1995	318	322	Brower and Opie 1996
Barrow	1987	3016	1595	Braund et al 1991
Barrow	1988	3379	1533	Braund et al 1991
Barrow	1989	3379	1656	Braund et al 1991
Barrow	1992	3908	1993	Fuller and George 1997
Barrow	2002–2003	4581	4935	Pedersen 2005
Barrow	2003-2004	4581	3180	Pedersen 2007
Barrow	2004-2005	4581	4206	Pedersen 2007
Barrow	2005-2006	4581	4535	Pedersen 2007
Atqasuk	1994–1995	237	262	Hepa et al. 1997
Atqasuk	2002–2003	228	259	Pedersen 2005
Atqasuk	2003-2004	228	314	Pedersen 2007
Atqasuk	2004-2005	228	203	Pedersen 2007
Atqasuk	2005-2006	228	170	Pedersen 2007
Nuiqsut	1985	337	513	Pedersen 1995
Nuiqsut	1992	418	278	Fuller and George 1997
Nuiqsut	1993	361	672	Pedersen 1995
Nuiqsut	1994–1995	418	258	Brower and Opie 1997
Nuiqsut	1999–2000	468	413	Pedersen 2001
Nuiqsut	2000–2001	468	600	Pedersen (pers. comm.)
Nuiqsut	2002–2003	433	364	Pedersen 2005
Nuiqsut	2003–2004	433	429	Pedersen 2007
Nuiqsut	2004–2005	433	436	Pedersen 2007
Nuiqsut	2005–2006	433	362	Pedersen 2007
Point Lay	1987	121	157	Pedersen 1989
Point Hope	1992	699	225	Fuller and George 1997
Wainwright	1988	506	505	Braund et al 1993
Wainwright	1989	468	711	Braund et al 1993
Wainwright	1992	584	748	Fuller and George 1997

TABLE 5 Estimated harvest of Teshekpuk Herd Caribou during the 2004-2005 and 2005-2006 regulatory years by residents living within the range of this herd

Community	Human population	Per capita caribou harvest	Estimated total community harvest	Approximate % TCH in harvest	Estimated Nr of TCH caribou harvested	Assessments used to estimate per capita caribou harvest
Anaktuvuk Pass	312	1.76	549	30	165	Anak. Pass 1990–1995
Atqasuk	228		203 (04-05) 170 (05-06)	60	155 102	Pedersen, 2007
Barrow	4581		4206 (04-05) 4535 (05-06)	70	2944 3174	Pedersen, 2007
Nuiqsut	433		436 (04-05) 362 (05-06)	60	261 217	Pedersen, 2007
Point Lay	217	1.3	282	20	57	Pt. Lay 1987
Point Hope	792	0.32	255	0	0	Pt. Hope 1992
Wainwright	545	1.27	690	60	414	Wainwright 1988, 1989, 1992
Total Harvest					3996 (04-05) 4129 (05-06)	

[a]The Estimated Total Community Harvest was derived from an ADF&G Subsistence Division harvest survey (Pedersen 2007)

TABLE 6 Percent and chronology of annual caribou harvest among Barrow and Wainwright residents 1987–1990[a]

Year	Mar–Apr	May–Jun	Jul–Aug	Sep–Oct	Nov–Dec	Jan–Feb	Annual harvest
Barrow							
1987–1988	5%	5%	40%	44%	1%	5%	1595
1988–1989	5%	6%	38%	41%	4%	6%	1533
1989–1990	6%	2%	49%	29%	3%	11%	1656
Wainwright							
1988–1989	2%	2%	31%	53%	9%	3%	505
1989–1990	11%	<1%	38%	31%	4%	15%	711

[a]Data from Braund et al. 1991 and 1993.

TABLE 7 Percent and chronology of annual caribou harvest among Nuiqsut and Atqasuk residents 1994–1995[a]

Village	Jul–Aug	Sep–Oct	Nov–Dec	Jan–Feb	Mar–Apr	May–Jun	Annual harvest
Atqasuk	40%	37%	14%	5%	1%	2%	187
Nuiqsut	38%	35%	7%	6%	8%	7%	249
Anaktuvuk Pass	50%	14%	12%	2%	15%	7%	322

[a]Data from Brower et al. 1996, 1997 and Hepa et al. 1997.

TABLE 8 Annual mortality for radiocollared Teshekpuk Caribou, 1990–2006

Collar year[a]	Sample size[b]	Mortalities[c]	Mortality rate[d]
1990–1991	13	2	15%
1991–1992	21	3	14%
1992–1993	21	3	13%
1993–1994	30	4	13%
1994–1995	29	5	17%
1995–1996	31	4	13%
1996–1997	25	6	24%
1997–1998	28	4	14%
1998–1999	39	3	8%
1999–2000	37	5	14%
2000–2001[e]	45	5	11%
2001–2002[f]	49	7	14%
Males	9	0	0%
Females	40	7	17%
2002–2003	46	9	20%
Males	10	5	50%
Females	36	4	11%
2003–2004	59	15	25%
Males	7	2	29%
Females	52	13	25%
2004-2005	51	10	20%
Males	5	2	40%
Females	46	8	17%
2005-2006	49	8	16%
Males	6	4	67%
Females	43	4	9%
Totals	573	93	16%

[a] Collar year defined as 1 July–30 June.
[b] Sample Size – the total number of active radio collars used in the analysis at the beginning of the collar year.
[c] Number of radiocollared caribou that died during the collar year.
[d] Mortality rate – Mortalities/Sample Size.
[e] Beginning in 2000–2001, caribou that were collared with PTTs or VHF radio collars were used in the analysis. Previous to 2000–2001 only VHF-collared caribou were used.
[f] Beginning in 2001–2002, males as well as females were collared

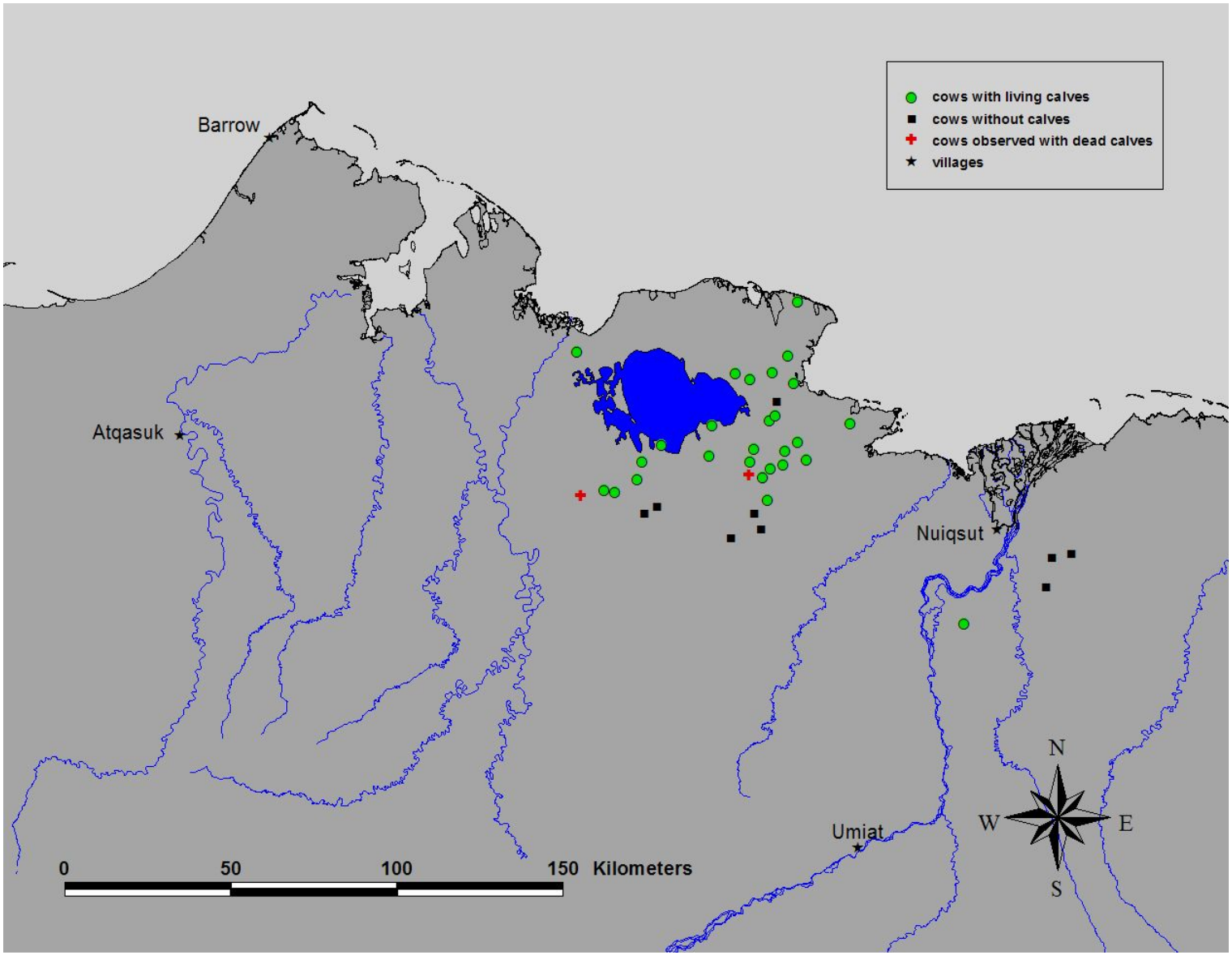

FIGURE 1 Locations of collared TCH cows during the calving period, 1–16 June 2006

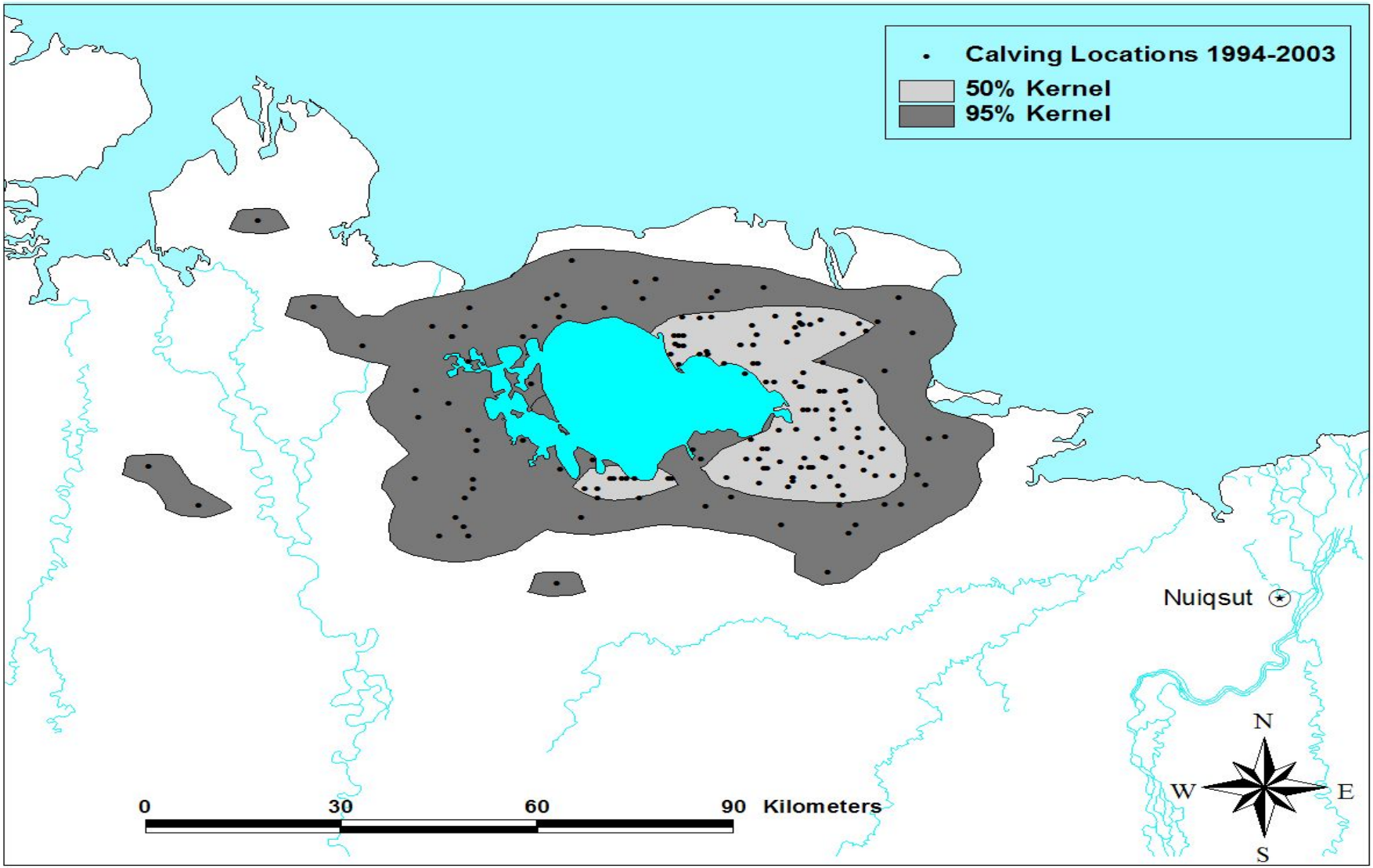

FIGURE 2 Calving locations of collared TCH cows, 1 June–16 June, 1994–2003, with fixed Kernel Probability of 50% and 95%

WILDLIFE

MANAGEMENT REPORT

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 P.O. Box 115526
Juneau, AK 99811-5526

CARIBOU MANAGEMENT REPORT

From: 1 July 2004
To: 30 June 2006[1]

LOCATION

GAME MANAGEMENT UNITS: 26B and 26C (25,787 mi^2)

HERD: Central Arctic

GEOGRAPHIC DESCRIPTION: Central Arctic Slope and Brooks Range

BACKGROUND

In the mid 1970s, the Central Arctic caribou herd (CAH) was recognized as a discrete herd, and in 1975 it was estimated at 5000 caribou (Cameron and Whitten 1979). By 1983 the CAH increased to approximately 13,000 and by 1992 to more than 23,000 caribou (Valkenburg 1993). In 1995 the herd declined to 18,100 and then stabilized for a few years. By 2000, herd size increased substantially to more than 27,000 animals, and in 2002 the herd was estimated at 31,857 caribou (Table 1). The recent increase was due to low adult mortality (<10%), high parturition rates (≥85%), and high calf survival to October (≥50 calves:100 cows) during 1998–2002.

Reported harvest on the CAH changed over time, probably as a result of regulatory modifications and changes in hunting pressure. In regulatory year (RY) 1986 (RY = 1 July through 30 June, e.g., RY86 = 1 July 1986 through 30 June 1987), more restrictive regulations were adopted, and harvest decreased substantially through RY90. Beginning in RY91, harvest and hunting pressure increased on the CAH, probably because (1) hunting was severely restricted on several Interior Alaska caribou herds (e.g., Delta, Macomb, Fortymile), which displaced hunters to hunt the CAH, and (2) the CAH was accessible by road because the Dalton Highway was officially open to public traffic in 1991. Reported harvest increased moderately beginning in RY00. Some of this increase was by bowhunters along the Dalton Highway.

The CAH traditionally calved between the Colville and Kuparuk Rivers on the west side of the Sagavanirktok River and between the Sagavanirktok and the Canning Rivers on the east side. During the early 1990s, the greatest concentration of caribou calving in the western portion of Unit 26B shifted southwest as development of infrastructure related to oil production occurred in

[1] At the discretion of the reporting biologist, this unit report may contain data collected outside the report period.

what was originally a major calving area (Lawhead and Johnson 2000; Wolfe 2000). No directional shift in distribution of caribou calving east of the Sagavanirktok River was noted. The CAH's summer range extends from Fish Creek, just west of the Colville River, eastward along the coast (and inland approximately 30 miles) to the Katakturuk River. The CAH winters in the northern and southern foothills and mountains of the Brooks Range. The herd's range often overlaps with the Porcupine caribou herd (PCH) on summer and winter range to the east and with the Western Arctic (WACH) and Teshekpuk (TCH) herds on summer and winter range to the west.

Within the range of the CAH, oil exploration and development began in the late 1960s and continues to the present. Beginning in the late 1970s, the Alaska Department of Fish and Game (ADF&G) implemented long-term studies on population dynamics, distribution, movements, and effects of development on the CAH. During the 1980s, calving activity was rare in the Prudhoe Bay oil field, where it was known to occur before development (Whitten and Cameron 1985). In addition, cows and newborn calves were underrepresented along the trans-Alaska pipeline corridor and around oil production facilities in the early 1990s (Cameron and Smith 1992; Cameron et al. 1992). By the mid 1980s, major movements of CAH caribou through the Prudhoe Bay oil field in summer had ceased, and caribou distribution and movements within the Kuparuk oil field were altered substantially (Smith and Cameron 1983, 1985*a,b;* Whitten and Cameron 1983, 1985; Curatolo and Murphy 1986). In the mid 1990s research on the CAH was reduced substantially, and efforts were focused on monitoring population parameters and their relationship to management objectives. Beginning in 2001, research efforts were renewed to look at the effects of oil field development on production, growth, survival, and movements of caribou calves (Arthur and Del Vecchio 2006).

MANAGEMENT DIRECTION

Some of the CAH management goals and objectives were developed in response to concerns arising from research conducted during 1978–1993. Based on the hypothesis that displacement of sufficient magnitude would be harmful to the CAH (Cameron 1983), we worked with the oil industry to minimize disturbance to caribou movement due to physical barriers created by oil development. In addition, given that stress is cumulative, ADF&G reduced hunting activity in areas adjacent to the oil field and the Dalton Highway and also restricted the cow harvest. The current management objectives reflect these concerns. In addition, during the March 2000 Alaska Board of Game (board) meeting, the board established Intensive Management (IM) population and harvest objectives for the CAH. This designation means the board must consider intensive management if a reduction in harvest becomes necessary because of dwindling caribou numbers or productivity. The IM population objective for the CAH is 18,000–20,000 caribou, and the harvest objective is 600–800 caribou (5 AAC 92.108).

MANAGEMENT GOALS

Goal 1: Minimize the adverse effects of development on CAH caribou.

Goal 2: Maintain a CAH population level that will support a harvest of at least 600 caribou without precluding population growth.

Goal 3: Provide the opportunity for a subsistence harvest of CAH caribou.

Goal 4: Maintain opportunities to view and photograph CAH caribou.

MANAGEMENT OBJECTIVES

Objective 1: Maintain a population of at least 18,000–20,000 caribou. (Goals 1, 2, 3)

Objective 2: Maintain accessibility of seasonal ranges for CAH caribou. (Goal 1)

Objective 3: Maintain a harvest of at least 600 caribou if the population is ≥18,000 caribou. (Goal 2)

Objective 4: Limit the annual harvest of cows to a maximum of 3% of the cows in the population. (Goals 1, 2, 3)

Objective 5: Maintain a ratio of at least 40 bulls:100 cows. (Goals 1, 2, 3)

Objective 6: Reduce conflicts between consumptive and nonconsumptive uses of caribou along the Dalton Highway. (Goal 4)

MANAGEMENT ACTIVITIES

- Conduct a photocensus every 2–3 years. (Objective 1)
- Conduct annual fall composition counts. (Objectives 3, 4, 5)
- Radiocollar 10–20 yearling females every 1–2 years. (Objectives 1 and 2)
- Radiotrack during early summer, fall, and winter to determine seasonal distribution. (Objectives 1 and 2)
- Radiotrack and estimate parturition rate and late June calf:cow ratios for radiocollared females. (Objective 1)
- Monitor harvest through harvest ticket reports and Division of Subsistence harvest surveys. (Objectives 3 and 4)
- Work with the oil industry and other agencies to minimize disturbance to caribou from resource development. (Objectives 1 and 2)
- Regulate hunting to maintain a maximum annual harvest rate of 3% of cows in the population. (Objective 4)
- Regulate caribou hunting along the Dalton Highway to reduce conflicts between consumptive and nonconsumptive uses. (Objective 6)

METHODS

POPULATION STATUS AND TREND

Population Size

Population size was estimated in July 1997, 2000, and 2002 using the modified aerial photo-direct count technique (Davis et al. 1979). Postcalving aggregations of caribou were located by radiotracking collared animals. These aggregations usually occurred when temperatures were >55°F and wind was <8 mph. Groups of caribou were photographed with a Zeiss RMK-A aerial camera mounted in a DeHavilland Beaver aircraft. Caribou were counted directly from photographs. No population estimates have been conducted since 2002 due to unsuitable weather and lack of aggregations.

Parturition and Early Calf Survival

Parturition and early calf survival (survival to 2 weeks) data were stratified as Unit 26B West (west of the west bank of the Sagavanirktok River) or Unit 26B East (east of the west bank of the Sagavanirktok River) because we estimated that 80% of CAH cows maintain fidelity to these calving areas from year to year (R. Cameron, ADF&G, unpublished data). These 2 calving areas may not have been totally separate, but were nonetheless somewhat distinct. Because some overlap occurred, we arbitrarily chose the Sagavanirktok River as the line separating Unit 26B West, where there was substantial oil exploration and development, from Unit 26B East, where little exploration and development occurred.

Parturition rate was determined by observing radiocollared females ≥2 years old from a fixed-wing aircraft during the first half of June. Caribou observed with calves, hard antlers, or distended udders were classified as parturient (Whitten 1991). During 1988–1993, caribou were relocated 2–3 times during 30 May–14 June. During 1995–2002, caribou were located once each year, the target date being pre-peak calving between 3 and 9 June. During this period, parturient caribou may have been missed because the cow did not have hard antlers and the udder was not distended and because calves were born early and died or calves were born late and not observed. Beginning in 2003, caribou were located 2–3 times during 30 May–14 June in cooperation with an ongoing research project (Arthur and Del Vecchio 2006). Data were stratified based on the location of caribou east and west of the Sagavanirktok River, as described above.

The proportion of calves:100 cows (early calf survival) was determined by observing radiocollared females ≥2 years old from a fixed-wing aircraft after most calving should have occurred. If a cow was observed with a calf, she was classified as "with calf." If distended udders were detected but no calf was seen, we assumed the cow had recently lost a calf and she was classified as "without calf." Thus, these proportions are a conservative estimate of early calf survival. During 1988–1994, calves:100 cows were determined from the last half of June through mid August. Since 1994, calves:100 cows has been determined during 15–30 June. This technique provides an indication of early calf survival or overall calf production and is referred to as late June calf:cow ratios. In addition, data were stratified based on the location of caribou east and west of the Sagavanirktok River (as described above) using locations from the current summer. In 2004 only GPS-collared females with radiocollared calves were relocated (in conjunction with an ongoing research project, Arthur and Del Vecchio 2006). In that year we

were unable to observe whether a cow was with a calf unless both were radiocollared because the caribou were aggregated too tightly.

Parturition rates and the proportion of calves:100 cows were calculated for 2 categories: known–age females and females ≥4 years old. Beginning in 2004, some random captures of adults were made and classified as "young," "medium," and "old" based on tooth wear. Caribou classified as "medium" or "old" were included in the "females ≥4 years old" category. Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River.

Population Composition

No fall composition survey was conducted during 2003–2006. Fall composition was estimated from a helicopter in mid October 2000, 2001, and 2002. Caribou were classified as cows; calves; and small, medium, or large bulls.

Distribution and Movements

Distribution of the CAH was monitored during calving, postcalving, summer, rut, and winter by relocating radiocollared females during June, July, mid October, and late March or early April.

HARVEST

Harvest and hunting pressure by Alaska residents who lived south of the Yukon River and by nonresidents were monitored using harvest reports submitted by hunters. Total harvest, residency and success, chronology, and transportation were summarized by regulatory year.

Alaska residents who lived north of the Yukon River were not required to obtain caribou harvest tickets and report cards. However, they were required to register with ADF&G or an authorized vendor. ADF&G/Division of Subsistence estimated caribou harvested by residents of Kaktovik and Nuiqsut. Caribou harvested by hunters from Nuiqsut included animals from the Teshekpuk and Western Arctic caribou herds, as well as some CAH caribou.

A hunter checkstation was operated on the Dalton Highway near the Yukon River Bridge during August and September 1991–1993 and 1996–1998. Checkstation reports are on file at ADF&G, Fairbanks.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Population size was not estimated in 2004, 2005 or 2006. However, continued good parturition rates and late June calf:cow ratios through 2006 suggest the CAH continued to increase from an estimated 31,857 caribou in 2002, or at least stabilized during 2004–2006. The July 2002 estimate of 31,857 caribou represented a 17% increase (8.5% annually) from the July 2000 estimate of 27,128 (Table 1). The CAH had increased substantially since 1997, when the herd was estimated at 19,730 caribou. A deterministic population model developed by P. Valkenburg and D. Reed (ADF&G, Fairbanks) indicated this increase could be accounted for by the high

parturition rates, high early summer calf survival, and low adult mortality observed during this period (Tables 2, 3, and 4).

Parturition and Early Calf Survival

Parturition rates of radiocollared females ≥4 years old throughout Unit 26B in 2005 and 2006 were 83% (n = 60) and 96% (n = 54), respectively, and have been high since 1998 (≥83%; Table 2). Parturition rates for 3-year-olds were 86% (n = 7) and 71% (n = 7) in 2005 and 2006. In general, parturition rates for 3-year-olds were good from 1998 through 2006 (≥71%, n = 4–13; Table 4), when the herd was increasing. (A high parturition rate, particularly in 3-year-olds, is indicative of good nutritional condition, although variability in parturition rates can be relatively high among 3-year-old cows [Valkenburg et al. 2000]). In 1995, when the population appeared to decline somewhat, no 3-year-old females were pregnant (n = 4), and parturition rates for females ≥4 years old were also low (56%, Tables 1 and 2).

Mean fidelity to a specific calving area (Unit 26B West or Unit 26B East) was determined for locations obtained ≥5 calving seasons during 1997–2006. Mean fidelity was 92% (n = 46; Arthur and Del Vecchio 2006). We observed no significant differences in parturition rates between Unit 26B West and Unit 26B East (95% CI) during 1994–2006, although Unit 26B East had higher point estimates most years. For 1988–1994, Cameron (1995) and Cameron et al. (2002) detected a significantly lower mean parturition rate in Unit 26B West than in Unit 26B East (P = 0.003; Table 2). This occurred during part of the period when the herd was declining (1992–1995).

The peak of calving was approximately 4–6 June in 2005 and 2–3 June in 2006, consistent with 2002–2004. Peak of calving in 2001 was several days later, approximately 9–10 June, due to late snowmelt on the coastal plain (Arthur and Del Vecchio 2006).

The late June calf:cow ratio of radiocollared females ≥4 years old throughout Unit 26B was 71:100 (n = 58) in 2005 and 89:100 (n = 55) in 2006. The ratio has been high since 1997 (≥75:100; Table 3), indicating consistently high early calf survival, which also contributed to the increase in population size observed in 2000 and 2002. During years when the herd was declining or stable (1994–1996), late June calf:cow ratios were lower (<65%; Table 3). The late June calf:cow ratio for radiocollared 3-year-olds was 40:100 (n = 5) in 2005, and 71:100 (n = 7) in 2006. During 1998–2006, calf:cow ratios appeared to be lower for 3-year-olds (33–71:100) and more variable than for older cows in the herd (Table 5). Calves born to 3-year-olds tended to have lower survival rates, although our sample sizes were small (n = 4–14). We noted no pattern for differences in calf:cow ratios between Unit 26B West and Unit 26B East for these years. (Table 3).

Although our analyses used the Sagavanirktok River to separate Unit 26B West and Unit 26B East, there are several reasons to view this approach and the results with caution. Even though density of calving caribou was lower near the Sagavanirktok River than in areas farther east or west, there was not complete separation between calving concentrations, and there may be no biological reason to separate caribou based on calving areas. Also, this may not be the best dividing line if calving distribution changes. Finally, we may not be able to detect differences between areas because of small sample sizes in some years.

Population Composition

No fall composition surveys were conducted during 2003–2006. The fall composition survey in October 2002 indicated a bull:cow ratio of 67:100 and a calf:cow ratio of 72:100 (Table 6). Bull:cow ratios have been high since 1976 (>50:100), indicating harvest had little effect on sex ratios. Calf:cow ratios were high in 2000, 2001, and 2002 (>50:100), indicating summer calf survival rates were relatively high. The composition surveys occurred in the Brooks Range in the Chandalar Shelf, Atigun Pass, Galbraith Lake, and upper Sagavanirktok River areas.

Distribution and Movements

Calving distribution. Distribution of calving in 2005 and 2006 was similar to the 3 previous years. During 2002–2006 the greatest concentration of calving in Unit 26B West occurred between the ConocoPhillips Alaska Meltwater production pad and the Kuparuk River, south of the spine road. In Unit 26B East the greatest concentration of caribou calving occurred between the Shaviovik and Canning Rivers in 2002, between the Sagavanirktok and Shaviovik in 2003–2006 (Arthur and Del Vecchio 2006). In 2001, snowmelt and spring migration was delayed and calving occurred over a larger area than during most years (Lenart 2003; Arthur and Del Vecchio 2006).

Summer and Early Fall Distribution. Commonly, the CAH summer range extends from the Colville River to just east of the Canning River and from the coast inland to the foothills. Movements during summer (postcalving) are influenced by insect abundance, which largely depends on temperature and wind speed (Dau 1986). Generally, when temperature is >55°F and wind speed is <8 mph, caribou are found along the coast or on large gravel bars. Caribou tend to concentrate along the coast during warm weather but move inland on cool and windy days. In general, the CAH begins migrating toward the foothills of the Brooks Range during August, and by September most caribou are found along the foothills of the Brooks Range, particularly around Toolik Lake, Galbraith Lake, Accomplishment Creek, the Ivishak River, and the upper Sagavanirktok River. When unusually warm temperatures persist in September, the CAH sometimes remain on the coastal plain as far north as the White Hills and Franklin Bluffs until about mid October.

No unusual summer movements were noted in 2005 and 2006. In July 2004 most of the GPS radiocollared caribou that had calved in Unit 26B West moved into Unit 26B East (Arthur and Del Vecchio 2006), and CAH caribou were found as far east as the Hulahula River. By early September they migrated back to Unit 26B West. Then many caribou crossed the Brooks Range and continued eastward to the Coleen River. In 2003 no unusual movements were detected for the CAH. However, in September 2003, the Teshekpuk caribou herd made an unprecedented movement from the Teshekpuk Lake area across the coastal plain in Unit 26B, continued east into the Arctic National Wildlife Refuge and to Barter Island, and spent the winter in that region (Carroll 2005). Other unusual movements have also been noted in the past. In 2002, caribou persisted on the coastal plain through August and the first week of September because of warm weather. By mid September, most of the caribou were headed for the foothills of the Brooks Range. In late July 2001 an estimated 5000 Central Arctic caribou were found inland in the Fish Creek drainage in Unit 26A.

Fall Distribution. During the rut in October, large concentrations of caribou can be found on Chandalar Shelf in Your and Thru Creeks and the North Fork and Middle Fork Chandalar River on the south side of the Brooks Range. On the north side of the Brooks Range, caribou can be located around Galbraith Lake, Accomplishment Creek, and in the upper Sagavanirktok River. In 2004 the caribou that had moved east to the Coleen River in September returned to their traditional rutting grounds in the Middle Fork Chandalar River by mid October.

Winter Distribution. In RY06 approximately 62% (n = 84) of the radiocollared caribou wintered on the south side of the Brooks Range in the Chandalar Shelf area as far east as the area between the Middle Fork Chandalar River and the Wind River. and also westward into Gates of the Arctic National Park and Preserve. The caribou that wintered on the north side of the Brooks Range were spread along the foothills from the Itkillik River to the Canning River. In RY05, approximately 54% (n = 76) of the radiocollared caribou wintered on the south side of the Brooks Range between the North Fork and East Fork Chandalar Rivers. In RY01–RY04, approximately 69% (n = 103), 68% (n = 89), 87% (n = 101), and 60% (n = 111), respectively, of the radiocollared caribou wintered between the North Fork and Middle Fork Chandalar Rivers. Additionally in RY04, another large concentration wintered farther east, just south of Arctic Village. The caribou that wintered on the north side of the Brooks Range were usually found on the east side of the Dalton Highway, along the foothills in the upper Sagavanirktok River, Accomplishment Creek, and Lupine River drainages, with some caribou as far east as the Canning River. Winter distribution of the CAH during 2002–2005 was somewhat similar to that observed during the late 1990s, except that it appears they expanded their winter range. During the mid 1990s, many CAH caribou wintered in the Chandalar Shelf area and east into the Wind River drainage, and in the Tinyaguk and upper North Fork Koyukuk Rivers (ADF&G files). In March 2003 heavy snows fell on the south side of the Brooks Range, and it appeared that the spring migration north was delayed.

Mixing with Other Herds. Mixing with the Teshekpuk caribou herd frequently occurs in both summer and winter because both herd ranges overlap along the Colville River. Since 2002 there has been extensive overlap during winter in Unit 26B West and on the south side of the Brooks Range in the North Fork Chandalar River. In RY03 some mixing occurred when the TCH traveled to Arctic National Wildlife Refuge for the winter. On their return spring migration, 3 Teshekpuk satellite collars remained in the CAH calving grounds during June and July. It is likely that several thousand caribou remained with them (Carroll 2005).

Some mixing with the WACH may have occurred during winter 2003–2004 when approximately one-third of the WACH wintered on the south side of the Brooks Range, west of the Dalton Highway in Gates of the Arctic National Park and Preserve (J. Dau, ADF&G, personal communication; ADF&G files). This phenomenon was not repeated in winters 2004–2005 or 2005–2006. During the early 1990s, we suspected some mixing with the WACH occurred during September on the north side of the Brooks Range when large groups of caribou (>5000) were observed.

It is unlikely that mixing with the PCH occurred during summers 2002–2006. In RY03 a large concentration of PCH caribou wintered near Arctic Village, and some overlap with the CAH probably occurred. In fact, one GPS radiocollared CAH caribou followed the PCH eastward

during its spring migration in March. She remained with the PCH during summer 2004, wintered with the PCH in RY04, had a calf on the PCH calving grounds in June 2005 and died shortly after calving. In 2001 some mixing may have occurred during the summer when approximately 10,000 Porcupine caribou inhabited the Sadlerochit Mountains, and Central Arctic caribou were located near the Canning River, 10–20 miles away. In addition, in winter 2001 we detected a small amount of overlap in CAH and PCH distribution when approximately half of the PCH was thought to have wintered in Alaska near Arctic Village. One Central Arctic radiocollared caribou was found on the Junjik River near some radiocollared PCH caribou, and a hunter killed a Central Arctic radiocollared female near Arctic Village in January 2002. Additionally, one radiocollared PCH caribou was found on the Ribdon River near some CAH animals.

MORTALITY

Harvest

Most harvest occurred in Unit 26B, but some also occurred in Units 24, 25A, 26A and 26C. However, harvest in units other than Unit 26B and 26C (in summer and early fall) may be recorded as harvest for a different herd (e.g., PCH). In addition, parts of the WACH occasionally mixed with the CAH in fall and winter, and some of these animals may have been harvested and recorded as harvest from the CAH.

Season and Bag Limit (RY96–RY06).

Unit/Location	Resident open season/Bag limit	Nonresident open season/Bag limit
Unit 25A	1 Jul–30 Apr; 10 caribou	1 Jul–30 Apr; 5 caribou
Unit 26B, within the Dalton Highway Corridor Management Area	1 Jul–30 Apr; 2 caribou; however, only 1 caribou may be taken 1 Jul–30 Sep, and cow caribou may be taken only 1 Oct–30 Apr	1 Jul–30 Apr; 2 bulls; however, only 1 bull may be taken 1 Jul–30 Sep
Unit 26B, that portion north of 69°30´ and west of the east bank of the Kuparuk River to a point at 70°10´N latitude 149°04´W longitude, then west approximately 22 miles to 70°10´ latitude 149°56´W longitude, then following the east bank of the Kalubik River to the Arctic Ocean	1 Jul–30 Apr; 10 caribou	1 Jul–30 Apr; 5 caribou

Unit/Location	Resident open season/Bag limit	Nonresident open season/Bag limit
Remainder of Unit 26B	1 Jul–30 Apr; 2 caribou; however, only bulls may be taken 1 Jul–30 Sep, and cow caribou may be taken only 1 Oct–30 Apr	1 Jul–30 Apr; 2 bulls
Unit 26C	1 Jul–30 Apr; 10 caribou; however, only bull caribou may be taken 23–30 Jun	1 Jul–30 Apr; 5 caribou

Additional state regulations that affect caribou hunting include special restrictions along the Dalton Highway. The Dalton Highway Corridor Management Area (DHCMA) extends 5 miles from each side of the Dalton Highway from the Yukon River to the Prudhoe Bay Closed Area, which encompasses most of the Prudhoe Bay oil field. The DHCMA is closed to hunting with firearms. Big game, small game, and fur animals can be taken by bow and arrow only, but hunters must possess a valid Alaska Bowhunter Education Program card or a recognized equivalent certification. In addition, no motorized vehicles except aircraft, boats, and licensed highway vehicles may be used to transport game or hunters within the DHCMA.

Federal subsistence hunting regulations also apply on federal lands within the DHCMA. Beginning in RY92, federal regulations allowed the use of firearms for hunting on federal land within the DHCMA by qualified rural subsistence hunters. During the first year of the regulation, qualified hunters included any rural resident. Subsequently, qualified hunters included residents of the corridor and the nearby villages of Anaktuvuk Pass, Wiseman, Nuiqsut, and Kaktovik.

Alaska Board of Game Actions and Emergency Orders. During the March 2004 meeting, the Board of Game rescinded several of the regulations related to bow hunting along the Dalton Highway that were put into effect in RY02. The North Slope Closed Area was eliminated, along with the requirement that hunters mark their arrows. In addition, limiting the use of licensed highway vehicles in the DHCMA to publicly maintained roads was more clearly defined to allow no motorized vehicles, except licensed highway vehicles on the following designated roads: 1) Dalton Highway; 2) Bettles Winter Trail during periods when BLM and the City of Bettles announce that the trail is open to winter travel; 3) Galbraith Lake road from the Dalton Highway to the BLM campground at Galbraith Lake, including the gravel pit access road when it is open; 4) Toolik Lake road, excluding the driveway to Toolik Lake Research Facility; 5) Sagavanirktok River access road 2 miles north of Pump Station 2; and 6) any constructed roadway or gravel pit within ¼ mile of the Dalton Highway. The 2002 regulation that extended the restriction on the use of motorized vehicles in the DHCMA to apply to the Prudhoe Bay Closed Area remained in regulation for RY04. Caribou seasons and bag limits have remained the same since 1996.

Hunter Harvest, Success, and Residency. In RY04, 1096 hunters reported hunting and 505 hunters reported harvesting 626 caribou, indicating an overall success rate of 46%. In RY05, 1174 hunters reported hunting and 555 hunters reported harvesting 660 caribou indicating an

overall success rate of 47%. Reported harvest was considerably higher beginning in RY00 (Table 7). This may be related to caribou distribution and accessibility.

Success by hunters who hunt the CAH has always been good (≥40% and frequently ≥50%; Table 7). Beginning in RY98 reminder letters were sent out to hunters to remind them to send in their report cards. This likely prompted unsuccessful hunters to turn in report cards; thus, the reported success rate after RY97 probably more closely reflects the actual success rates compared to previous years.

A small proportion of hunters were nonresidents (21% both years) during RY04 and RY05, and they took 21% and 23% of the harvest, similar to previous years (Lenart 2003, 2005). Nonresident hunters were highly successful (59%, and 60%, respectively). Nonlocal resident hunters during the same period also had good success (43% and 44%). Harvest by local residents (residents of Units 24, 25, 26; particularly Nuiqsut and Kaktovik residents) was estimated at 200–250 caribou annually. However, it is difficult to accurately assess harvest of CAH animals by some local residents, especially in the Nuiqsut area, because the Teshekpuk and Western Arctic herds frequently mix with the CAH during periods when much of the harvest occurs.

Reported harvest of cows during RY04–RY05 (42 both years) was slightly higher than previous years, but was still considered low (Table 7). The harvest of cows by local residents was estimated at 22% of the estimated total harvest of 200–250 caribou. This was based on several years of data (1985, 1992, 1993, 1994, 1999) from the Nuiqsut Subsistence Caribou Harvest Surveys, a cooperative effort of the City of Nuiqsut, Kuukpik Corporation, Native Village of Nuiqsut, North Slope Borough, and ADF&G Division of Subsistence (ADF&G files).

Bowhunters accounted for 36% and 35% of the harvest in RY04 and RY05 (Table 7). In general, there was a steady increase in the number of successful bowhunters using the DHCMA, except in RY02. The lower value in RY02 was probably due to distribution of caribou outside the DHCMA.

Harvest Chronology. During RY04–RY05, most reported harvest occurred in August (58% and 53%), similar to previous years (Table 8). The remaining harvest occurred primarily in September and then in October. In RY01, October harvest increased substantially to 25%. This was likely related to warmer weather that persisted into October in 2001. A small number of caribou were taken in late winter and spring, primarily in March and April (1–5%).

Harvest by Nuiqsut residents typically occurs in July, August, and September and in March and April. A little over 50% of the harvest taken by Nuiqsut hunters occurs in summer and fall. When unusually cold weather persists and spring arrives late, caribou are harvested in May (S. Pedersen, ADF&G, personal communication).

Transport Methods. Because of restrictions on the use of off-road vehicles within the DHCMA and the remoteness of Unit 26B, most hunters used highway vehicles and aircraft for access. During RY04–RY05, the proportion of successful hunters who used highway vehicles to access caribou was 53% in both years. This value was slightly lower than years previous to 2000 when it ranged 57–70% during RY92–RY01. This is probably related to an increase in the use of boats in the Ivishak and Echooka drainages. During RY02–RY05, the proportion of successful hunters

who used boats increased to 16–29% compared with 5–15% during RY92–RY01. In RY04 and RY05, boats were the second most common transport method (Table 9). In previous years, airplanes were sometimes the second most common transport method. Few hunters used horses, dogs, snowmachines, or ATVs as a transport method (Table 9). Residents of Unit 26 used boats during summer and fall and snowmachines during the spring months. Nuiqsut residents primarily hunted from the Colville River and Fish Creek in Unit 26A during summer, and Kaktovik residents hunted along the coast to Camden Bay (S. Pedersen, ADF&G, personal communication; ADF&G files).

Natural Mortality

Radiocollared caribou were relocated infrequently in fall and winter, making it difficult to estimate adult mortality or determine causes of adult mortality. Wolves, grizzly bears, and golden eagles are the 3 most common predators on Arctic caribou (Whitten et al. 1992). However, natural mortality of CAH caribou during calving and postcalving is relatively low because calving occurs in areas near the coast where there are few wolves, and predation by golden eagles appears to be rare compared to the Porcupine caribou herd (Murphy and Lawhead 2000). Winter mortality was probably higher during the 1990s than in previous years because more CAH caribou wintered on the south side of the Brooks Range, where wolves were probably more abundant than on the north side of the range, and where snowfall is deeper. However, there have been no studies of predation rates on the CAH. During RY97–RY04, we confirmed the crude mortality rates of 4–18% among cow caribou ≥1 year old with functioning radio collars:

Regulatory year	Number of mortalities	Number of radio collars located	% Mortality
1997–1998	2	44	4
1998–1999	2	53	4
1999–2000	7	53	13
2000–2001	12	66	18
2001–2002	4	64	6
2002–2003	11	76	14
2003–2004	4	65	6
2004–2005	16	94	17

CONCLUSIONS AND RECOMMENDATIONS

High parturition rates, high late June calf:cow ratios, and low adult mortality during 1998–2002 contributed to an increase of approximately 61% in the CAH in 5 years (Tables 1, 2, and 3). Although we have not conducted a population estimate survey since 2002, the CAH has experienced high parturition rates and late June calf:cow ratios since 2002 and low adult mortality of radiocollared caribou in most years. This suggests that herd size probably increased or at least remained stable during the report period. Harvest increased beginning in RY00 but remained well below sustained yield (<2% of the herd). Most hunters who lived outside of Unit 26 primarily used highway vehicles as a means of access, and most harvest occurred in August. However, the use of boats in the Ivishak and Echooka drainages increased substantially in recent

years. Harvest by bowhunters also increased in recent years. Hunters who resided in Unit 26 used boats to harvest approximately half of their caribou in July, August, and September and used snowmachines in March and April to take the other half of the caribou they harvested. Although herd size has increased and harvest remained somewhat stable, with an increase beginning in RY00, the CAH has provided substantial hunting opportunity, and we recommend no regulatory changes.

We met our first goal—to minimize adverse effects of development on caribou—by working with ConocoPhillips Alaska, Inc. in developing mitigation measures to decrease disturbance of caribou, particularly during calving. We met our second goal—to maintain a population level that will support a harvest of at least 600 caribou without precluding population growth—because the herd grew and harvest exceeded 600. We met our third goal—maintaining an opportunity for a subsistence harvest—by providing liberal hunting seasons. We met our fourth goal—to maintain viewing and photographing opportunities—because these opportunities were adequate when taking into account the unpredictability of caribou movements.

Our first and third objectives—to maintain a population of at least 18,000–20,000 caribou and a harvest of at least 600 caribou if the population is ≥18,000 caribou—were met because in 2002 population size was 31,857 caribou and since RY00, reported and estimated harvest combined has exceeded 600 caribou each year. We also met our fourth objective—of limiting the annual harvest of cows to a maximum of 3% of the cows in the population—because cow harvest has been <1% since RY92. This was partially accomplished by maintaining a bulls-only season during the time of year when hunting pressure was highest. We met our fifth objective—to maintain a ratio of at least 40 bulls:100 cows—because the ratio has been high since RY92 (>60 bulls:100 cows), and although we have not conducted a fall composition survey since 2002, we suspect that the bull:cow ratio is still at least 40 bulls:100 cows. We met our second objective—to maintain accessibility of seasonal ranges for CAH caribou—because, based on radiotelemetry and anecdotal observations, CAH animals were able to access their calving, postcalving, summer, fall, and winter ranges. We met our sixth objective—to reduce conflicts between consumptive and nonconsumptive uses of caribou along the Dalton Highway—because few conflicts between consumptive and nonconsumptive users appeared to arise during RY04–RY05, even though the North Slope Closed Area was rescinded by the Board of Game in 2004.

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TABLE 1 Central Arctic herd estimated population size, 1978–2002

	Population survey		Estimated
Year	Date	Method[a]	size
1978	Jul	STS	5,000
1981	Jul	AC	8,537
1983	Jul	APDCE	12,905
1991	18–20 Jun	GM	19,046[b]
1992	8–9 Jul	APDCE	23,444
1995	13 Jul	APDCE	18,100
1997	19–20 Jul	APDCE	19,730
2000	21 Jul	APDCE	27,128
2002	16 Jul	APDCE	31,857

[a] STS (Systematic transect surveys); AC (Aerial count); APDCE (Aerial Photo Direct Count Extrapolation, Davis et al. 1979); GM = Gasaway method (Gasaway et al. 1986; Valkenburg 1993).
[b] Ninety-percent confidence interval was 14,677–23,414.

TABLE 2 Central Arctic herd caribou percent parturition of radiocollared females, 1994–2006

		Percent parturition by subunit		
		≥4 years old[a]		
Year	Date	26B West (*n*)	26B East (*n*)	All 26B (*n*)
1994	10–14 Jun	67 (6)	78 (9)	73 (15)
1995	7–8 Jun	75 (4)	40 (5)	56 (9)
1996[b]				
1997	6–7 Jun	77 (13)	46 (13)	61 (26)
1998	3–4 Jun	93 (14)	83 (12)	88 (26)
1999	5, 9 Jun	94 (16)	92 (12)	93 (28)
2000	6–7 Jun	89 (9)	100 (16)	96 (25)
2001	3–9 Jun	90 (20)	93 (15)	91 (35)
2002	4–7 Jun	89 (27)	96 (23)	92 (50)
2003	30 May–8 Jun	93 (29)	100 (25)	96 (54)
2004	31 May–11 Jun	88 (40)	96 (28)	91 (68)
2005	31 May–9 Jun	86 (35)	80 (25)	83 (60)
2006	29 May–8 Jun	94 (32)	100 (22)	96 (54)

[a] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River. In some years, we captured unknown age adult females and these were included in the ≥4 years old sample.
[b] Survey not completed.

TABLE 3 Central Arctic herd caribou late June calf cow ratios (calves:100 cows) of radiocollared females ≥4 years old, 1994–2006

		Late June calf cow ratios (calves:100 cows) by subunit		
		≥4 years old[a]		
Year	Date	26B West (*n*)	26B East (*n*)	All 26B (*n*)
1994	27–29 Jun	50 (6)	75 (8)	64 (14)
1995	27, 30 Jun	75 (4)	50 (4)	63 (8)
1996	15–16 Jun	60 (10)	83 (6)	69 (16)
1997	29–30 Jun	85 (13)	64 (11)	75 (24)
1998	29–30 Jun	79 (14)	80 (15)	79 (29)
1999	22–24 Jun	92 (13)	67 (12)	80 (25)
2000	17–19 Jun	79 (14)	72 (18)	75 (32)
2001	23–25 Jun	78 (18)	81 (16)	79 (34)
2002	23–25 Jun	78 (28)	83 (24)	81 (52)
2003	24–26 Jun	77 (26)	78 (27)	77 (53)
2004[b]	24 Jun	78 (27)	87 (17)	82 (44)
2005	24 Jun	77 (35)	61 (23)	71 (58)
2006	23–24 Jun	82 (22)	94 (33)	89 (55)

[a] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River. In some years, we captured unknown age adult females and these were included in the ≥4 years old sample.
[b] Only GPS collared females with radiocollared calves were relocated because the caribou were aggregated tightly, making identifying a calf with the correct cow impossible.

TABLE 4 Central Arctic herd caribou known-age percent parturition of radiocollared females, 1994–2006

Year	Date	2-year-olds (*n*)[a]	3-year-olds (*n*)	4-year-olds (*n*)	5-year-olds (*n*)	≥6-year-olds (*n*)
1994	10–14 Jun	0 (5)				73 (15)
1995	7–8 Jun	0 (8)	0 (4)			56 (9)
1996						
1997	6–7 Jun	0 (2)	0 (1)	29 (7)	100 (2)	67 (3)
1998	3–4 Jun	0 (6)	100 (2)	0 (1)	88 (8)	100 (3)
1999	5, 9 Jun	9 (11)	100 (7)	100 (2)	100 (1)	100 (17)
2000	6–7 Jun	13 (8)	80 (10)	100 (5)		94 (16)
2001	3–8 Jun	8 (13)	77 (13)	100 (10)	75 (4)	94 (16)
2002	4–7 Jun	(0)	77 (12)	73 (11)	100 (9)	100 (20)
2003	30 May–8 Jun	0 (8)	(0)	100 (12)	85 (13)	100 (23)
2004	31 May–11 Jun	0 (6)	88 (8)	(0)	90 (10)	88 (32)
2005	31 May–9 Jun	0 (7)	86 (7)	83 (6)	(0)	82 (34)
2006	29 May–8 Jun	0 (7)	71 (7)	100 (6)	100 (6)	96 (25)

[a] A 2-year-old parturient caribou was classified based on presence of hard antlers only. No calf or udder was observed.

TABLE 5 Central Arctic herd caribou known-age late June calf:cow ratios (calves:100 cows) of radiocollared females, 1994–2006

Year	Date	2-year-olds (*n*)	3-year-olds (*n*)	4-year-olds (*n*)	5-year-olds (*n*)	≥ 6-year-olds (*n*)
1994	27–29 Jun	0 (4)	(0)	(0)	(0)	64 (14)
1995	27–30 Jun	0 (6)	0 (3)	(0)	(0)	62 (8)
1996	15–16 Jun	(0)	71 (7)	50 (4)	(0)	83 (6)
1997	29 Jun	(0)	0 (1)	57 (7)	100 (3)	100 (3)
1998	29–30 Jun	<1 (7)	50 (2)	0 (1)	86 (7)	100 (5)
1999	22–24 Jun	<1 (10)	33 (6)	100 (2)	100 (1)	80 (15)
2000	17–18 Jun	0 (11)	60 (10)	71 (7)	0 (1)	75 (20)
2001	23–25 Jun	0 (3)	38 (13)	78 (9)	80 (5)	80 (20)
2002	23–25 Jun	(0)	57 (14)	75 (12)	100 (10)	82 (22)
2003	24–26 Jun	(0)	(0)	100 (12)	50 (12)	78 (23)
2004[a]	24 Jun	(0)	(0)	(0)	100 (1)	75 (20)
2005	24 Jun	(0)	40 (5)	83 (6)	(0)	74 (31)
2006	23–24 Jun	(0)	71 (7)	100 (6)	83 (6)	96 (25)

[a] Only GPS collared females with radiocollared calves were relocated because the caribou were aggregated tightly, making identifying a calf with the correct cow impossible.

TABLE 6 Central Arctic caribou herd fall composition counts, 1976–2002

Survey date	Bulls:100 cows	Calves:100 cows	Percent calves	Percent cows	Percent small bulls (% bulls)	Percent medium bulls (% bulls)	Percent large bulls (% bulls)	Percent bulls	Composition sample size
Oct 1976	122	44	17	38				46	1223
Oct 1977	118	55	20	37				43	628
Oct 1978	96	58	23	39				38	816
Oct 1980	132	49	18	35				47	1722
Oct 1981	81	64	26	41	22	41	36	33	1712
16–18 Oct 1992	96	47	19	41	37	27	40	40	2469
22 Oct 1996	61	67	29	44	15	43	43	27	3062
12 Oct 2000	84	57	24	42	45	40	14	35	3335
13 Oct 2001	73	54	24	44	38	39	23	32	4092
24 Oct 2002[a]	67	72	30	42	36	43	21	28	1732

[a] This survey was conducted later in the fall than usual, and caribou were more widely distributed; thus, we were unable to obtain a large sample size.

TABLE 7 Central Arctic caribou herd harvest and hunter success, regulatory years 1992–1993 through 2005–2006

Regulatory year	Reported harvest				Total hunters	Percent successful hunters[b]	Estimated unreported harvest[c]	Total harvest
	Male	Female	Unk	Total (harvest by bow)[a]				
1992–1993	391	32	4	427 (93)	655	58	100–200	527–627
1993–1994	347	23	2	372 (90)	618	54	100–200	472–572
1994–1995	320	20	0	340 (103)	584	54	100–200	440–540
1995–1996	318	18	0	336 (79)	571	53	100–200	436–536
1996–1997	200	18	3	221 (77)	384	49	200–250	421–471
1997–1998	289	18	2	309 (96)	500	54	200–250	509–559
1998–1999	292	18	5	315 (87)	699	40	200–250	515–565
1999–2000	343	17	2	362 (136)	722	43	200–250	562–612
2000–2001	464	28	1	493 (215)	808	51	200–250	693–743
2001–2002	495	16	4	515 (192)	918	47	200–250	715–765
2002–2003	397	23	3	423 (98)	877	41	200–250	623–673
2003–2004	403	12	4	419 (139)	741	48	200–250	619–669
2004–2005	580	42	4	626 (228)	1096	46	200–250	826–876
2005–2006	611	42	7	660 (233)	1174	47	200–250	860–910

[a] Harvest by bow is also included in total harvest.

[b] Percent successful hunters calculated by dividing total reported harvest by number of successful hunters.

[c] Estimated by area biologist and Division of Subsistence.

TABLE 8 Central Arctic caribou herd harvest chronology, regulatory years 1992–1993 through 2005–2006[a]

Regulatory year	Harvest chronology by month (%)										Unk[b]	Total
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr		
1992–1993	7 (2)	197 (46)	122 (29)	73 (17)	10 (2)	1 (<1)	1 (<1)	0 (0)	6 (1)	6 (1)	3	427
1993–1994	34 (9)	152 (41)	73 (20)	78 (21)	14 (4)	1 (<1)	2 (<2)	4 (<1)	3 (1)	8 (2)	3	372
1994–1995	28 (8)	154 (45)	109 (32)	27 (8)	1	0 (0)	0 (0)	0 (0)	12 (3)	6 (2)	3	340
1995–1996	9 (3)	150 (45)	64 (19)	65 (19)	21 (6)	1 (<1)	4 (<1)	1 (<1)	9 (3)	8 (2)	4	336
1996–1997	13 (6)	108 (49)	49 (22)	35 (16)	1	0 (0)	2 (<1)	0 (0)	2 (1)	5 (2)	5	220
1997–1998	7 (2)	189 (61)	40 (13)	44 (14)	1	3 (1)	0 (0)	0 (0)	7 (2)	14 (4)	4	309
1998–1999	18 (6)	163 (52)	59 (19)	47 (15)	5 (2)	2 (<1)	3 (<1)	2 (<1)	3 (1)	9 (3)	4	315
1999–2000	18 (5)	201 (55)	86 (24)	16 (4)	8 (2)	1 (<1)	1 (<1)	0 (0)	8 (2)	17 (5)	6	362
2000–2001	42 (8)	262 (53)	109 (22)	32 (6)	11 (2)	0 (0)	2 (<1)	3 (<1)	4 (1)	24 (5)	4	493
2001–2002	28 (5)	217 (42)	117 (23)	127 (25)	7 (1)	0 (0)	0 (0)	2 (<1)	5 (1)	7 (1)	5	515
2002–2003	24 (6)	184 (43)	131 (31)	44 (10)	8 (2)	1 (<1)	1 (<1)	1 (<1)	4 (1)	21 (5)	4	423
2003–2004	17 (4)	228 (54)	122 (29)	24 (6)	3 (<1)	0 (0)	2 (<1)	2 (<1)	1 (<1)	12 (3)	8	419
2004–2005	22 (4)	364 (58)	117 (19)	77 (12)	6 (1)	1 (<1)	0 (0)	0 (0)	17 (3)	19 (3)	3	626
2005–2006	42 (6)	352 (53)	134 (20)	71 (11)	10 (1)	2 (<1)	1 (<1)	2 (<1)	17 (3)	21 (3)	8	660

[a] Includes only harvest from harvest report cards.

[b] Includes the occasional animal reported taken in May and June.

TABLE 9 Central Arctic caribou herd successful hunter transport methods, regulatory years 1992–1993 through 2005–2006[a]

Regulatory year	Transport methods (%)												Total
	Airplane		Horse/Dog		Boat[b]		3- or 4-Wheeler		Snowmachine		Other ORV		Highway vehicle		Unk		
1992–1993	89	(23)	7	(2)	17	(4)	6	(2)	0	(0)	0	(0)	243	(64)	18	(5)	380
1993–1994	49	(15)	4	(1)	20	(6)	4	(1)	2	(1)	0	(0)	242	(73)	12	(4)	333
1994–1995	81	(25)	0	(0)	23	(7)	0	(0)	0	(0)	0	(0)	214	(67)	0	(0)	318
1995–1996	87	(28)	4	(1)	30	(10)	0	(0)	0	(0)	0	(0)	177	(58)	7	(2)	305
1996–1997	63	(28)	8	(4)	19	(9)	0	(0)	0	(0)	0	(0)	126	(57)	5	(2)	221
1997–1998	58	(19)	7	(2)	14	(5)	0	(0)	0	(0)	1	(<1)	216	(70)	13	(4)	309
1998–1999	66	(21)	4	(1)	36	(11)	0	(0)	0	(0)	1	(<1)	205	(65)	3	(1)	315
1999–2000	100	(28)	9	(2)	29	(8)	1	(<1)	0	(0)	1	(<1)	218	(60)	4	(2)	362
2000–2001	90	(18)	17	(3)	74	(15)	1	(<1)	4	(<1)	0	(0)	302	(61)	5	(1)	493
2001–2002	108	(21)	7	(1)	68	(13)	1	(<1)	0	(0)	4	(<1)	324	(63)	3	(<1)	515
2002–2003	116	(27)	10	(2)	67	(16)	12	(3)	1	(<1)	2	(<1)	208	(49)	7	(2)	423
2003–2004	87	(21)	2	(<1)	97	(23)	3	(<1)	0	(0)	3	(<1)	222	(53)	5	(1)	419
2004–2005	92	(15)	10	(2)	180	(29)	0	(0)	1	(<1)	3	(<1)	335	(53)	5	(<1)	626
2005–2006	109	(17)	7	(1)	174	(26)	1	(<1)	0	(0)	1	(<1)	352	(53)	16	(2)	660

[a] Includes only harvest from harvest report cards.

[b] Includes airboats.

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition and archery equipment. The Federal Aid program allots funds back to states through a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum 5% of revenues collected each year. The Alaska Department of Fish and Game uses federal aid funds to help restore, conserve and manage wild birds and mammals to benefit the public. These funds are also used to educate hunters to develop the skills, knowledge and attitudes for responsible hunting.

Photo by Jim Dau, ADF&G