Caribou
Management Report
of survey-inventory activities
1 July 2002–30 June 2004

Cathy Brown, Editor
Alaska Department of Fish and Game
Division of Wildlife Conservation

ADF&G

Funded through
Federal Aid in Wildlife Restoration
Grants W-33-1 and W-33-2
December 2005

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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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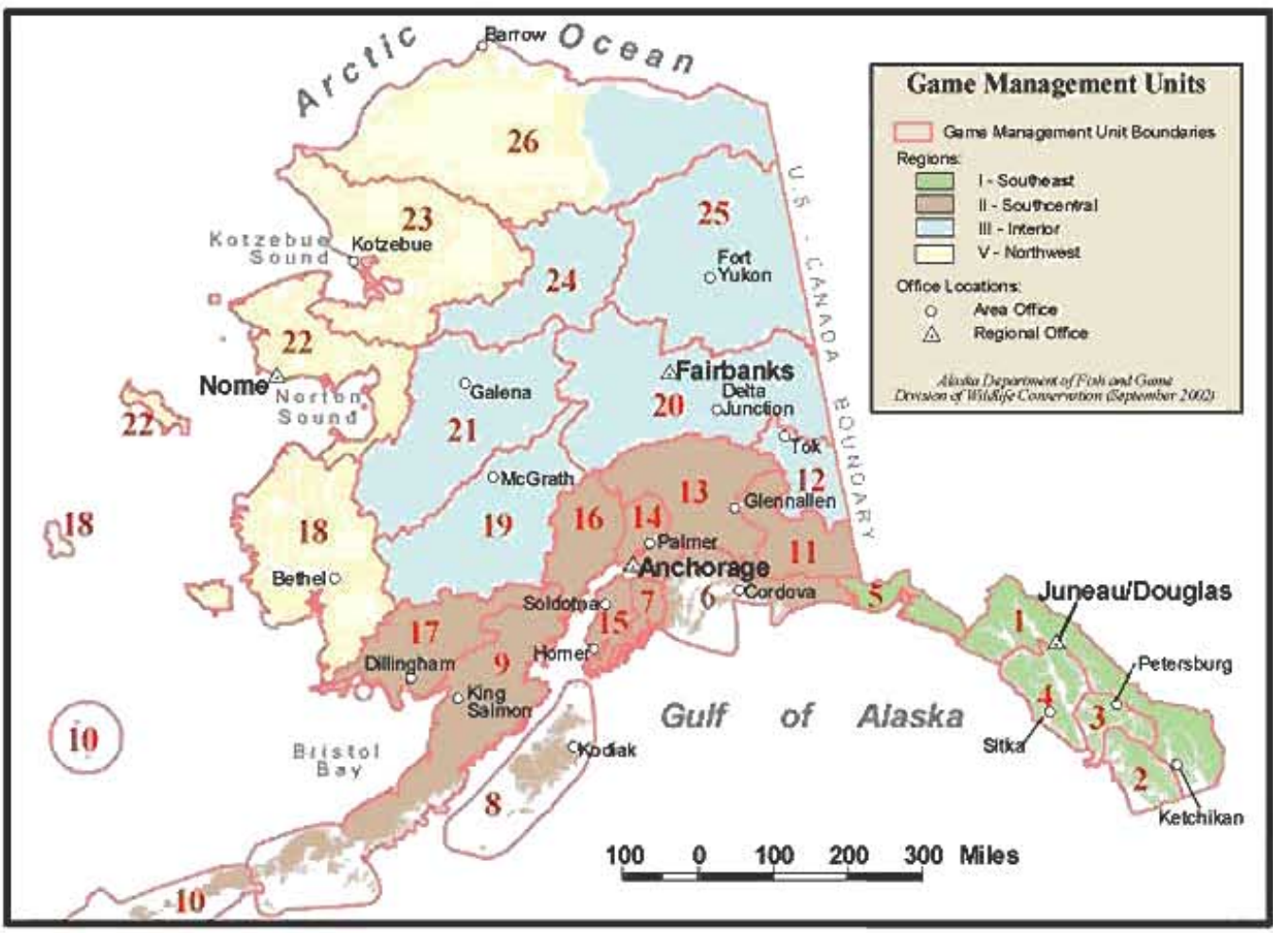
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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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

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

Beginning in 2002, the number of recognized caribou herds on the Kenai Peninsula was reduced to 4. As the Killey River herd grew, its range expanded to include the range of the Twin Lakes herd. The overlap of these herds makes them indistinguishable, and the herd is now recognized as the Killey River herd. The 2003–04 estimated population sizes of the KMCH, KLCH, KRCH, and FRCH were 300, 135, 400, and 30 caribou, respectively.

The KMCH has been hunted annually since 1972. The number of permits issued and animals harvested sharply increased as hunters became aware of the KMCH. From 1972 to 1976, the department issued an unlimited number of registration permits, and the season was closed by emergency order when necessary. In 1977, a limited permit system was implemented and remains in place. Following the 1985 peak in population, the KMCH began to decline for unknown reasons. The department reduced harvest from 1987 to 1990. Biologists surveyed the herd in fall 1992 and tallied 390 caribou; however, calf recruitment was only 14%. A March 1996 survey revealed the herd had grown to at least 425 animals, with a slightly increased calf percentage of 17%. Beginning in 1996 this herd showed a steady decline with 290 counted on 5 March 2000. Population trends correlated with harvest data collected since the early 1970s suggested the carrying capacity for this herd's range was 350 to 400 caribou.

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

The Killey River herd grew steadily until 2001, while the Fox River herd peaked in 1998. The herds occupied subalpine habitat rarely used by moose; however, the caribou may compete with Dall sheep for winter range. Caribou had been absent from this area since 1912 (Palmer 1938). Biologists documented instances of wolves killing caribou, which may explain the slow growth and subsequent decline of the Fox River herd. Another factor that has impacted caribou populations on the Kenai Peninsula is avalanches. From 2001 to 2003 we documented almost 200 caribou from the Killey River Herd that died in avalanches. The Killey River herd has been hunted since 1994, and the Fox River herd has been hunted since 1995.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

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

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

Management objectives for the Killey River and Fox River caribou herds are to: 1) maintain viable caribou populations throughout suitable caribou habitat in Subunits 15B (Killey River) and 15C (Fox River); and 2) provide for additional opportunities to hunt caribou on the Kenai Peninsula.

METHODS

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

POPULATION STATUS AND TREND

Population Size

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

herd increased to an estimated 500 animals and has since been variable at lower numbers (Table 1).

Kenai Lowlands Caribou Herd. The KLCH increased steadily from 96 animals in 1995–96 to a peak of 140 caribou counted (population estimate of 150) during spring 1999. The population declined slightly and is now estimated at 135 caribou (Table 2). The primary management concern is low recruitment caused by predation.

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

Fox River Caribou Herd. The FRCH mean annual rate of increase was 29% (range = 14–49%) between fall 1991 and 1994 and only increased 9% by spring 1996. The herd declined by 9% the following spring, then increased 16% by spring 1998. Predation by wolves and brown bears was the suspected cause of a reduction in herd size to 67 by the fall of 1998, when a survey revealed there were no calves in the herd. Recent surveys show the number of caribou has since decreased (Table 4).

Population Composition

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

Kenai Lowlands Caribou Herd. Biologists only surveyed the KLCH during spring because of poor fall survey conditions. The area where this herd aggregated during the fall rutting period was heavily timbered, making it difficult to locate and classify caribou. Data collected from 1996 to 2000 indicated the mean June calf percentage was 21 %, (range = 17–29%). Surveyors counted a low of 17 calves in 1997 compared to a high of 29 young in 1999. The counts increased from 96 to 140 caribou during the same period, but decreased the following year. During the latest survey flown (2003–04) we counted 25 calves, but the total number of caribou did not increase (Table 2).

Killey River Caribou Herd. A composition survey of 509 of 546 caribou observed on 23 June 1999 revealed the following ratios: 25 calves:100 cows, 36 bulls:100 cows, and calves composed 16 percent of the total classified. Although a survey was not completed in 1999–

2000, the herd is believed to have increased again and was estimated at 600 animals. This herd continued to grow and was estimated at 750 animals in 2001–02, but has since declined (Table 3). A major factor for the decline was the minimum of 191 caribou that died in avalanches between 2001–02 and 2003–04 (Table 7). Most of the mortalities were cows and calves, and the effect on herd composition has not been determined.

Fox River Caribou Herd. The last survey flown for this herd was during 2002–03 when 47 caribou were counted (Table 4). The latest information from other flights in this area is that the herd continues to decline.

MORTALITY

Harvest

Season and Bag Limits.

Kenai Mountains Caribou Herd—Open season for resident and nonresident hunters in Unit 7 north of the Sterling Highway and west of the Seward Highway was 10 August–30 September between 1993 and 1996. In 1997 and 1998, the season was 10 August–30 September and 10 November–10 December. In 1999, the season was extended to 10 August–31 December. The bag limit was 1 caribou by drawing permit (DC001), and 250 permits have been issued throughout this report period.

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

Killey River Caribou Herd—Open season for resident and nonresident hunters in Subunits 15B south and west of Killey River in the Kenai National Wildlife Refuge was 10 August–20 September. The bag limit was 1 caribou by drawing permit; up to 150 permits could be issued. In 1999, two drawing permit cow hunts were opened from 10 August to 10 September (hunt 610) and 15 September–10 October (hunt 612). Twenty permits, each for 2 caribou, were issued for each hunt for a total of 40 permits. Seasons and bag limits remained the same until 2001–02 when DC610 and DC612 were combined and changed to registration hunt RC610, with a bag limit of 3 cows and season dates of 10 August–20 September. Also at this time the bag limit for DC608 was changed from 1 caribou to 3, only 1 of which may be a bull. Season dates for DC608 remained 10 August–20 September. During fall 2004 the bag limit for DC608 was limited to 1 bull, and the number of permits issued was reduced to 25. No permits were issued for RC610 during 2004.

Fox River Caribou Herd—Open season for resident and nonresident hunters in Subunits 15C, that portion north of Fox River and east of Windy Lake, was 10 August–20 September. The bag limit was 1 caribou by drawing permit, and no more than 30 permits could be issued. During 2004 no permits were issued for this hunt.

Board of Game Actions and Emergency Orders

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

Permit hunts

Kenai Mountains Caribou Herd — Harvest for the Kenai Mountains caribou herd is administered through a drawing permit hunt (DC001). The department issued 250 permits annually during the last 5 years, and the average annual harvest has been 21 caribou (Table 9).

Kenai Lowlands Caribou Herd — The season was closed during this reporting period (Table 6).

Killey River Caribou Herd — Harvest for the Killey River caribou herd is administered through drawing permit (DC608) and registration permit (RC610) hunts. The number of permits and permit structure for Killey River caribou hunts has varied during the past 5 years (1999/2000–2003/2004). The number of drawing permits (DC608) issued annually has been 25 or 75 (Table 10). During 1999–2000 and 2000–2001 there were 2 additional drawing hunts (DC610 and DC612), and 40 total permits were issued annually. During 2001–02 these drawing permit hunts (DC610 and DC612) were combined to create a registration hunt (RC610). Anyone who applied for RC610 received a permit, so the number issued varied annually (Table 11).

Fox River Caribou Herd — Harvest for the Fox River caribou herd is administered through a drawing permit hunt (DC618). During the last 5 years (1999/2000–2003/2004) the department has issued 10 permits annually (Table 12).

Hunter Residency and Success

Kenai Mountains Caribou Herd — Local residents harvested 3 caribou, nonlocal residents harvested 15 and nonresidents harvested 1 in 2002. Local residents harvested no caribou, nonlocal residents harvested 22 and nonresidents harvested none in 2003 (Table 13).

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

Killey River Caribou Herd — Of successful hunters participating in hunt DC608 during 2002, 44% (n=7) were local residents, 50% (n=8) were nonlocal residents and 6% (n=1) were nonresidents. During 2003, 58% (n=7) were local residents, 33% (n=4) were nonlocal residents and 8% (n=1) were nonresidents (Table 14). Hunters harvested a total of 21 caribou in 2002 and 16 during 2003 under DC608 (Table 10).

The department issued 137 permits in 2002 for hunt RC610, resulting in a harvest of 25 cows. During 2003, the department issued 109 permits, which resulted in a harvest of 14 cows (Table 11).

Fox River Caribou Herd — The department issued 10 permits in 2002 and 2003 for hunt DC618, which resulted in a harvest of 1 caribou each year (Table 12). Local residents were the only successful hunters during 2002 and 2003 (Table 15).

Harvest Chronology

Kenai Mountains Caribou Herd — Since 1999, essentially all of the harvest for hunt DC001 occurred during August and September (Table 16). In the past 5 years combined (1999/2000–2003/2004), hunters harvested 59% of the take during August, 34% in September and less than 7% after September.

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

Killey River Caribou Herd — During the 2002 hunting season 67% (14 of 21) of the harvest occurred 1–15 September, while the harvest was more evenly distributed throughout the 2003 season for hunt DC608 (Table 17).

Fox River Caribou Herd — For the 2002 and 2003 seasons combined, all of the harvest occurred during the middle 2 weeks of the season (Table 18).

Transport Methods

Kenai Mountains Caribou Herd — In 2002 and 2003 most successful hunters used highway vehicles for access and then hiked into the areas they hunted (Table 19).

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

Killey River Caribou Herd — During 2002 hunters used horses, boats or airplanes for access relatively equally, while almost everyone used only horses for access in 2003 (Table 20).

Fox River Caribou Herd —All successful hunters (n=2) used boats for access during the 2002 and 2003 seasons (Table 21).

HABITAT

Assessment

Biologists have not thoroughly investigated the habitat components of the Kenai Mountains herd. There are approximately 1407 km^2 (563 mi^{-2}) within the known range of the KMCH. Winter range was approximately 532 km^2 of the total identified range. The department initially discussed habitat concerns during the mid 1980s when the herd started to decline. Between 1980 and 1984 the KMCH had high calf:cow ratios and the herd was growing. Subsequent declines in the calf:cow ratios and herd size between 1985 and 1990 raised concerns over habitat adequacy. Hunting mortalities probably became additive around 1985; while hunting may have accelerated the decline, it provided some habitat protection. The herd declined to 300 animals by 1988 and remained at that size until 1990. The calf:cow ratio improved with 34:100 in fall 1990. As the herd increased, the percentage of calves observed declined from 20% in 1990 to 14% in fall 1992. A 14 March 1996 composition survey revealed the herd size had continued to increase since 1992. We

observed 425 caribou and classified 403. Classification indicated the bull:cow ratio has remained relatively unchanged at about 41:100 since 1990, and the calf:cow ratio has increased slightly from 14:100 in 1992 to 17:100 in 1996. Composition surveys were not completed from 1997 to 2004; however, surveys to determine population size were. The observation of 452 caribou on 14 March 1997 indicated the herd had reached its highest number and began a downward trend. During the October 2001 survey, 353 were counted. This has been the typical pattern of the Kenai Mountains caribou herd over the past 3 decades. The KMCH appeared more productive when stabilized around 350–400 caribou.

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

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

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

CONCLUSIONS AND RECOMMENDATIONS

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

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

The Killey River herd increased from 1998 to 2001. Reduced annual recruitment and declining mean weight of female calves indicate this herd may now be becoming habitat limited. A secondary management objective is to allow hunting as this herd increases. During the winters of

2001/02–2003/04 avalanches killed a minimum of 191 Killey River caribou. The effects of these events on population parameters are not known because surveys have not been conducted since.

The Fox River caribou herd has declined in recent years, probably due to increased predation by wolves and bears or migration into the Killey River herd. Observations by staff and hunters indicate that a pack of at least 6 wolves, several brown bears and numerous black bears commonly use this small area. I recommend that we stop issuing permits for hunt DC618 until we can demonstrate that this herd is increasing from its present numbers.

LITERATURE CITED

PALMER, L. J. 1938. Management of moose herds on the Kenai Peninsula. Restoration Project Report March, April, and May 1938. Unpublished manuscript. Kenai National Wildlife Refuge files, Soldotna. AK. 40pp.

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Table 1 Kenai Mountains caribou fall composition counts and estimated population size, 1999–2004

Regulatory year	bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1999–2000[b]	--	--	--	--	--	--	--	290	325
2000–2001[c]	--	--	--	--	--	--	--	378	400
2001–2002[d]	--	--	--	--	--	--	--	353	375
2002–2003	--	--	--	--	--	--	--		300
2003–2004	--	--	--	--	--	--	--		300

[a] Estimated herd size postseason.
[b] Surveyed 5 Mar 2000.
[c] Surveyed 31 Mar 2001.
[d] Surveyed 23 Oct 2001.

Table 2 Kenai Lowlands caribou composition counts and estimated population size, 1999–2004

Regulatory year	bulls: 100 cows	Calves: 100 cows	Calves (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1999–2000[b]	--	--	25(18)	--	--	25(24)	--	131	140
2000–2001[c]	--	--	29(22)	--	--	18(18)	--	128	135
2001–2002	--	--	11(9)	--	--	11(13)	--	98	135
2002–2003	No surveys conducted								
2003–2004[d]	--	--	25(26)	--	--	--	--	88	135

[a] Estimated herd size in June.
[b] Surveyed 20 Jun 2000.
[c] Surveyed 19 Jun 2001.
[d] Surveyed 18 Jun 2004. After the survey we received a reliable report accounting for 44 additional animals.

Table 3 Killey River caribou composition counts and estimated population size, 1999–2004

Regulatory year	bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate[a] of herd size
1999–2000	--	--	--	--	--	--	--	--		600
2000–2001[b]	42	24	87(14)		--	--	--	154(25)	607	650
2001–2002[c, d]	--	--	--		--	--	--	--	710	750
2002–2003[e]	--	--	14(4)		--	--	--	--	347	400
2003–2004	No surveys conducted									

[a] Estimated fall herd size.
[b] Surveyed 14 Nov 2000.
[c] Surveyed 19 Oct 2001.
[d] A minimum of 143 caribou died in an avalanche during the winter of 2001–02.
[e] Surveyed 27 Dec 2002.

Table 4 Fox River caribou fall composition counts and estimated population size, 1999–2004

Regulatory year	bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	Total bulls (%)	Composition sample size	Estimate of herd size
1999–2000	No surveys conducted									70
2000–2001[a]	--	--	10 (14)		--	--	--	--	70	70
2001–2002[b]	--	--	--		--	--	--	--	66	66
2002–2003[c]	--	--	--		--	--	--	--	47	50
2003–2004	No surveys conducted									

[a] Surveyed 1 Nov 2000.
[b] Surveyed 19 Oct 2001.
[c] Surveyed 26 Mar 2003.

Table 5 Kenai Mountains caribou harvest (DC001) and accidental death, 1999–2004

Regulatory year	Hunter Harvest: Reported M (%)	F (%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death	Grand Total
1999–2000	11(46)	13(54)	0	24	--	--	--	--	24
2000–2001	15(68)	7(32)	0	22	--	--	--	--	22
2001–2002	13(68)	6(19)	0	19	--	--	--	--	19
2002–2003	11(58)	8(42)	0	19	--	--	--	--	19
2003–2004	14(67)	7(33)	1	22	--	--	--	--	22

Table 6 Kenai Lowlands caribou harvest and accidental death, 1995–2004

Regulatory year	Hunter Harvest: Reported M (%)	F (%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death	Grand Total
1999–2000[a]	No open season							3	3
2000–2001	No open season							0	0
2001–2002	No open season							0	0
2002–2003	No open season							0	0
2003–2004	No open season							0	0

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

Table 7 Killey River caribou harvest (DC608) and accidental death, 1999–2004

Regulatory year	Hunter Harvest: Reported M (%)	F (%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death	Total
1999–2000	13(93)	1(7)	0	14	--	--	--	--	14
2000–01	13(100)	0	0	13	--	--	--	--	13
2001–02 [a]		4(29)	0	14	--	--	--	143	157
2002–03 [b]		4(19)	0	21	--	--	--	25	46
2003–04 [c]	10(63)	6(37)	0	16	--	--	--	23	39
	10(71)							Grand	
	17(81)								

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

Table 8 Fox River caribou harvest (DC618) and accidental death, 1999–2004

Regulatory year	Hunter Harvest: Reported M (%)	F (%)	Unk.	Total	Estimated: Unreported	Illegal	Total	Accidental death	Total
1999–2000	1(50)	1(50)	0	2	--	--	--	--	2
2000–01	3(100)	0	0	3	--	--	--	--	3
2001–02	1(100)	0	0	1	--	--	--	--	1
2002–03	1(100)	0	0	1	--	--	--	--	
2003–04	0	1(100)	0	1	--	--	--	--	1
								Grand	

1

Table 9 Kenai Mountains caribou harvest (DC001), 1999–2004

Regulatory year	Permits issued	did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
1999–2000	250	50	19	81	11(46)	13(54)	--	24
2000–01	250	54	19	81	15(68)	7(32)	--	22
2001–02	250	64	21	79	13(68)	6(32)	--	19
2002–03	250	51	15	85	11(58)	8(42)	--	19
2003–04	250	50	18	82	14(67)	7(33)	1	22

Percent

Table 10 Killey River caribou harvest (DC608), 1999–2004

Regulatory Year	Permits issued	did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
1999–2000	25	24	74	26	13(93)	1(7)	0	14
2000–01	25	20	65	35	13(100)	0	0	13
2001–02 [a]	25	52	48	52	10(71)	4(29)	0	14
2002–03 [a]	75	52	58	42	17(81)	4(19)	0	21
2003–04 [a]	75	57	50	50	10(63)	6(37)	0	16

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

Percent

Table 11 Killey River caribou harvest (DC610, DC612, and RC610) by permit hunt, 1999–2004

Hunt No. /Area	Regulatory year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
DC610& DC612									
		40	40	25	75	1(17)	5(83)	0	6
	2000/01	40	52	16	84	0	3(100)	0	3
RC610									
		158	53	54	46	0	40(100)	0	40
		137	56	42	58	0	25(100)	0	25
1999/00		109	49	25	75	0	14(100)	0	14

2001/02
2002/03
2003/04

Table 12 Fox River caribou harvest (DC618), 1999–2004

Regulatory year	Permits issued	did not hunt	Percent successful hunters	Percent unsuccessful hunters	Bulls (%)	Cows (%)	Unk.	Total harvest
1999–2000	10	60	50	50	1(50)	1(50)	0	2
2000–2001	10	50	60	40	3(100)	0	0	3
2001–2002	10	60	20	80	1(100)	0	0	1
2002–2003	10	60	25	75	1(100)	0	0	1
2003–2004	10	70	33	67	0	1(100)	0	1

Percent

Table 13 Kenai Mountains caribou (DC001) hunter residency and success, 1999–2004

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	
1999–2000	2	22	0	24(19)	7	90	3	100(81)	124
2000–01	0	21	1	22(19)	4	88	0	92(81)	114
2001–02	1	14	4	19(21)	1	69	0	70(79)	89
2002–03	3	15	1	19(15)	8	95	1	104(85)	123
2003–04	0	22	0	22(18)	5	96	1	102(82)	124

[a] Local resident resides in Unit 7.

Table 14 Killey River caribou (DC608) hunter residency and success, 1999–2004

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	
1999–2000	10	4	0	14(74)	4	1	0	5(26)	19
2000–01	12	1	0	13(65)	2	3	2	7(35)	20
2001–02	8	5	1	14(39)	14	5	3	22(61)	36
2002–03[b]	7	8	1	16(44)	12	8	0	20(56)	36
2003–04[b]	7	4	1	12(38)	11	8	2	21(62)	33

[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 15 Fox River caribou (DC618) hunter residency and success, 1999–2004

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	
1999–2000	2	0	0	2(50)	2	0	0	2(50)	4
2000–2001	3	0	0	3(60)	0	0	2	2(40)	5
2001–2002	1	0	0	1(25)	0	3	0	3(75)	4
2002–2003	1	0	0	1(25)	3	0	0	3(75)	4
2003–2004	1	0	0	1(33)	0	2	0	2(67)	3

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

Table 16 Kenai Mountains caribou (DC001) harvest chronology, 1999–2004

Regulatory year	Harvest periods				
	8/10–8/31	9/01–9/30	10/01–10/31	11/01–12/31	n
1999–2000	15	8	1	0	24
2000–2001	11	11	0	0	22
2001–2002	9	10	0	0	19
2002–2003	16	3	0	0	19
2003–2004	12	4	4	2	22

Table 17 Killey River caribou (DC608) harvest chronology, 1999–2004

Regulatory year	Harvest periods					
	8/10–8/15	8/16–8/31	9/1–9/15	9/16–9/30	Unk.	n
1999–2000	5	1	8	1		115
2000–2001	1	3	9	0	0	13
2001–2002	3	2	4	4	1	14
2002–2003	1	2	14	2	1	21
2003–2004	2	6	5	3	0	16

Table 18 Fox River caribou (DC618) harvest chronology, 1999–2004

Regulatory year	Harvest periods				
	8/10–8/15	8/16–8/31	9/1–9/15	9/16–9/30	n
1999–2000	0	1	1	0	2
2000–2001	2	0	1	0	3
2001–2002	1	0	0	0	1
2002–2003	0	0	1	0	1
2003–2004	0	1	0	0	1

Table 19 Kenai Mountains caribou % harvest (DC001) by transport method, 1999–2004

Regulatory year	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV [a]	Highway vehicle	Unknown	n
1999–2000	21	4	0	0	0	0	75	0	24
2000–2001	5	23	0	0	0	0	73	0	22
2001–2002	21	11	0	0	0	5	42	21	19
2002–2003	11	26	0	0	0	0	63	0	19
2003–2004	9	18	0	0	0	0	55	18	22

[a] ORV includes mountain bike.

Table 20 Killey River caribou % harvest (DC608) by transport method, 1999–2004

Regulatory year	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1999–2000	0	43	57	0	0	0	0	0	14
2000–2001	0	31	69	0	0	0	0	0	13
2001–2002	0	57	36	0	0	0	0	7	14
2002–2003	29	38	33	0	0	0	0	0	21
2003–2004	6	81	6	0	0	0	0	6	16

Percent of harvest

Table 21 Fox River caribou % harvest (DC618) by transport method, 1999–2004

Regulatory year	Percent of harvest								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unknown	n
1999–2000	0	0	100	0	0	0	0	0	2
2000–2001	0	0	100	0	0	0	0	0	3
2001–2002	0	0	100	0	0	0	0	0	1
2002–2003	0	0	100	0	0	0	0	0	1
2003–2004	0	0	100	0	0	0	0	0	1

Alaska Department of Fish and Game
Division of Wildlife Conservation
(907) 465-4190 PO BOX 25526
JUNEAU, AK 99802-5526

CARIBOU MANAGEMENT REPORT

From: July 1, 2002
To: June 30, 2004

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 photocensusing 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 2004 provided a minimum estimate of 85,000 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. The last photocensus was conducted just after this reporting period, in July 2004, though flights preliminary to the photocensus occurred in June. 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). 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 2003, eighteen 10-month-old female calves and one 22-month-old female were radiocollared between the Nushagak and Kvichak Rivers near Levelok. Three more 10-month-old female calves were radiocollared near Togiak Lake. In April 2004, six 10-month-old female calves and 6 adult males were radiocollared between the Nushagak and Kvichak Rivers, near Levelock.

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 Troopers, Bureau of Wildlife Enforcement (ABWE) 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 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. 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 7 July 2004. Based on results of that survey, the population estimate for the MCH was 85,000 (Table 1). The MCH has declined as indicated by the summer 2004 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 Kilbuck Mountains (Units 19A&B) on 9 October 2002, and in the middle Nushagak River drainage (Unit 17B&C) on 10 October 2002. In 2003 composition surveys were conducted in the middle Nushagak River and lower Mulchatna River drainages (Units 17B&C) on 11 October, and near Whitefish Lake (Unit 19A) on 14 October.

During the fall 2002 surveys, 42.5 bulls:100 cows were counted in the sample of 1343 caribou in Units 19A&B. Only 21.0 bulls:100 cows were observed in the sample of 4391 caribou in Unit 17. The caribou located in Unit 17 generally were subject to heavier hunting pressure in the fall than the caribou in Unit 18, which probably contributes to the disparity in the bull:cow ratio between the survey areas. Because of the great deal of mixing of the herd throughout the rest of the year, composition data for the 2002 survey were pooled for an overall bull:cow ratio of 25.7 bulls:100 cows (Table 2).

During the fall 2003 surveys, 28.6 bulls:100 cows were counted in the sample of 2005 caribou in Unit 18. Only 14.1 bulls:100 cows were observed in the sample of 5816 caribou in Unit 17. Composition data for the 2003 surveys were pooled for an overall bull:cow ratio of 17.4 bulls:100 cows (Table 2).

The fall calf:cow ratio observed on 9 October 2002 in Units 19A and B was 23.6 calves:100 cows and in Unit 17C on 10 Oct was 29.4 calves:100 cows. Pooled counts for both areas gave a calf:cow ratio of 28.1 calves:100 cows in fall 2002 (Table 2). The fall calf:cow ratio observed on 11 October 2003 in Units 17B and C was 23.2 calves:100 cows; on 14 October in Unit 19A it was 33.9 calves:100 cows. Pooled counts from all 3 areas gave a calf:cow ratio of 25.6 calves:100 cows for the Mulchatna herd in fall 2003 (Table 2).

Productivity Surveys

Productivity surveys were flown in May 2003 and 2004. A total of 28 radiocollared female caribou of calf-bearing age were located in May 2003: five 2-year-olds (radioed as calves in spring 2002); six 3-year-olds (radioed as calves in spring 2001); nine 4-year-olds (radioed as calves in spring 2000); and eight 5-years old or older. Of the 28 caribou, 16 were accompanied by calves or had hard antlers. None of the 2-year-old or 3-year-old females was accompanied by calves or had hard antlers. Eight of the nine 4-year-olds and all 8 of the cows 5 years or older were accompanied by calves or had hard antlers.

A total of 27 radiocollared female caribou of calf-bearing age were located in May 2004: nine 2-year-olds (collared as calves in spring 2003); two 3-year-olds (collared as calves in spring 2002);

three 4-year-olds (collared as calves in spring 2001); and thirteen 5 years old or older. Of the 27 caribou, 15 were accompanied by calves or had hard antlers. None of the 2-year-old or 3-year-old females was accompanied by calves or had hard antlers. All 3 of the 4-year-olds and 12 of the 13 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 49 caribou with active radio collars in June 2004. 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 radiotelemetry 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 2002 and again in fall 2003, 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 2002–03, 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. Movement into these wintering areas probably has decreased pressure on the forage supply in the formerly used wintering areas. Winter distribution during 2003–04 was about the same as the previous winter, with large numbers moving into snow-free areas near the lower Kvichak River in March 2004.

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, northeast of the village of Koliganek. In 1994 most of the MCH females started using the area between the upper Nushagak River and upper Tikchik Lakes for calving. In May 1996, 1997 and 1998, most of the cows from the MCH calved in the drainages of the King Salmon River and Klutuspak Creek of the upper Nushagak River. In May 1999 the drainages of the King Salmon River and Klutuspak Creek were still covered with snow, and the caribou continued to move south to the edge of the snow, between Klutuspak Creek and the Nuyakuk River, where many of them calved. Calving during the spring of 2000, 2001, and 2002 occurred in 2 distinct areas: the lower Nushagak River and the headwaters of the South Fork of the Hoholitna River. In May 2003 calving also occurred in 2 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 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.

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 a large part of the herd moves to the western side of its range during the fall, back to the middle part of its range for calving, into the upper Mulchatna River drainage for the postcalving aggregations, becomes widely dispersed throughout its range by late summer, and then forms into large groups and moves west again during the fall.

In May 2002 most of the MCH returned from being scattered throughout the western part of the range to calve in the middle Nushagak River area and South Fork of the Hoholitna River. Throughout June, most of the herd moved into the eastern Nushagak Hills and scattered through the upper Mulchatna River area. During late June, large aggregations moved southeast from the northeastern Nushagak Hills and upper Mulchatna drainage into the lower Mulchatna River area. The large postcalving aggregations during late June–early July 2002 occurred in the upper Koktuli River, where the photocensus for that summer took place. By late July, the caribou were moving northward from the lower Nushagak River area and scattered throughout Units 9B,17B, and probably southern 19B. Large numbers of caribou also moved westward into Unit 18 by mid September. During fall 2002 and winter of 2002–03, the bulk of the Mulchatna Herd was scattered throughout Unit 18 south of the Kuskokwim River, though 10,000–20,000 remained throughout the winter in the Mulchatna River drainage. By late April 2003, Mulchatna caribou started moving toward the calving areas for that year, in the middle Nushagak River area and northeastern Nushagak Hills/Hoholitna River drainage.

Postcalving aggregations during summer 2003 occurred in widely scattered areas, including the upper Tikchik Lakes, Muklung Hills, and a group of 30,000–40,000 west of the Nushagak River near Portage Creek. Again, by late July and early August, most of the herd became widely scattered throughout much of its range until aggregations formed for the rut in late September and early October 2003. By late fall most of the caribou were in the general areas where they would winter. A large portion of the herd wintered south of the Kuskokwim River in Unit 18, and another large portion wintered between the lower Nushagak River and the Kvichak River. In late April 2004, caribou moved from the various wintering areas to where they would calve. Unlike the previous several years, when large groups of calving caribou used distinct areas (i.e. lower and middle Nushagak River area and Hoholitna River drainage), in May 2004 caribou were scattered from Dillingham northward to the confluence of the Holitna and Hoholitna Rivers. In addition, a few cows accompanied by calves were observed in Unit 18 south of the Kuskokwim River. Postcalving aggregations during summer 2004 again were 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.

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.

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
Unit 9B.		
Resident Hunters: 5 caribou, of which only 1 may be a bull during 1 Jul–30 Nov	1 Jul–15 Apr	
Nonresident Hunters: 1 caribou		1 Aug–15 Apr
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 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	
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 2003 meeting, the Alaska Board of Game reduced the bag limit for nonresident caribou hunters to 1 caribou and changed the resident bag limit so only 1 bull could be taken prior to 30 November in Units 17 and 9B. The board made these same changes to the bag limits for Unit 18 during its fall 2003 meeting, and for Units 19A and B during the spring 2004 meeting. No emergency orders for caribou were issued during this reporting period.

Hunter Harvest. The reported harvest from the MCH was 2582 caribou during the 2003–04 hunting season and 3175 during 2003–04 (Table 3). These totals and the number of hunters reporting hunting Mulchatna caribou are similar to the previous several years. As in previous years, males composed most of the reported harvest each year (74% and 64%).

The unreported harvest has been estimated at an additional 5000 caribou most years. This number should be viewed with some caution. Change in distribution from year to year, as well as snow cover adequate for winter travel, can greatly affect the number of caribou killed. While reminder letters were sent to caribou hunters, 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). The number of caribou harvested by local residents undoubtedly has increased since the subsistence surveys because of increases in the size and range of the herd and number of people living in the surrounding villages. Unreported harvest by other Alaska residents is even more difficult to quantify.

From the early 1980s through 1999, the number of people reporting hunting for Mulchatna caribou steadily increased, 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. Since then, however, commercial operators providing transportation to hunters have expanded into areas previously not hunted, as well as basing their hunts from additional communities located throughout the range of this herd.

Hunter Residency and Success. Local Alaska residents (living within the range of the Mulchatna herd) made up 13% of the reporting hunters during the 2002–03 season and 16% of the hunters during 2003–04. Nonlocal Alaska residents accounted for 33% of the reporting hunters during the 2002–03 season and 36% during 2003–04. Nonresidents made up 52% of the reporting hunters during the 2002–03 season and 47% of the reporting hunters during 2003–04. Of the reporting hunters, 63% successfully harvested at least 1 caribou in 2002–03 and in 2003–04, 70% were successful (Table 4).

Harvest Chronology. Most (79%) of the reported harvest in 2002–03 occurred during August and September, as did 64% in 2003–04. March was also an important month for harvesting caribou, accounting for 6% in 2002–03 and 13% in 2003–04 of the reported harvest and probably a large portion of any local unreported harvest. These data are comparable to the harvest chronology reported for previous years (Table 5).

Transport Methods. Aircraft were the most common means of hunter transportation reported during the 2002–03 (82%) and 2003–04 (73%) hunting seasons (Table 6). Boats and snowmachines were other important means of transportation and were the main transportation methods for local hunters, and 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 85,000 by summer 2004. 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, then both appeared to have declined. Despite efforts to increase harvest information, reported hunting effort during this reporting period indicates harvests remain at less than 7% of the herd. However, a better assessment of unreported harvest will be important if the herd continues to decline substantially. The MCH is an important source of meat and recreation for hunters throughout southcentral and southwest Alaska. Establishment of the 5 caribou bag limit, coupled with the reputation for large antler and body sizes, made this herd popular with hunters. However, if the herd continues to decline, adjustments to the bag limit will be warranted.

During the past 15 years, the MCH has made dramatic changes in its range. In the early 1980s, the herd spent most of the year east of the Mulchatna River between the Bonanza Hills and Iliamna Lake. 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 the outbreak of foot rot in 1998 and the low calf:cow ratios in fall 1999 (Woolington 2001). Caribou in the adjacent NAPCH had a high incidence of lungworms in 1995 and 1996. 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. Conducting an annual photocensus during post-calving aggregations.

2. Conducting annual October composition surveys in at least 2 distinct areas.

3. Conducting calving surveys in May of each year.

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

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

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

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

8. Working 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 1991–2004

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

[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 1991–2003

Regulatory Year	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	59.8	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	--

[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– 2003

	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	--	9004
2001–2002	72%	27%	0.4%	3830	2500[c]	--	2500	--	6330
2002–2003	74%	25%	0.5%	2582	2500[c]	--	2500	--	5082
2003–2004	64%	35%	0.9%	3175	2500[c]	--	2500	--	5675

[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 1991–2003

Regulatory Year	Successful: Local resident[a]	Successful: Nonlocal resident	Successful: Nonresident	Successful: Total (%)	Unsuccessful: Local resident[a]	Unsuccessful: Nonlocal resident	Unsuccessful: Nonresident	Unsuccessful: Total (%)	Total hunters[b]
1991–1992	89	562	599	85%	9	136	69	15%	1464
1992–1993	82	542	651	91%	12	82	26	9%	1391
1993–1994	47	718	725	86%	5	171	77	14%	2394
1994–1995	61	812	896	85%	11	227		15%	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%	4140
2000–2001	188	817	1713	68%	148	427	692	32%	3999
2001–2002	270	843	1377	74%	159	351	368	26%	3406
2002–2003	169	556	1028	63%	210	383	450	37%	2833
2003–2004	312	763	1061	70%	181	352	378	30%	3080

Successful

Unsuccessful

Resident

124

[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– 2003

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%	56%	5%	0.7%	1%	3%	2%	6%	2%	2582
2003–2004	0.3%	19%	45%	4%	0.6%	4%	5%	5%	13%	3%	3175

[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 1991–2003

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%		0.2%	2%	1573
1992–1993	88%	0.2%	8%	3%	3%	0.1%	0.1%	0%	1602
1993–1994	86%	1%	10%	1%	2%	0.1%	1%	0%	2804
1994–1995	85%	0.2%	12%	1%	2%	0.3%	0.2%	0.2%	3301
1995–1996	88%	0.2%	9%	1%	2%	0%	0.1%	0%	4449
1996–1997	82%	0.4%	10%	2%	3%	0.1%	0.7%	1%	2366
1997–1998	86%	0.4%	8%	1%	2%	0.3%	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%	0.1%	0.7%	1%	4467
2000–2001	87%	0.2%	6%	1%	5%	0.2%	0.1%	0.6%	4096
2001–2002	79%	0.1%	7%	2%	11%	0.1%	0.2%	0.8%	3830
2002–2003	82%	0.2%	8%	3%	5%	0.2%	0%	0.2%	2582
2003–2004	73%	0%	6%	2%	19%	0.1%	0%	0.7%	3175

[a] Includes harvest by unknown transport method.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 (i.e., 2000 caribou). By 1963 the herd had increased to more than 10,000 animals (Skoog 1968). The first radiotelemetry-aided census in 1981 estimated 16,000 caribou; by 1984 the herd had increased to 20,000.

During the next several years, 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

In late June 2003 and 2004 a fixed-winged aircraft was used to conduct radiotelemetry-aided aerial photocensuses on postcalving concentrations. Oblique 35mm photos of large groups were taken to allow accurate enumeration. In addition, the U.S. Fish and Wildlife Service (FWS) surveyed peripheral areas along the Aleutian Mountains and Pacific Coast. Calf percentages were calculated from direct enumeration of 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 with a helicopter between the Naknek River and Port Moller. Caribou were classified as calves, cows, small bulls, medium bulls, and large bulls.

Parturition Surveys

From late May through early June of 2003 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 FWS to maintain 25–30 functioning radio collars in the NAPCH. In April 2001 we put standard collars on 22 female calves and 1 female yearling. In July 2001 we fitted 6 adult females with satellite collars and 1 yearling female with a standard VHF collar. In October 2002 we put satellite collars on 6 adult females captured between the Naknek and King Salmon Rivers to monitor intermingling with the Mulchatna herd. In April 2004 standard radio collars were placed on 9 female calves and 4 female yearlings and a satellite collar was placed on 1 adult female. In October 2004 satellite collars with VHF beacons were placed on 10 adult females and a standard radio collar was placed on 1 adult female. 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 state Tier II and federal subsistence permits beginning in 1999. Survival rates of radiocollared females were estimated with the Kaplan-Meier method (Pollock et al. 1989)

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Minimum counts from photocensuses during 1981–1993 ranged between 15,000 and 19,000 caribou. Annual variations in counts were caused by actual changes in herd size and/or sampling error (restricted coverage due to poor weather or errors in visual estimates). Because of concerns regarding winter range quality, in the late 1980s we decided to keep the herd at the lower end of the management objective. The actual postcalving count dropped from a minimum of 16,500 in 1992 to 15,000 in 1993. The 1994 postcalving count, which involved extended coverage of fringe areas, only tallied 12,000 caribou. The herd began a decline in 1992, although at first the decline was not viewed with alarm because the herd was at the desired level. We anticipated that harvest pressure would decline due to liberalized regulations for the growing Mulchatna herd and closure of the King Salmon Air Force Base. Despite a series of hunting restrictions implemented starting in 1994, which significantly reduced harvests, the herd continued to decline through 2004 (Table 1).

Population size

Over the past 14 years, the size of the NAPCH has been reported in 2 ways: the actual number of caribou counted during the postcalving photocensus, rounded to the nearest 100, and an estimated total herd size which included 1000 to 1500 "uncounted" caribou believed to be in fringe areas. Since 1995, staff 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 obtained from photocensuses in previous years. The same cooperative counts conducted during 1999–2002 resulted in estimates of 8600, 7200, 6300, and 6660, respectively (Table 1). In 2003 weather and staff turnover limited our ability to complete the population count, and weather limited surveys in 2004. A computer model, based on estimated recruitment and survival rates, closely agrees with the 2004 population estimate and predicts that there are 3000–4000 caribou in this herd. Because of corroborative information, Table 1 lists the point estimate from the 2004 population count.

Population Composition

During 1970–80 when the NAPCH was growing, the average fall ratio was 50 calves:100 cows (range = 45–56). During 1981–94, the fall ratio varied from 27 to 52 calves:100 cows and averaged 39 (Table 1). During 1995–2002 the ratio averaged 26 calves:100 cows (range = 18–38). During the past 2 years the fall ratios were the lowest ever recorded for this herd (11 and 7 calves:100 cows in 2003 and 2004, respectively).

From 1990 to 1997, the bull:cow ratio averaged 42:100 (range 34–48), but the ratio dropped to an average of 36 bulls:100 cows during 1998–2000 (Table 1). Higher bull:cow ratios were observed during 2001 and 2002, but returned to prior levels in 2003 and 2004 (36 and 34 bulls:100 cows respectively).

Distribution and Movements

The NAPCH's primary calving grounds are in the Bering Sea flats between the Cinder and Bear Rivers. Traditionally, this herd wintered between the Ugashik and Naknek Rivers. Beginning in 1986 many caribou wintered between the Naknek River and the Alagnak River. Since 2000, this extended wintering range appears to have become less important for the NAPCH. No radiocollared NAP caribou wintered north of the Naknek River during the winters of 2000–01, 2001–02, 2002–03, or 2004–05, and only one radiocollared NAP caribou wintered north of the Naknek River in 2003–04.

MORTALITY

Harvest

Season and Bag Limits. Since the Tier II permit hunt was instituted in 1999 the bag limit has been one 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.

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 361 permits in 2002 and 400 permits in 2003. The reduced number of permits issued in 2002 resulted from a lack of applicants for the 400 permits available. The decrease in the number of applicants was attributed to increasing frustration with the permit system among local residents who were unsuccessful in obtaining a Tier II permit during prior years. The FWS issued 40 permits in 2002 and 2003.

Harvests from state hunts during the 1997–2003 regulatory years are presented in Table 2. Data from federal subsistence hunt (RC009) appear to be incomplete. Of the 3 hunters that turned in federal harvest reports in 2002, two reported successfully harvesting a bull. No hunt reports were received for the 2003–04 season.

Hunter Residency and Success. Under the Tier II hunts during 2001–2003, an average of 66% of those that reported hunting were successful, and local hunters took more than 91% 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 the 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

The radio collars placed on the NAPCH cows were designed to facilitate annual postcalving photocensuses, so mortality sensors were not used in some transmitters. Telemetry flights were sporadic. These 2 factors preclude precise dating of natural mortalities or determining the cause of death. There appears to be a higher rate of natural mortality of adult females in recent years. From October 1980 through March 1984, the average annual mortality rate was approximately 7%. Annual mortality rate averaged 18% from 1985 to 1989 and averaged 25% from 1992 to 1998. In October 1998, 19 calves and 2 yearlings were collared throughout the range of the NAPCH, and by June 1999, 71% were dead. Because radio collars were not retrieved until June 1999, evidence of the cause of death was scant, but most deaths from the NAPCH were on winter range, ruling out bear predation in most cases. Evidence of wolf activity was present at several carcasses, but we could not confirm whether predation or merely scavenging occurred. Annual mortality rates of adult females have been variable in recent years (7%, 18%, and 16% in 2001, 2002, and 2003, respectively), but are lower than values reported during the 1990s for this herd.

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

Habitat and Animal Condition

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

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

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

During 1995–98 we captured female calves and collected female calves every October to further assess body condition, looking for differences over time and to make comparisons with other herds. Weights and percent bone marrow fat of female calves collected in October are also intermediate, but a high percentage of these caribou showed lesions from lungworms. In October

1999, 11 captured female calves 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) and Sellers et al. (1998*a*, 1998*b*, 1999 and 2000). Overall, this work demonstrates that the NAPCH is under moderate nutritional stress. No 2-year-old females have produced calves (n = 32), and only 33% of 3-year-olds (n = 18) have been pregnant. Overall pregnancy rates are relatively low at less than 80% for cows over 2 years of age.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

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

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

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

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 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, biologists reevaluated intensive management options for this population in 2004 and concluded that no viable solutions existed to alter the status of this herd. If surveys in 2005 continue to show a declining population suffering from low productivity, low survival and low calf recruitment, the Tier II hunt may need to be closed until these parameters increase and the herd begins to recover. Fieldwork scheduled for the summer of 2005 includes a calf-mortality 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, 1970–2004

Year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% of bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size
1970	48	46	23							
1975	33	45	25							10,340
1980	53	56	27							
1981	34	39	23							
1982	43	52	26						1392	18,000
1983	39	27	16		51	25	24	24	1410	19,000
1984	39	39	22		67	16	17	22	1087	20,000
1986	51	34	18	54				27	2540	17,000
1987	54	51	25	49	51	32	17[22]	26	1536	17,000
1988	49	48	26	51	46	34	20	25	1156	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	17	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

Table 2 NAPCH harvest, 1997–2004

Regulatory Year	Hunter Harvest				Estimated Unreported	Illegal	Estimated Total[a]
	Reported						
	M (%)	F (%)	Unk.	Total			
1997–98	446 (92%)	36 (8%)	0	482	900–1000		1300–1400
1998–99	453 (94%)	31 (6%)	6	490	500		1000
1999–2000	147 (95%)	8 (5%)	0	155	45		200
2000–01	76 (93%)	6 (7%)	0	82	30		112
2001–02	87 (93%)	7 (7%)	0	94	30		124
2002–03	78 (95%)	4 (5%)	1	83	30		113
2003–04	115 (95%)	6 (5%)	0	121	75		196

[a] Estimated total is rounded off.

Table 3 NAP caribou annual hunter residency and success, 1997–2004

Regulatory Year	Successful				Unsuccessful				Total Hunters
	Local Resident	Nonlocal Resident	Nonresident	Total (%)	Local Resident	Nonlocal Resident	Nonresident	Total (%)	
1997–98	49	112	277	438 (78%)	14	57	56	127 (22%)	565
1998–99	145	136	140	421 (68%)	53	75	66	194 (32%)	624
1999–2000	151	52	0	156 (68%)	72	3	0	75 (32%)	231
2000–01	80	8	0	82 (60%)	48	6	0	54 (40%)	136
2001–02	86	6	0	92 (69%)	41	1	0	42 (31%)	134
2002–03	74	6	0	80 (60%)	45	8	0	53 (40%)	133
2003–04	108	13	0	121 (71%)	39	10	0	49 (29%)	170

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

Table 4 NAP caribou annual harvest chronology percent by month 1997–2004

Regulatory Year	Percent of Harvest									
	August	September	October	November	December	January	February	March	April	*n*
1997–98	11	50	23	1	5	4	4	2	0	454
1998–99	16	31	12	6	8	8	8	6	1	490
1999–2000	14	23	0	8	13	19	16	6	0	124
2000–01	14	22	1	5	4	9	18	8	18	77
2001–02	14	12	0	8	7	6	19	11	24	85
2002–03	16	26	0	5	4	3	4	22	20	74
2003–04	14	24	1	4	27	8	8	8	7	114

Table 5 NAP caribou harvest percent by transport method, 1997–2004

Regulatory Year	Percent of Harvest						
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway Vehicle
1997–98	53	0	21	15	4	2	5
1998–99	33	0	21	25	10	1	9
1999–2000	3	0	15	52	19	2	10
2000–01	5	0	27	44	19	1	4
2001–02	1	0	18	42	25	6	8
2002–03	7	0	30	37	5	18	4
2003–04	11	0	15	35	20	13	6

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

LOCATION

GAME MANAGEMENT UNITS: 9D (3325 mi^2)

HERD: Southern Alaska Peninsula

GEOGRAPHIC DESCRIPTION: Southern Alaska Peninsula

BACKGROUND

The range of the Southern Alaska Peninsula Caribou Herd (SAPCH) extends from Port Moller to False Pass. Even though there have been numerous reports of caribou moving between Unimak Island and the mainland, including what may have been a substantial emigration in 1976, caribou on Unimak Island have been determined to be genetically isolated enough with fidelity to calving areas on the island to be designated a separate herd. Historically, the size of the SAPCH has varied widely, ranging from 500 to 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 1975 to 1983 and decline from 1983 to 1996.

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.

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

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of 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 4200 caribou by 2002. Since 2001, estimates of calf recruitment have been lower than any previously reported estimate for this herd. The population is currently thought to be declining.

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. In December 2004, the FWS counted 1800 caribou during 2 separate surveys of the SAPCH.

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 in 2000, 2001 and 2002 showed a decline in calf:cow ratios, reaching an all-time low in 2003 and 2004 (8 and 7 calves:100 cows, respectively; Table 1). Bull:cow ratios averaged 45 bulls:100 cows from 1997 to 2001 and have decreased to an average of 38 bulls:100 cows since 2002.

Distribution and Movements

Data from radiotracking surveys indicate the SAPCH calves were in 2 main subgroups in separate 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 2 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 8 caribou in the northeastern portion of Unit 9D were fitted with satellite collars to further investigate whether interchange between herds occurred in this area. 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). The bag limit since 1999 has been 1 caribou for residents and 1 bull for nonresidents.

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

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.

Hunter Harvest. Hunters reported harvesting an average of 53 caribou during state hunts from 2001 to 2003 (Table 2). Under the federal subsistence hunt (RC091) 11 caribou were reported in 2002 and 6 caribou in 2003, although the reporting rate averaged only 56%.

Hunter Residency and Success. Nonresident hunters have averaged 88% success and accounted for 51% of the reported harvest during this reporting period (Table 3). 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.

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, four were still alive in November.

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

Based on evidence of improved body condition, higher productivity, and better survival rates of radiocollared females, the SAPCH began a period of recovery during the late 1990s. However, high mortality of neonatal calves documented in 1999 and reduced calf:cow ratios during 2000–2004 indicate the recovery may be sporadic. Because all available data suggests that the herd is declining, cow harvest should be phased out. Chronic reporting problems for the federal hunt make it difficult to predict the effect of the recent increase in the federal subsistence bag limit. Because of the lack of information and current population trend, federal restrictions are warranted and herd performance should be monitored carefully.

Close cooperation between the department and the INWR staff is essential for effective management and research. Expanded survey and research efforts made possible from recent cooperative projects have provided essential information on the current condition of this herd. Genetic testing should be used to evaluate the distinctness of the NAPCH, SAPCH, and Unimak Island herds. Following the protocol for caribou management, we recommend future collaring efforts be directed at female calves, and that a collaring effort be planned. However, due to low survival rates of calves collared in 2004, adult cows also should be collared to provide a more reliable pool of radiocollared animals for conducting population counts and fall composition surveys. Given the high incidence of lungworm detected in 1995–98 in the NAPCH, it might be worth collecting 10 calves during fall composition surveys in 2005.

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Table 1 Southern Alaska Peninsula caribou composition and survey results, 1983–2004

Regulatory year	% Calves		Fall composition							Postcalving survey results	INWR[a] counts
	Summer	Fall	Bulls: 100 cows	Calves: 100 cows	Cows (%)	Small bulls (% bulls)	Medium bulls (% bulls)	Large bulls (% bulls)	sample size		
1983		15[a]									10,203
1985	6[a]	9[a]									4044
1986	17	13	32	20	66	59	28	13	2307		4543
1987	12	16	36	26	62	54	25	21	1769	4067	6401
1988	16	12	41	19	59	61	37	4	886	3407	
1989	17	5							1718[b]	3386	3957
1990	14	9	19	12	76				1051	3375	
1991	18	13	28	19	68	53	33	14	883	2287	2830
1992	15	15	22	22	70	46	32	21	746	2380	
1993	16	16	30	24	65	59	24	17	745	1495	1929
1994	21	18	29	28	64	46	27	27	531	2137	1806
1995	11									1434	
1996	10										1403
1997	15	12	42	19	62	36	36	27	546	1844	3243
1998		21	32	35	60	42	23	36	987		3127
1999	26	15	51	25	57	48	30	22	1049	3612	
2000	24	21	42	37	56	50	24	26	982		
2001		19	57	38	51	57	26	17	1313		
2002		10	38	16	65	44	34	23	932		4100
2003		5	40	8	68	40	26	33	1257		
2004		5	36	7	70	24	38	38	966		1872

[a] Counts by INWR staff
[b] Count from Super Cub

Table 2 SAP caribou harvest, 1999–2004

Regulatory Year	Hunter Harvest				Estimated Unreported	Illegal	Estimated Total[a]
	Reported						
	M (%)	F (%)	Unknown	Total			
1999–2000	46 (85%)	7 (13%)	1	54	30	-	84
2000–2001	49 (93%)	2 (4%)	2	53	30	-	83
2001–2002	52 (93%)	4 (7%)	0	56	30	-	86
2002–2003	50 (88%)	5 (9%)	2 (4%)	57	30	-	87
2003–2004	43 (96%)	1 (2%)	1 (2%)	45	30	-	75

[a] Estimated total is rounded off.

Table 3 SAP caribou annual hunter residency and success, 1999–2004

Regulatory Year	Successful				Unsuccessful				Total Hunters
	Local resident[a]	Nonlocal resident	Nonresident	Total[b] (%)	Local resident[a]	Nonlocal resident	Nonresident	Total (%)	
1999–2000	27	19	7	54 (77%)	8	6	2	16 (23%)	70
2000–2001	20	10	21	53 (79%)	5	8	1	14 (21%)	67
2001–2002	26	17	12	56 (70%)	12	4	6	24 (30%)	80
2002–2003	24	8	25	57 (67%)	12	14	2	28 (33%)	85
2003–2004	4	13	25	45 (70%)	9	5	5	19 (30%)	64

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

[b] Includes hunters of unspecified residency.

Table 4 SAP caribou annual harvest chronology percent by month 1999–2004

Regulatory Year	Percent of Harvest								
	August	September	October	November	December	January	February	March	*n*
1999–2000	0	46	2	17	19	7	2	7	54
2000–2001	2	60	0	16	4	16	2	0	50
2001–2002	0	41	6	13	11	24	6	0	54
2002–2003	0	35	20	17	22	6	0	0	54
2003–2004	2	67	5	9	7	0	5	5	43

Table 5 SAP caribou harvest percent by transport method, 1999–2004

Regulatory Year	Percent of Harvest						
	Airplane	Horse	Boat	3- or 4-wheeler	Snowmachine	ORV	Highway Vehicle
1999–2000	20	0	17	22	0	2	37
2000–2001	36	0	17	13	0	9	25
2001–2002	27	0	18	29	0	4	22
2002–2003	42	0	16	23	0	0	18
2003–2004	62	0	7	22	0	0	9

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 2 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 the formidable logistics involved in reaching the island, keeping hunting effort extremely low. Given poor access and the relatively limited habitat, the herd ideally should be kept at 1000 to 1500 animals.

METHODS

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

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Following a peak of 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 2 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 caribou in late December 2002 and 1006 caribou during surveys in November 2004.

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, 406 caribou were classified and ratios were 40 bulls and 21 calves per 100 cows. Large bulls made up 33% of all bulls. In 2002, 392 caribou were classified with ratios of 54 bulls and 31 calves per 100 cows. Large bulls made up 29% of all bulls.

Distribution and Movements

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

MORTALITY

Harvest

Season and Bag Limits. There 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, 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.

Hunter Harvest. Hunters reported harvesting an average of 14 caribou in state hunts from 2001 to 2003 (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 1 of the permittees turned in a report and stated he did not hunt. No information was available for 2003.

Hunter Residency and Success. Nonresident hunters had an average success rate of 97% and have accounted for 73% of the reported harvest (Table 2). Success rates for nonlocal residents have averaged 73% since 2001. 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 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 should be considered a separate herd, even though it is recognized we will be unable to manage this herd to dampen population fluctuations. Hunting regulations should be manipulated to provide for local subsistence uses and to provide quality hunting experiences for other Alaskans and nonresidents. Under the current management agreement between the state and federal governments, the 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, restricting seasons and bag limits on Unimak Island based on the population decline of the Southern Alaska Peninsula Caribou Herd would restrict opportunity to hunt caribou in a herd that currently appears to be biologically healthy. Continuing to manage these herds jointly is not recommended based on the lack of observed interchange between caribou on Unimak and the mainland since 1976, differences in carrying capacity and population trend between the 2 areas, and the relatively low accessibility of Unimak Island. A new agreement between state and federal agencies for the management of these herds that recognizes the independence of these populations should be developed. The recent change in the federal bag limit, combined with a lack of information about caribou harvest by local residents, warrants some concern. This herd should be monitored periodically to assess the affect of this liberalization and to detect changes in the status of the herd.

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Table 1 Unimak caribou harvest, 2001–2004

Regulatory Year	Hunter Harvest				Estimated Unreported	Illegal	Estimated Total[a]
	Reported						
	M (%)	F (%)	Unknown	Total			
2001–02	19 (100%)	0 (0%)	0	19	-	-	19
2002–03	11 (91%)	1 (9%)	0	12	-	-	12
2003–04	10 (100%)	0 (0%)	0	10	-	-	10

[a] Estimated total is rounded off.

Table 2 Unimak caribou annual hunter residency and success, 2001–2004

Regulatory Year	Successful				Unsuccessful				
	Local Resident[a]	Nonlocal Resident	Nonresident	Total (%)	Local Resident[a]	Nonlocal Resident	Nonresident	Total (%)	Total Hunters
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 (33%)	13

[a] Local residents are residents of Unimak Island.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 his estimate was low due to sampling problems. Skoog (1968) estimated the CCH at 3000 animals in 1964. By the mid to late 1970s, the herd declined to an estimated 1000 caribou. Similar declining trends were reported in other Interior caribou herds. During the 1980s, environmental conditions were favorable, and the herd increased to about 1900 caribou by 1988.

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

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

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

Before the mid 1980s, the CCH was not a high management priority because of its small size, remoteness, and the light and selective (primarily mature males) hunting pressure it received. In 1980 the Wrangell–St Elias National Park and Preserve was created, and the preserve boundaries encompassed most of the Chisana herd's range. The Alaska National Interest Lands Conservation Act that created the preserve mandated 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, we initiated a cooperative study with the NPS and the Yukon Department of Environment (YDE) in October 1987. Initially, 15 adult female caribou were radiocollared to monitor movements and to facilitate spring and fall censuses and composition surveys. From 1990 through 2002, 57 adult females and 33 four-month-old female calves were radiocollared. Radiocollaring and herd monitoring costs have been shared by ADF&G, NPS, and YDE.

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

MANAGEMENT DIRECTION

During 2000–2004, CCH management and research was cooperatively developed to aid herd recovery. Activities that met the different mandates and philosophies of ADF&G, NPS, and YDE were assigned.

The current Chisana caribou management goal and objective are:

MANAGEMENT GOAL

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

MANAGEMENT OBJECTIVE

- Cooperatively with YDE and NPS develop and implement management strategies to increase calf recruitment to 25 calves:100 cows by 2005.

METHODS

Herd size was estimated in late June 2002. During this survey we located caribou by visually searching the herd's summer range and by locating radiocollared caribou. We used 1–2 search aircraft (Piper Super Cub and a Bellanca Scout) with a pilot and 1 observer in each. All caribou found were counted by the observation team, and all groups larger than 25 caribou were also photographed using a 35-mm camera. Prints were then enlarged and the caribou were counted with the aid of a magnifying loupe.

We estimated population size and trend by using a population model designed by P. Valkenburg and D. Reed (ADF&G). Sex and age composition, recruitment, and mortality data were the primary components of the model. No herd population estimate was developed by ADF&G in 2003; however, a population estimate was developed by Layne Adams of the U.S. Geological Survey (USGS) in Anchorage, Alaska following a population survey in October 2003. Techniques are summarized in unpublished USGS progress reports (L. Adams, USGS, personal communication).

Since 1986 we have collected annual fall sex and age composition data between late September and early October. In 2002 a Bellanca Scout was used to locate most of the herd by radiotracking collared animals, and a Robinson-22 helicopter was used to classify each caribou as a cow, calf, or bull. Bulls were further classified based on antler size as either small, medium, or large (Eagan 1993).

In 2003, we began a cooperative (USGS, NPS, YDE and ADF&G) research project to evaluate the population dynamics and effects of recovery efforts on the CCH during 2003–2008 (Adams, USGS, unpublished data 2004). In 2003 the composition count was conducted by Adams. Methods used are summarized in unpublished USGS reports (L. Adams, personal communication).

There is a hunting season for CCH; however, no permits were issued during RY95–RY04 because of the low population. Harvest data since 1989 are included in this report to clarify herd population and composition trends. Hunting seasons are based on regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size and Composition, and Herd Distribution and Movements

The CCH increased through the 1980s, and the population peaked in 1988 at about 1900 caribou. During 1988 through 2002, ADF&G believed the herd size declined to an estimated 315 caribou in 2002 (Table 1). A captive rearing project to help the herd recover was implemented in 2002 in Yukon Canada by Rick Farnell, YDE. In addition, following a more intense population survey by the USGS in October 2003, the CCH population was estimated

at 720 caribou, significantly higher than estimates generated from recent surveys. We concluded that numerous caribou were likely missed during an undetermined number of 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.

The details of herd status and movement for RY03 are summarized in unpublished progress reports by Adams of USGS. Preliminary data indicate that the herd has an age structure skewed toward old animals and that calf recruitment in wild-born calves remains chronically low. Factors influencing low calf survival are still under investigation. 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.

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 Board of Game took no actions, and no emergency orders were issued during RY02–RY03.

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 0–3 caribou annually during the report period. In Yukon, between 1996 and 1999, First Nation members killed 3–20 Chisana caribou annually along the Alaska Highway. Since 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 RY02–RY03.

Other Mortality

No activities were conducted during RY02–RY03 to evaluate causes of other mortality on the CCH. However, as summarized by Gardner (2003), predation by wolves has been identified as the primary factor limiting herd growth.

HABITAT

Assessment

No habitat assessment activities were conducted during RY02–RY03. Gardner (2003), Lenart (1997), and Boertje (1984) provide information about habitat within the CCH range.

Enhancement

No habitat enhancement activities were conducted during RY02–RY03.

CONCLUSIONS AND RECOMMENDATIONS

Since 1988 the CCH has experienced a significant (60%) decline. This decline was primarily due to poor calf recruitment and high adult mortality associated with adverse weather conditions and predation. Since 1991, predation was the cause of 89% of the documented mortality among radiocollared cows ≥4 months old.

Hunting was allowed during the herd's initial decline (1989–1994); however, harvest was restricted to bulls and only removed 2% or less of the population annually. Legal hunting did not limit the herd's ability to grow, but subsistence harvest along the Alaska Highway in Yukon may have had some limiting effect.

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%. In order 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 16 years have never been documented in any other wild caribou herd. Factors causing low calf recruitment in the CCH are not well understood, but the 2003–2008 USGS research effort will be addressing 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. Local subsistence users harvested 8 (9% of the harvest) caribou during this time. Once the herd recovers and hunting is allowed, harvest regulations should provide for guided nonresidents.

We met our management objective during RY02–RY03 by working cooperatively with the NPS and YDE 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 to 25 calves:100 cows during RY03. ADF&G will continue to work cooperatively with the NPS, YDE 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 RY04, and it is unlikely that funding will be available for RY05. Tok ADF&G personnel will continue to provide personnel support and participate in management activities and research efforts for this herd, as opportunities present themselves, during the next report period.

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TABLE 1 Chisana caribou fall composition counts and estimated population size, 1987–2003

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]									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

[a] Based on population modeling.

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

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

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

TABLE 2 Chisana caribou harvest regulatory years 1989–1990 through 2003–2004

Regulatory year	Alaska harvest							Yukon harvest		
	Reported				Estimated					
	M	F	Unk	Total	Unreported	Illegal	Total	Reported	Unreported	Total
1989–1990	34	0		34	0	0	0	18	5–20	57–72
1990–1991	34	0	0	34	0	0	0	11	5–20	50–65
1991–1992	21	0	0	21	0	0	0	0	5–20	26–41
1992–1993	16	0	0	16	0	0	0	0	5–20	21–36
1993–1994	19	6	0	19	0	0	0	0	5–20	24–39
1994–1995	0	0	0	0	0	0	0	0	5–20	5–20
1995–1996	0	0	0	0	0	3	7	0	1–3	4–6
1996–1997	0	0	0	0	0	3	3	0	7	10
1997–1998	0	0	0	0	0	3	3	0	3–5	6–8
1998–1999	0	0	0	0	0	3	3	0	20	23
1999–2000	0	0	0	0	0	3	3	0	3–5	6–8
2000–2001	0	0	0	0	0	1	1	0	1–3	2–4
2001–2002	0	0	0	0	0	1	1	0	1–3	2–4
2002–2003	0	0	0	0	0	1	1	0	0	1
2003–2004	0	0	0	0	0	1	1	0	0	1

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004[a]

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 was equal to or exceeding 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 determination that harvest had to be reduced (Davis 1979). In 1978 the bag limit for the

[a] Report may contain information from outside of reporting period of discretion of biologist.

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 RY92 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.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVE

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

METHODS

We used a Robinson R-22 helicopter in 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 PA18 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–longitude were recorded.

The U.S. Army Alaska (USARAK) conducted radiotracking flights 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 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 (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 Jul 2002 through 30 Jun 2003).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During this reporting period, we did not unequivocally meet our population objective for the MCH. However, census results showed a slow but steady increase during this reporting period, and herd size in RY04 was estimated to have met the objective, although the actual census was below the objective.

RY01. We conducted a census on 9 October 2001 and counted 467 caribou. Survey conditions were generally adequate; however, conditions were somewhat windy and snow cover was patchy. Observers felt that there were probably at least 500–550 caribou in the herd (Table 1). One aggregation of 81 caribou located in the Jarvis Creek drainage contained 4 radiocollared caribou with 2 each from the MCH and the adjacent Delta caribou herd. Therefore, only one-half of the caribou from that aggregation were added to the MCH total.

RY02. We conducted a census on 2 November 2002 and counted only 234 caribou (Table 1). Survey conditions were very poor, with only about 50% snow cover in the eastern portion of the MCH range and no snow in the western portion. Conditions were also windy with low clouds. Therefore, no population estimate was achieved (Table 1).

RY03. We conducted a census on 4 October 2003 and counted 526 caribou and estimated herd size to be 550–575 caribou (Table 1). Although there was no snow cover during this census, observers thought the census was accurate.

RY04. We conducted a census on 9 October 2004 and counted 546 caribou and estimated herd size to be 600–650 (Table 1). Survey conditions were fair; however, discontinuous snow cover made tracking peripheral groups and completing a total count difficult. Given that there was a high calf:cow ratio and that some groups likely were not counted, we estimated herd size to be 600–650.

Population Composition

RY01. Composition data was collected from 467 caribou during the 9 October 2001 MCH census. The bull:cow ratio of 39:100 continued a decline since RY99 (Table 1). The bull segment of the population consisted of 40% small bulls, 30% medium bulls, and 30% large bulls. The calf:cow ratio of 11:100 was very low and unchanged from RY00.

RY02. Composition data was collected from only 234 caribou due to poor survey conditions during the MCH census on 2 November 2002. The bull:cow ratio was 51:100 with 39% small bulls, 43% medium bulls, and 19% large bulls (Table 1). The calf:cow ratio was 21:100 cows.

RY03. Composition data was collected from 526 caribou during the 4 October 2003 MCH census. The bull:cow ratio was 46:100 with 44% small bulls, 22% medium bulls, and 31% large bulls. Calf survival was still relatively low at 19 calves:100 cows (Table 1).

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. Bull composition was 18% small bulls, 37% medium bulls, and 45% large bulls. Calf survival to fall increased substantially to 40 calves:100 cows (Table 1), which is the highest ratio since 1984.

Distribution and Movements

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

RY01. During the MCH fall 2001 census, most radiocollared caribou were observed on the Macomb Plateau area. Two radiocollared caribou were located in the western Granite Mountains, and one was located north of the Tanana River in the upper Healy River.

A fall radiotracking flight was flown on 18 September 2001. Sixteen of 20 radio collars thought to be active were located and were distributed between the Granite Mountains and the Macomb Plateau area in Unit 20D. One radio collar was on mortality mode indicating a dead caribou. Two radiocollared caribou were located in the Granite Mountains, 2 were located in the Gerstle River drainage, and the remainder were in the general Macomb Plateau area.

RY02. During the MCH fall 2002 census, 45% of all caribou observed were in the McCumber–Jarvis Creek drainage, with most others in the upper Little Gerstle River and Macomb Plateau. However, survey conditions were so poor that large numbers of caribou were not seen.

A fall radiotracking flight was flown on 25 August 2002. The Delta River portion of the survey resulted in 2 Delta herd caribou being heard east of the Delta River in Unit 20; 1 common frequency on both herds was also heard east of the Delta River and 2 west of the Delta River in Unit 20A. The portion of the survey flight toward the east was stopped at Bear Creek on the Macomb Plateau due to poor weather conditions. Fifteen of 21 active radio collars were located: 3 were in the Jarvis Creek–Donnelly Dome area, 1 in Sheep Creek, 1 in the Little Gerstle, and the remainder in the Macomb Plateau area.

RY03. During the MCH fall 2003 census, the largest aggregation of caribou was on the Macomb Plateau, with 62% of all caribou seen on the plateau. A significant number of caribou (21%) were also seen in the Jarvis Creek drainage; smaller groups were in the Sheep Creek and Little Gerstle River drainages.

A fall radiotracking flight was conducted on 18 August 2003 along the Delta River and 19 August 2003 along the Alaska Range east of the Delta River. On the 19 August flight we intended to extend the survey to Yerrick Creek in Unit 12; however, poor weather prevented us from flying east of the Robertson River. Ten of 15 radio collars thought to be on the air were located. On the Delta River portion of the flight, 7 Delta Herd caribou were detected, all located west of the Delta River in Unit 20A. One Macomb caribou that has the same radio collar frequency as a Delta caribou was visually located in Unit 20D and verified by its visual collar. On the 19 August flight, 1 Macomb caribou was located in the McCumber Creek drainage, and the rest were in the Macomb Plateau area.

On 3 February 2004, USARAK personnel conducted a radiotracking flight to determine if Delta or Macomb caribou were using military land in Units 20D and 20A. During this flight, 3 Delta Herd caribou were heard in Unit 20D between the Richardson Highway and Granite Creek and 9 Macomb caribou were heard in Unit 20D.

RY04. During the department's 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.

USARAK 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.

USARAK 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, USARAK personnel located an aggregation of 36 Macomb caribou with 4 radio collars near Coal Mine Road in the Jarvis Creek drainage. One radio collar (150.210) was a duplicate frequency 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, USARAK personnel located an aggregation of 50 caribou that contained 1 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.

MORTALITY

Harvest

Season and Bag Limit.

RY01 — The RY01 hunting season was conducted as Tier I registration permit hunt RC835 (Table 2) from 10 to 20 September with a harvest quota of 25 bulls.

RY02 — The RY02 hunting season was conducted as Tier I registration permit hunt RC835 (Table 2) from 15 to 25 August with a harvest quota of 25 bulls. The season date was changed from 10–20 September to 15–25 August in an attempt to reduce the rate of harvest and make this hunt more manageable without having to close by emergency order annually. The August season dates coincided with motorized access restrictions for the Delta Controlled Use Area (DCUA) where most hunters have killed caribou in recent years via motorized access from the Richardson Highway. Placing RC835 within access restrictions of the DCUA, combined with access restrictions in the Macomb Plateau Controlled Use Area, make RC835 a walk-in only hunt over most of its range within Unit 20D.

RY03 —The hunt was conducted as Tier I registration permit hunt RC835 from 15 to 25 August with a harvest quota of 25 caribou.

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.

Alaska Board of Game Actions and Emergency Orders. During RY01, I issued an emergency order to close registration hunt RC835 at midnight on 12 September, in anticipation that the harvest quota would be met before the scheduled closing date of 20 September.

Also during RY01, at the March 2002 meeting of the Board of Game, I presented department proposal 11 to move the boundary of the DCUA from the Richardson Highway, west to the Delta River. The purpose of this proposal was to include the area between the Richardson Highway and the Delta River within the DCUA for caribou management purposes. I also informed the board that the department intended to use discretionary permitting authority to change the RC835 season dates from 10–20 September to 15–25 August. The boundary change, combined with the season change, is 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 has determined that this herd has customarily and traditionally been used for subsistence. The board adopted the proposal to change the boundary and concurred with the season change.

During RY02, I issued an emergency order to close registration hunt RC835 at midnight on 20 August in anticipation that the harvest quota would be met before the scheduled closing date of 25 August.

During RY03, I issued an emergency order to close registration hunt RC835 at midnight on 18 August in anticipation that the harvest quota would be met before the scheduled closing date of 25 August.

At the March 2004 meeting of the Board of Game, I informed the board that the department intended to use our discretionary permitting authority to move the western hunt boundary for RC835 from the Delta River to Jarvis Creek. The effect of this change was to close hunting in close proximity to the Richardson Highway. This boundary change, combined with the DCUA boundary change in RY01 and the season date change in RY02, made the hunt a walk-in only hunt over much of its range within Unit 20D and prevented easy access from the Richardson Highway.

Hunter Harvest.

From RY01 though RY04 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. However, in RY01 the harvest of 43 bulls exceeded the quota and inadvertently met the objective, and in RY03 the harvest of 29 bulls again exceeded the quota but met the objective.

Permit Hunts.

RY01 — Permits were issued to 255 people (Table 2), and 174 (68%) actually hunted (Table 3), killing 43 bulls (Tables 3 and 4) for a 28% hunter success rate (among those people who hunted) (Table 2). This harvest exceeded the quota but met the objective.

RY02 — Permits were issued to 158 people (Table 2), and 91 (58%) actually hunted (Table 3), killing 25 bulls (Tables 3 and 4) for a 28% success rate (Tables 2). This harvest met the quota of 25 but was below the objective.

RY03 — Permits were issued to 161 people (Table 2), and 115 (71%) actually hunted (Table 3), killing 29 bulls for a 25% success rate (Tables 3 and 4). This harvest nearly met the objective but exceeded the quota of 25.

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

The substantial decrease in the number of registration permits issued and the RY01–RY04 harvest was due to changing RC835 hunt dates and western boundary. By RY04 these changes resulted in making the hunt manageable without exceeding the harvest quota while providing a reasonable opportunity to hunt for subsistence hunters during a 10-day season.

Hunter Residency and Success.

RY01 — Hunters had a 25% success rate (Table 3). Most hunters (54%) were not local residents of Unit 20D (Table 3). Local hunters had a 16% success rate compared to nonlocal hunters, who had a 32% success rate.

RY02 — Hunters had a 28% success rate (Table 3). Most hunters (56%) were not local residents of Unit 20D (Table 3), and local hunters (residents of Unit 20D) had a 25% success rate. Nonlocal hunters had a similar 29% success rate (Table 3).

RY03 — Hunters had a 35% success rate (Table 3). Most hunters (58%) were not local residents of Unit 20D (Table 3). Local hunters had a lower success rate (20%) than nonlocal hunters, who had a 46% success rate.

RY04 — Hunters had a 21% success rate (Table 3). Most hunters (54%) were not local residents of Unit 20D (Table 3). Local hunters had a lower success rate (8%) than nonlocal hunters, who had a 33% success rate.

Harvest Chronology.

RY01 — Thirty-four caribou were killed on the 10 September opening day, which exceeded the harvest quota of 25 caribou (Table 5). Efforts to close the season by emergency order began. Before the season could be closed at midnight on 13 September, an additional 4 caribou were killed on 11 September and 5 were killed on 12 September. The harvest was exceeded with only a 3-day season.

RY02 — Hunting season dates were changed to 15–25 August (Table 5). Eleven caribou were killed on opening day (44% of harvest quota), with 4 more killed on 16 August and 5 killed on 17 August. Efforts to close the season by emergency order began, but 1, 1, and 3 caribou

were killed in each successive day before the season closed at midnight on 20 August. The harvest quota was met; however, it was necessary to limit the season to 6 days.

RY03 — Eighteen caribou were killed on the 15 August opening day (72% of harvest quota) (Table 5). Efforts to close the season by emergency order began, and the season was closed at midnight 18 August, with an additional 9, 1, and 1 caribou killed each successive day the season was open.

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 19, 23, and 25 August, respectively (Table 5).

Harvest Location.

RY01 — Most caribou (56%) were taken in the Jarvis Creek drainage, with an additional 30% taken in the Macomb Plateau area (Table 6).

RY02 — Most caribou (88%) were taken in the Jarvis Creek drainage (Table 6).

RY03 — Most caribou (76%) were taken in the Jarvis Creek drainage (Table 6).

RY04 — Only 7 caribou were killed during RY04; 2 (33%) were taken in the Jarvis Creek drainage, 2 (33%) on Macomb Plateau, 1 in the Granite Mountains and 1 in an unknown location.

Transport Methods.

RY01— Three- or 4-wheelers were the most commonly used mode of transportation for successful hunters. They were used by 56% of all successful hunters (Table 7).

RY02 — With the change of season dates from 10–20 September to 15–25 August, which coincided with motorized access restrictions within the DCUA, the use of 3- or 4-wheelers by successful hunters dropped from 56% in RY01 to 0% in RY02 (Table 7). Hunter access by highway vehicle became the most common mode of transportation used by successful hunters.

The department issued a Methods and Means Exemption permit via the Americans with Disabilities Act (ADA) to 1 hunter, who was then allowed to use motorized vehicles (i.e., 4-wheelers) within the hunt area to participate in the RC835 hunt. The hunter killed a caribou.

RY03 — The most commonly used mode of transportation for successful hunters was again highway vehicles (62%), reflecting access restrictions implemented in RY02 (Table 7).

The department issued a Methods and Means Exemption permit via the ADA to 2 hunters, which allowed them to use motorized vehicles (i.e., 4-wheelers) to participate in the RC835 hunt. Both hunters killed caribou. These hunters had a 100% success rate compared to a 35% success rate by nonexempt hunters.

RY04 — The most commonly used mode of transportation for successful hunters was again highway vehicles (57%), reflecting access restrictions implemented in RY02 (Table 7).

The department issued a Methods and Means Exemption permit via the ADA to 1 hunter that allowed him to use motorized vehicles (i.e., 4-wheelers) to participate in the RC835 hunt. This hunter killed a caribou.

Other Mortality

During MCH censuses on 11 October 2001, 2 caribou kills were observed. One caribou was thought to have been killed by a wolf and 1 by a bear.

HABITAT

Assessment and Enhancement

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

CONCLUSIONS AND RECOMMENDATIONS

Managing MCH harvest as a Tier I registration permit with a small harvest quota has been difficult in recent years. Compounding the difficulty was increased numbers of moose hunters coming to the area and targeting caribou as part of their hunt. The herd has also been easily accessible from the Richardson Highway in recent years. Therefore, it has been necessary to close the hunt by emergency order almost annually in recent years, which was not providing a reasonable opportunity to hunt (interpreted as a 10-day season) for Tier I subsistence hunters. Therefore, hunt management during this reporting period has resulted in increasing restrictions on hunters that were necessary to provide a sustainable harvest while providing a reasonable opportunity to hunt. The combination of regulatory changes made during this reporting period appears to have finally accomplished these objectives in RY04 by changing season dates and hunt boundaries. The RY04 harvest was substantially below the quota, even though the season was open for the full 10-days. If future harvest remains substantially below the quota, it may be possible to lengthen the season in the future, while maintaining current season dates and hunt boundaries.

The MCH size objective of 600–800 was not met during RY01–RY03, but may have been met during RY04. The MCH has shown slow annual growth during this reporting period, and calf survival in RY04 was the best it had been in many years.

The MCH was hunted each year of this reporting period; however, the annual harvest quota of 25 caribou is below the objective of 30–50 per year. If the herd continues the slow growth achieved during this reporting period, 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, and the bull:cow ratio does not decline below 30:100. The most significant factor required to maintain population size and achieve the harvest objective will be adequate calf survival. Intensive management efforts will continue in the area in an attempt to meet established objectives.

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TABLE 1 Macomb caribou fall composition counts and estimated population size, 1982–2004

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

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

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

[c] Based on population modeling estimate.

[d] Estimated.

TABLE 2 Macomb caribou harvest data by permit hunt, regulatory years 1985–1986 through 2004–2005

Hunt	year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Harvest			Total harvest
						Bulls (%)	Cows (%)	Unk	
530[a]	1985–1986	140	61	22	78	12 (100)	0 (0)	0 (0)	12
	1986–1987	100	62	26	74	10 (100)	0 (0)	0 (0)	10
570[b]	Regulatory	15	53	14	86	1 (100)	0 (0)	0 (0)	1
530[a]	1987–1988	150	53	76	24	53 (100)	0 (0)	0 (0)	53[c]
		150	57	55	45	36 (100)	0 (0)	0 (0)	36[d]
		150	47	55	45	44 (100)	0 (0)	0 (0)	44[d]
535[e]	1986–1987	351	42	21	79	42 (100)	0 (0)	0 (0)	42
	1990–1991	317	33	16	50	48 (96)	0 (0)	2 (4)	50
	[f]								0
	[f]	0							0
1988–1989	[f]	0							0
1989–1990	[f]	0							0
	[f]	0							0
1991–1992									
RC835[e]	1997–1998[g]	143	34	23	77	22 (100)	0 (0)	0 (0)	22
1992–1993		168	32	28	72	32 (100)	0 (0)	0 (0)	32
1993–1994	[f]	0							0
1994–1995									
1995–1996	[g]	274	31	12	88	22 (100)	0 (0)	0 (0)	22
1996–1997	[g]	255	32	25	75	43 (100)	0 (0)	0 (0)	43
	[g]	158	41	28	73	25 (100)	0 (0)	0 (0)	25
1998–1999	[g]	161	27	25	75	29 (100)	0 (0)	0 (0)	29
1999–2000		76	58	22	78	7 (100)	0 (0)	0 (0)	7
2000–2001									
Totals for	1985–1986	140	61	22	78	12 (100)	0 (0)	0 (0)	12
2001–2002 all permit	1986–1987	115	61	24	76	11 (100)	0 (0)	0 (0)	11
2002–2003 hunts	1987–1988	150	53	76	24	53 (100)	0 (0)	0 (0)	53[a]
2003–2004		150	57	55	45	36 (100)	0 (0)	0 (0)	36[b]
2004–2005		150	47	53	48	44 (100)	0 (0)	0 (0)	44[b]
	1990–1991	351	42	23	77	42 (100)	0 (0)	0 (0)	42
		317	33	16	50	48 (96)	0 (0)	2 (4)	50
	[f]								0
		0							0
1988–1989	[f]	0							0
1989–1990	[g]	143	34	23	77	22 (100)	0 (0)	0 (0)	22
	0								
1991–1992									
1992–1993									
1996–1997									
thru									
1997–1998									

Hunt	year	Permits issued	Percent did not hunt	Percent successful hunters	Percent unsuccessful hunters	Harvest			Total harvest
						Bulls (%)	Cows (%)	Unk	
Regulatory	1998–1999	168	32	28	72	32 (100)	0 (0)	0 (0)	32
	1999–2000 [f]	0							0
	2000–2001 [g]	274	31	12	88	22 (100)	0 (0)	0 (0)	22
	2001–2002 [g]	255	32	25	75	43 (100)	0 (0)	0 (0)	43
	2002–2003 [g]	158	41	28	73	25 (100)	0 (0)	0 (0)	25
	2003–2004 [g]	161	27	25	75	29 (100)	0 (0)	0 (0)	29
	2004–2005	76	58	22	78	7 (100)	0 (0)	0 (0)	7

[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] Number of 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 2004–2005

Regulatory year	Successful				Unsuccessful				Total hunters
	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	
1986–1987[b]	9	0	1	10 (18)	19	27	1	47 (82)	57
1987–1988[b]	21	36	0	57 (61)	15	21	1	37 (39)	94
1988–1989[b]	15	18	0	33 (54)	4	22	0	28 (46)	61
1989–1990[b]	18	20	0	38 (54)	8	24	0	32 (46)	70
1990–1991[c]	28	14	0	42 (23)	80	64	0	144 (77)	186
1991–1992[c]	23	27	0	50 (24)	77	81	0	158 (76)	208
1992–1993[d] thru 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
2004–2005[c]	1	6	0	7 (22)	12	13	0	25 (78)	32

[a] Resident of Unit 20D.

[b] Hunt by drawing permit.

[c] Hunt by registration permit.

[d] Hunt canceled.

TABLE 4 Macomb caribou harvest[a] and accidental death, regulatory years 1985–1986 through 2004–2005

Regulatory year	Hunter harvest							Accidental death	Total
	Reported				Estimated				
	M	F	Unk	Total	Unreported	Illegal	Total		
1985–1986	12	0	0	12	0	2	2	0	14
1986–1987	10	0	0	10	0	2	2	0	12
1987–1988	57	0	0	57	0	2	2	0	59
1988–1989	42	0	0	42	0	2	2	0	44
1989–1990	44	0	0	44	0	2	2	3	49
1990–1991	42	0	0	42	0	2	2	0	44
1991–1992	48	0	2	50	0	2	2	0	52
1992–1993[b]					0	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

[a] Includes permit hunt harvest.

[b] Hunt canceled.

TABLE 5 Macomb caribou harvest by date during permit hunt RC835 with a 10–20 September hunting season, regulatory years 1997–1998 through 2004–2005

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

[a] Hunt canceled.

TABLE 6 Macomb caribou harvest location during permit hunt RC835, regulatory years 1997–1998 through 2004–2005

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

[a] Hunt canceled.

0
0
0
2

TABLE 7 Macomb caribou harvest percent by transport method, regulatory years 1986–1987 through 2004–2005

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			68
1988–1989	15	25	0	6	0	5	49		0	65
1989–1990	5	45	0	0	5	39	7			44
1990–1991	2	5	0	24	0	14	17	380	0	42
1991–1992	4	10	0	32	0	8	20	0	26	50
1992–1993[c] thru 1996–1997[c]								0		
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

[a] Includes permit hunt harvest.

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

[c] Hunt canceled.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004[a]

LOCATION

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

GEOGRAPHIC DESCRIPTION: Nelchina Basin

HERD: Nelchina Caribou Herd

BACKGROUND

The Nelchina caribou herd (NCH) contained 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 numbered 7000–10,000 caribou in 1972. During 1973–74, the NCH began to increase and continued to grow through the mid 1990s, peaking at an estimated 50,000 animals in 1995. Herd size declined between 1996 and 2000, but now is increasing again.

The NCH has been important to hunters because of its accessibility and proximity to Anchorage and Fairbanks. The Board of Game (BOG) increased bag limits and extended seasons when the NCH began to increase in the late 1950s. Annual harvests from 1955 through 1971 ranged from 2500 to more than 10,000 caribou. After the herd declined, the bag limit was reduced to 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 14 years (1989–2003) there have been more than 42,000 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 between 3000–6000 caribou.

METHODS

Biologists conduct yearly censuses and sex and age composition counts. The censuses involve aerial counts of caribou observed during June in postcalving aggregations and are followed immediately by sex and age composition surveys. Count technique includes either a fixed-wing photocensus, or a traditional census using hand-held cameras and direct field estimates made from the aircraft. Aggregation of caribou and weather conditions determine the census technique; loosely aggregated caribou cannot be photographed effectively. Composition data is collected via helicopter immediately after the census in June to determine productivity, and again in October during the rut to determine the bull:cow ratio and calf survival. Extrapolated fall 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, a minimum of 40 to 60 radiocollared cow caribou are maintained in the herd each year. Collars are also placed on 4-month-old female calves to obtain survival and parturition data for known-age females. Radiocollared cows are located during the calving period to determine pregnancy rates and the mean calving date.

Female calves are captured during the fall and the following spring to obtain body condition indices. Neonatal calves are captured to obtain estimates of birth weights. 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 increased 7% from 34,380 caribou in 2002 to 36,677 in 2004 (Table 1). The estimated stocking density was 0.8 caribou/km^2 in 2004 based on an approximate range of 44,200 km^2 (Lieb et al. 1988).

Population Composition

Spring postcalving composition surveys were not completed in 2004 because smoke from large Interior fires prohibited flying following the photocensus. However, herd productivity in 2004 was thought to be quite high based on the number of radiocollared cows having calves (87% for cows $\geq$ 4 years of age). Productivity declined in 2003 with only 39 calves:100 cows compared to

52:100 in 2002. The lowest calf production ever was 32 and 31 calves:100 cows in 1999 and 2000. Productivity was high between 1985 and 1996, averaging 52 calves:100 cows. The drop in calf production was attributed to a decline in physical condition of the cows that resulted in a delay in age of first reproduction (from 2 to 3 or 4 years of age) and a reproductive pause in many adult cows. Lactating cow caribou nutritionally stressed because of poor forage conditions during dry summers often skip a breeding season to regain body condition (Whitten 1995).

Calf mortality is monitored by comparing changes in calf:cow ratios between summer and fall. Summer calf mortality in the first 4 months of life during 1999 and 2000 was very high with a loss of 9 and 11 calves:100 cows respectively. The fall calf ratios were 23 and 20 calves:100 cows (Table 1). Survival improved dramatically in 2001, starting with calf-to-cow ratios dropping only by 4 calves:100 cows from spring to fall since then. The fall 2004 ratio was 45 calves:100 cows, one of the highest in 10 years. Fall calf ratios historically ranged from 38 to 48 calves:100 cows when the NCH was stable or increasing.

The bull:cow ratio for the last 3 years during fall composition counts was 31:100. Fall bull ratios have been below the management objective of 40 bulls:100 cows since 1995. Bull:cow ratios during the 1980s, when the herd was increasing, were often in the range of 50–60 bulls:100 cows. Increased bull harvests contributed to the reduction in the bull:cow ratio. As more subsistence permits were issued, not only did the number of bulls decline, but the age structure of the bull population became skewed toward younger animals. Most subsistence permittees select for large bulls. Additionally, increased wolf predation because of higher wolf numbers in the late 1990s also contributed to the decline in large bulls. Older bulls are more susceptible to wolf predation than younger cohorts (Colman et al. 2003). The large bull segment of the bull population dropped to 10% in 1999 and 11% in 2000. With bull harvests reduced the last 2 years, and declining wolf numbers, the percent of large bulls increased to 23% in 2002. Composition data from fall 2004 included 51% small bulls, 30% medium bulls, and 19% 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 to Kosina Creek. This area is also used during the post-calving and early summer period. During summer and early fall, caribou distribution extends from the Denali Highway near Butte Lake on the west, across Lake Louise Flats, and as far east as the Gulkana River. Much of this summer range is relatively inaccessible compared to other portions of Unit 13. In 2003 the rut occurred in the eastern portion of Game Management Unit 13A and western Unit 11, from the Lake Louise road to Mt. Drum, while the rut in 2004 was concentrated around Tolsona Creek and the Tazlina River in Units 13A and D. Winter habitat for the NCH extends northeast from eastern 13A and B into Units 11, 12 and 20E. The number of caribou wintering in Unit 13 has generally declined over the last 10–12 years as old burns in Unit 20E provide a much higher lichen biomass than can be found in Unit 13 after 50 years of high grazing use. Winter movements of the NCH will be monitored closely in the next few years as almost all of the high quality winter range in 20E burned in 2004.

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 21 October–31 March. Since 2000, the bag limit has been 1 bull. There has been no state registration subsistence hunt (RC 460) for NCH in Unit 12 since the 1998 season. A state drawing hunt (DC 590) for any caribou with season dates of 10 August–20 September was held in Subunit 14B. The Unit 13 federal subsistence hunts (RC 513 and 514) are 10 August–30 September and 21 October–31 March. Since 2001, the federal bag limit has been 2 bulls. The Unit 13 federal subsistence hunt is by registration administered by the Bureau of Land Management (BLM); only residents of Units 11, 13, or along the Nabesna Road in Unit 12 and Unit 20 residents from Delta Junction are eligible. A Unit 12 federal subsistence hunt (RC 512) 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 November. This hunt has been held every fall since 1998.

Board of Game Actions and Emergency Orders. The 2003 season was closed 20 October by emergency order, and the winter hunt was not held.

Hunter Harvest. The reported harvest in 2003–2004 for the combined state and federal hunts for the NCH was 1085 caribou. The total harvest for the NCH has averaged 1250 (Table 2) for the last 4 years since the herd declined in 2000. This average represents about a 4% harvest rate for the herd. Harvests have dropped 78% from the 1996 peak when 5601 caribou were reported.

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

Wounding loss is considered 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 5 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 with 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 any caribou, but was changed to bulls-only in 2000 when harvests needed to be reduced. In 2003, we issued 2000 permits, and hunters reported a harvest of 752 caribou (Table 2).

The number of participants in the federal registration hunts has been fairly stable the last 6 years with about 2600 permits issued. Most hunters have 2 federal permits. The 2003–04 harvest was 319 caribou, and the bag over the last 5 years is 370 caribou (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. Under federal regulations, state-selected and Alaska Native-selected lands are closed to federal subsistence hunting. The potential for a high harvest under this hunt still exists because during the fall migration, caribou consistently cross the Richardson Highway between Paxson and Sourdough, an area open to federal subsistence hunting. Access along the Richardson provides hunters an easy opportunity to kill caribou should large numbers of animals use this area during the open season.

The state registration hunt (RC460) in Unit 12 was opened when the NCH migrated into Unit 12, but the Mentasta and Forty-Mile Caribou herds were not yet mixed in. This hunt allowed Alaska residents, especially Unit 12 residents, the opportunity to harvest a caribou when the herd was large and the harvest quota in GMU 13 was being met. Season dates and bag limits are controlled by emergency order. Historic harvests averaged about 250 caribou a year; bulls predominated in most years. The hunt was very popular and has the potential for a very high harvest if held when caribou migrate into the area in large numbers. This hunt has not been held since 1998.

The federal registration hunt (RC512) is a local subsistence hunt for 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. The hunt was held in 2002, and the harvest was very low with only 7 bulls reported taken (Table 2).

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

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, there was only one successful nonresident permittee in 2002, and one in 2003. Table 4 lists hunter residency for local (Units 11, 13 and along the Nabesna road in Unit 12) or nonlocal hunters and their success for the state Tier II hunt only. Most of the Tier II permits were issued to nonlocal Alaska residents. In 2003, local hunters made up 9% of the total Tier II hunters and took 6% of the total harvest. Both federal hunts (RC512 and RC513) are open

only to residents of defined subsistence zones; thus, only federally defined local rural residents harvest caribou from these federal hunts.

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

Hunter success for the Tier II NCH hunt increased from 25% in 1999–2000 to an average of 43% between 2000–01 and 2003–04. The increase in hunter success was primarily attributable to the dramatic decline in the number of permits issued; 8000 permits were issued in 1999, then only 2000 in 2000. During the 1999–2000 season, 31% of permit holders did not hunt. Between 2000–01 and 2003–04, permittees that did not hunt ranged from 15 to 24% (Table 2). Fluctuations in hunter success between years with similar hunting effort are usually attributed to fall caribou distributions away from the road system or winter migrations out of the unit. Another factor that affects hunter success in all Tier II hunts is the increasing use of proxy hunters by older permittees. Proxy hunters are more physically and mentally able to spend the time and energy needed to successfully take a caribou. Even with the use of proxy hunters, success rates for Tier II hunters are lower than rates observed under the old NCH drawing hunt. Because the same individuals get the permits every year, a Nelchina Tier II permit is not the valued prize it was under the old drawing system when an individual was fortunate to get drawn for a permit once every 4 or more years, and permittee success rates often exceeded 60%.

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 seasons have been important, with high harvests in those years when caribou remain in Unit 13. However, the winter season is subject to emergency closures in those years when the harvest quota is reached before the season ends on 31 March.

Transport Methods. For successful Tier II subsistence hunters during this reporting period, 4-wheelers were the predominant method of transportation, followed by highway vehicles, boats, and snowmachines (Table 6). During the early 1990s, highway vehicles were the most important method of transportation, but in 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. Highway vehicles have been the most important transportation method in the Unit 13 federal subsistence hunt (RC513 and 514) and the Unit 12 state registration hunt (RC460), with 40–70% of successful hunters reporting their use. Aircraft is the primary transportation method in the Unit 14B drawing hunt (DC590).

Other Mortality

The mortality rate for radiocollared yearling and adult cows is obtained throughout the year while conducting telemetry flights. In 1999, the 20% mortality rate for radiocollared caribou was considered high. Radiocollared caribou mortality rates have dropped since then and have been between 6 and 10% since 2001. Neonatal calf mortality was also high in the late 1990s averaging

31% calf loss in the 4 months between spring and fall composition counts. Since 2001, calf survival to 4 months of age has increased appreciably, averaging only a 9% loss. The high adult and calf mortality rate in the late 1990s was attributable to increased predation from high numbers of wolves. Wolves are present throughout the NCH range, and predation by wolves is thought to be an important source of mortality. Ballard et al. (1987) reported that Unit 13 wolves preyed on caribou whenever they were available. During the early-to-mid 1980s, the number of wolves occupying both the core Nelchina caribou range and winter range was relatively low because of high human harvests, and annual mortality rates on radiocollared caribou typically were at or below 10%. 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 wolf numbers in 1998 and 1999 were the highest observed in more than 25 years on the core calving grounds. A wolf census in 1998 resulted in a density estimate of 12 wolves/1000 km^2 (Testa, ADF&G files) in 13A. Accessibility combined with increased interest in wolf hunting has resulted in high wolf harvests the last 4 years. Wolf numbers have been reduced in the core calving area, thus the observed increase in caribou survival. A wolf survey in 2002 resulted in a density estimate of 7.9 wolves/1000 km^2 in 13A (Golden, ADF&G files). Wolf control by land-and-shoot permit hunting started in portions of GMU 13A, B and E in January 2004. As a result, wolf numbers on the calving grounds were further reduced to an estimated 4 wolves/1000 km^2 by spring 2004 based on sightings throughout the winter.

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

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

Eagles are abundant on the NCH calving grounds. During flights monitoring survival of neonatal caribou calves born to radiocollared cows, there were 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.

Winter snow accumulations were severe in Units 13, 12, and 20E in 1999–2000. In winters with deep snow, caribou are vulnerable to wolf predation and are more nutritionally and energetically stressed, impacting future productivity. Neonatal weights in 2000 were 15% lower than the 1996–99, 2001–03 average; the 10-month-old females weighed 8% below their average for the same time period, further increasing vulnerability to predators.

HABITAT

Assessment

Between 1955 and 1962, ADF&G established 39 range stations, including exclosures, throughout much of the Nelchina caribou range. Biologists examined these stations at

approximately 5- to 6-year intervals from 1957 through 1989. A complete description of the Nelchina caribou range, range station locations, and results of long-term monitoring is presented by Lieb (1994). Lieb concluded that lichen use was high during the 1960s when caribou were abundant, and the result was an overall decline in lichens on the Nelchina range. Following a decline in caribou numbers, lichen increased over much of the fall and traditional winter range from the early 1970s to 1983. However, as the herd doubled in size between 1974 and 1983, increases in lichen biomass ceased in areas of substantial caribou use. Between 1983 and 1989, continued increases in caribou numbers resulted in a decline in lichen biomass. Lieb concluded that in 1989, 77% of the Nelchina range exhibited poor lichen production, 2% was considered to have fair production, and only 21% good production; this compared to 33% of the range in each category in 1983. On the important calving and summer range in the Eastern Talkeetna Mountains, Lieb (1994) reported the lowest lichen biomass ever recorded, with all the preferred lichen species virtually eliminated. Lichen standing crops are expected to improve now that there has been a reduction in herd size.

Initial research in the early 1990s designed to evaluate body condition in various caribou herds led to the conclusion that Nelchina animals were in poorer body condition than animals from the Alaska Peninsula or Mulchatna Caribou Herds (Pitcher 1991). Since 1992, female calves have been captured and radiocollared or collected to assess body condition and future age specific productivity data. Four-month fall and 10-month spring weights have ranged between 103 and 129 lbs. These represent the lightest and most variable weights for the Interior herds (Valkenburg, ADF&G files).

Variations in 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). During this reporting period, the lowest 4-month old calf weights (106.5 lbs) were observed following a dry summer in 1996 and the highest (129.0 lbs) in 2001 following a summer with a wet, cool July. The NCH has the genetic potential to produce heavier caribou provided adequate nutrition is available. Female calves weighed in Kenai, which were the progeny of NCH animals translocated in 1986 and 1987, average over 130 lbs, and are among the heaviest in the state (ADF&G files).

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

Herd productivity was 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 years with conditions favorable to good forage production and availability, up to 64% of the 3-year old cows have had calves, but during years with drought or deep snow conditions, no 3-year old cows calved. Pregnancy rates in 2002 were high, with 64% of the 3-year-old and 87% of the 4-year-old and older radiocollared cows pregnant. 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. Given the heavy fall calf weights in 2001, the high rate of pregnancy was expected in spring.

Enhancement

Short-term caribou habitat enhancement depends more on weather conditions than any other factor. The Nelchina summer range has a short growing season. An early spring can provide caribou with abundant early nutritious forage that can have an incredible 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 maintaining a sustainable number of animals on the range and providing adequate habitat diversity. 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. Because a herd reduction occurred only in the last 4 years, more time is needed to fully evaluate the impact on range condition and forage production.

The other aspect of long-term enhancement is dependent on the return of wildfire or controlled burns. The Copper River Basin Fire Management Plan, an interagency plan, designates areas in Unit 13 where wildfires will not necessarily be suppressed. The plan provides for a natural fire regime to benefit wildlife habitat. Wildfire may play a role in the recovery of depleted or decadent stands of forage lichens important for overwintering caribou. However, recent research on the Nelchina winter range indicates selected winter habitat is greater than 50 years postburn (Joly et al. 2003), further supporting a mosaic habitat. In addition, wildfire likely enhances summer range conditions that currently limit productivity of the Nelchina herd. 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 most wildfire ignitions have been 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. 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

Current management needs include: (1) Monitoring range condition. The immediate repair and reading of the existing Nelchina range stations is needed if they are to remain a useful tool for

evaluating range condition and trend. Additional stations should be added in important habitats such as the Eastern Talkeetna Mountains and wintering grounds in eastern Unit 13 and Units 11 and 12. (2) Continued monitoring of body condition parameters. (3) Monitoring sources and rates of natural mortality. (4) Minimizing land use activities that adversely affect the Nelchina range. The use of ORVs in Unit 13 has increased and may be disrupting normal caribou behavior patterns in addition to the direct effects they have on forage plants.

CONCLUSIONS AND RECOMMENDATIONS

The fall 2004 NCH herd estimate of 36,677 caribou indicates the herd has increased from the 2000 low of 29,601 and is within the population management objective of 35,000–40,000 caribou. The large declines in herd size observed between 1998 and 2000 were attributed to both low productivity and increased wolf predation. Calf production in 1999 and 2000, 32 and 31 calves:100 cows respectively, was the lowest ever observed, but increased in 2001 and has remained higher since then. Calf survival to fall also increased during the last 4 years as high wolf harvests and wolf control in 13A appreciably reduced the number of wolves on the core calving ground. Also, caribou remained on the calving ground until later in the summer during 2004 and did not expose themselves to higher wolf densities in other parts of Unit 13.

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

The bull:cow ratio bottomed in 1998 at 21:100 then increased to 31:100 over the last 3 years. The current bull:cow ratio is still 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. High harvest rates for bulls in the late 1990s were responsible for the decline in the bull:cow ratio and the number of large bulls. Most hunters select for older, larger bulls when they are available. Wolf predation also decreases the number of large bulls, as they are vulnerable to predation when isolated after the rut. Reduced hunter harvest and lower predation rates from wolves the last few years have allowed bull numbers, especially large bulls to rebound somewhat. 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.

Caribou harvests need to be increased to a level that allows us to maintain the population within the management objective of 35,000–40,000 caribou. Harvest objectives should be established

for the Tier II hunt annually. Individual yearly harvest objectives for cows and bulls should be based on annual recruitment, bull:cow ratios, and the population trend. Harvest objectives for the NCH can be successfully attained by adjusting the number of Tier II permits issued and closing the season for bulls and cows by emergency order when the management goal for each has been reached.

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

The NCH is probably the only large herd in the state that can have its upper population limit controlled solely by human harvests. This is only possible because the NCH is accessible by the road system from the major population centers of Fairbanks and Anchorage. Because of this, limiting and maintaining the herd's size to 35,000–40,000 animals is considered a management experiment. The management objective of having hunters control herd size at a level that is below prior peak herd numbers but well above herd lows, over a prolonged number of years, has never been accomplished on a large herd. A major benefit of this management strategy is to provide a more stable and predictable harvest of caribou from the herd over the long term. Historic harvests, when the NCH peaked in the 1960s, averaged 3600 caribou a year (range 360–10,100), then dropped dramatically after the crash in the 1970s. If the herd could be stabilized at 35,000–40,000, and wolf predation limited to 10% or less, the projected annual harvest would be about 3000–4000 caribou each year, thus eliminating the boom-and-bust cycle. Also, a consistently moderate-sized herd should provide a more stable prey supply for wolves and somewhat reduce the predation pressure on moose.

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Table 1 Nelchina caribou fall composition counts and estimated herd size, regulatory years 1999–2004

Regulatory year	bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Total bulls (%)	Composition sample size	Total adults	Estimate of herd size	Postcalving[a] count
1999–2000	30	23	15	65	20	3000	26,650	31,365	33,125
2000–2001	25	20	14	69	17	3017	25,518	29,601	33,795
Total									
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

[a] Spring census.

Table 2 Nelchina caribou harvest data by permit hunt, regulatory years 1999–2004

Hunt No. /Area	Regulatory year	Permits Issued	Percent did not hunt	Percent Successful Hunters	Percent Unsuccessful hunters	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
TC566[a]	1999–2000	8015	31	25	40	1422	(71)	589	(29)	6	2017
	2000	18	38	41	760	(99)	4	(1)	1	765	
	1996	16	49	31	977	(99)	4	(1)	1	982	
	2003	15	48	35	965	(99)	1	(0)	0	966	
	2005	24	38	37	746	(99)	3	(0)	3	752	
RC 513/514[b]	1999–2000	2631	24	15	39	207	(53)	181	(47)	1	389
	2000–2001	2367	32	12	51	193	(71)	79	(29)	1	273
	2001–2002	2607	24	19	37	492	(98)	3	(1)	6	501
	2002–2003	2552	31	14	42	349	(96)	2	(1)	12	363
	2003–2004	2598	31	12	35	316	(99)	2	(1)	1	319
RC460[c]	1999–2003	No hunts									
RC512[d]	1999–2000	207	26	18	27	38	(100)	--	--	--	38
	2001–2002	192	21	22	33	43	(100)	--	--	--	43
	2002–2003	No data									
	2003–2004	111	59	25	6	7	(100)	--	--	--	7
	2003–2004	No data									
DC590[e]	1999–2000	100	56	12	28	6	(50)	6	(50)	0	12
	2000–2001	100	63	9	27	5	(56)	4	(44)	0	9
	2002–2003	100	51	17	30	7	(41)	10	(59)	0	17
		60	50	13	30	5	(63)	3	(38)	0	8
		60	68	7	22	4	(100)	0	(0)	0	4
Totals for all permit hunts	1999–2000	10,953	29	22	39	1673	(68)	776	(32)	7	2456
	2000–2001	4659	26	23	46	1001	(92)	87	(8)	2	1090
	2001–2002	4703	21	32	34	1476	(98)	17	(1)	7	1500
	2002–2003	4726	25	28	39	1326	(100)	6	(0)	12	1344
	2003–2004	4663	28	23	35	1076	(100)	5	(0)	4	1085

[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] Now-registration hunt for Alaska residents, held in Unit 12.

[d] Subsistence registration for Unit 12 residents, administered by FWS as Federal Hunt RC512.

[e] A drawing hunt.

Table 3 Nelchina caribou harvest and accidental death, regulatory years 1999–2004

Regulatory	Reported						Estimated			Accidental	Grand
Year	M	(%)	F	(%)	Unk.	Total	Unreported	Illegal	Total	death	total
1999–2000	1673	(68)	776	(32)	7	2456	200	100	300	200	2956
2000–2001	1001	(92)	87	(8)	2	1090	200	100	300	200	1590
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	1076	(100)	5	(0)	4	1085	200	100	300	200	1585

Table 4 Nelchina caribou Hunt TC566 annual hunter residency and success, regulatory years 1999–2004

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total	Local[a] resident	Nonlocal resident	Nonresident	Total	Total hunters
1999–2000	75	1942	--	2017	291	2,889	--	3180	5197
2000–2001	74	691	--	765	128	698	--	826	1591
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

[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 1999–2004

	Harvest Periods														
	Weeks (fall)								Months (winter)						
Regulatory year	1	2	3	4	5	6	7	8	Oct	Nov	Dec	Jan	Feb	Mar	n
1999–2000	6	16	15	12	23	15	12	--	--	--	--	--	--	--	2002
2000–2001	0	5	10	6	9	14	17	12	8	7	3	1	2	5	760
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

Table 6 Nelchina caribou hunt TC566 harvest percent by transport method, regulatory years 1999–2004

	Percent of harvest									
Regulatory Year	Airplane	Horse	Boat	3 or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Airboat	Unk.	n
1999–2000	8	1	17	41	0	15	15	1	1	2017
2000–2001	6	1	11	33	18	12	18	2	1	765
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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

LOCATION

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

GEOGRAPHIC DESCRIPTION: Yukon–Kuskokwim Delta

BACKGROUND

Historically, caribou ranged throughout the Yukon–Kuskokwim Delta, including Nunivak Island, and populations probably peaked during the 1860s (Skoog 1968). By the early 1900s, there were few caribou in the lowlands of the Delta. From the 1920s to the 1930s, reindeer herds ranged throughout much of the area but declined sharply in the 1940s (Calista 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, 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 functions 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 2002. Two observers and a pilot used an R44 helicopter to sample caribou for composition. A fixed-wing Cessna 185 aircraft equipped with radiotelemetry equipment was used to locate groups of caribou throughout the area. We did not find sufficient numbers of caribou to survey during October 2003, but caribou composition surveys were conducted by Dillingham personnel and included a sample along the Unit 18–19 boundary near Whitefish Lake.

We conducted a series of aerial surveys to assess caribou hunter pressure in the Kilbuck Mountains during August 2003. We noted the number of boats along the rivers and the number of tents at aircraft access points throughout the Kilbucks as an index of the number of hunters.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Before 1994, the KCH was small but growing and was expanding its range when approximately 35,000 Mulchatna caribou overran it in September–October 1994. There have been annual influxes of approximately 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 2002, and in October 2003 staff from Dillingham conducted a similar survey that included a sample from the Whitefish Lake area in Unit 18 (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 westward 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.

Caribou from the Western Arctic caribou herd (WAH) occasionally use portions of Unit 18 north of the Yukon River. The number of WAH caribou using this area is small relative to the size of the entire herd. Unit 18 is on the periphery of the WAH's range, and use of this area is occasional and intermittent. We did not find nor hear of any evidence of WAH caribou in Unit 18 during a reporting period.

MORTALITY

Harvest

Season and Bag Limit

2002–2003 and 2003–2004 Units and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Unit 18, north of the Yukon River		
RESIDENT AND NONRESIDENT HUNTERS:		
1 caribou per day		
Bulls	16 May–30 Jun	16 May–30 Jun
Any caribou	1 Jul–15 May	1 Jul–15 May
Unit 18, south of the Yukon River		
RESIDENT HUNTERS:		
Up to 5 caribou	1 Aug–31 Mar	
NONRESIDENT HUNTERS:		
One bull		1 Sep–1 Oct

Board of Game Actions and Emergency Orders. During its November 2003 meeting, the Board of Game changed the caribou season throughout Unit 18 so that beginning in 2004–2005, the resident season will be 1 August–15 April with a bag limit of 5 caribou, but no more than 1 bull may be taken prior to 1 November, and the nonresident season will be 1–30 September with a 1 bull bag limit.

Hunter Harvest. In 2002–2003, 170 successful hunters reported killing 258 caribou, including 218 bulls, 34 cows, and 6 of unknown sex. In 2003–2004, 395 successful hunters reported killing 704 caribou, including 497 bulls, 201 cows, and 6 of unknown 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 grasp the extent to which the harvest is underreported.

We made an aerial assessment of caribou hunter pressure in the Kilbuck Mountains in August and September 2003. Because the number of hunters per boat or tent is difficult to assess from the air, we used the number of boats along the rivers and the number of tents near lakes or landing strips as an index for hunting pressure. The average number of boats or tents concurrently using lakes, rivers, or landing strips per observation in the Kilbuck Mountains was 3.8 with a high of 29 tents and a low of 0 (n=51).

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

Hunter Residency and Success. The 2002–2003 season was the first opportunity for nonresidents to participate in a caribou hunt in the Kilbuck Mountains in recent years. During that year, 54 nonresident hunters (87%) were successful, while 116 residents (50%) reported taking at least one caribou. In 2003–2004, 119 nonresident hunters (88%) were successful, while 276 residents (77%) reported taking at least one 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, but even though the harvest is unreported, the chronology of the unreported harvest probably parallels the reported harvest. During 2002–2003, snow conditions were poor and fewer caribou were harvested, while during 2003–2004, conditions were adequate for travel through most of the season, caribou were generally available, and harvest was greater.

The reported harvest is greater during the month of September than any other month with 45% of the reported annual harvest being taken during September 2002 and 19% during September 2003 (Table 2).

Transport Methods. During the open water months, many caribou were reported taken using boats (40 in 2002–2003 and 43 in 2003–2004), but most were reported taken using airplanes (125 in 2002–2003 and 262 in 2003–2004). Nonresidents used airplanes almost exclusively.

During the winter months, caribou were typically taken using snowmachines (88 in 2002–2003 and 386 in 2003–2004) 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 now that 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 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 but continue to informally keep interested working group members abreast of caribou issues.

We should continue to meet with other agencies to consider our common interest in MCH caribou and to better use our limited resources. This is likely to become more important as the interest in caribou hunting in Unit 18 in the fall is increasing, though the reasons for this increased interest 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, but 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 herd" is in Unit 18, when generally only a small portion of it can be found here; 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, 1999–2003

			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

Table 2 2002–2003 and 2003–2004, 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			

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

LOCATION

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

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

GEOGRAPHIC DESCRIPTION: Drainages of the Kuskokwim River upstream from the village of Lower Kalskag; Yukon River drainage from Paimiut upstream to, but not including, the Blackburn Creek drainage; the entire Innoko River drainage; and the Nowitna River drainage upstream from the confluence of the Little Mud and Nowitna Rivers

BACKGROUND

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

Small caribou bands have apparently existed in the Kuskokwim Mountains, which divide Unit 19 from Unit 21, since at least the turn of the 20th century. Reindeer herders from the Yukon River villages of Holy Cross and Shageluk traditionally herded their animals to summer range in these mountains. In areas where reindeer were herded, animals were occasionally lost. Some people believe the *Rangifer* herds in the Kuskokwim Mountains today are descendants of feral reindeer or reindeer–caribou hybrids. This theory is supported by the fact that the Beaver Mountains caribou herd calves much earlier than many other caribou herds (early to mid May), although this may be due to abundance of food rather than the influence of reindeer genes.

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

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

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

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

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

Big River–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

We reviewed hunter harvest reports and compiled harvest data annually. Harvest data were summarized by regulatory year, which begins 1 July and ends 30 June (e.g., RY03 = 1 Jul 2003 through 30 Jun 2004). 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 more precise, they must not be interpreted necessarily as increases in harvests. Also, some harvest reports are difficult to code to specific location because hunters provide ambiguous information. This causes difficulty in discerning which herd the harvested animal was from, especially in Unit 19C where there are 3 different herds.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Overall, the McGrath area caribou herds probably declined or remained stable during this reporting period (RY02–RY03), based on incidental observations and hunter information.

Population Size

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

The current population estimate for the Sunshine Mountains herd is 100–150 animals. This herd also declined over that same period as the Beaver Mountains herd and appears to have stabilized its decline. Whitman (1997) estimated the population was 700 animals in 1994 and 500 in 1995. This herd seems to mirror the population dynamics of the Beaver Mountains herd and other small mountain herds like the Chisana and Mentasta, in which predators probably have a major impact on calf survival (Jenkins 1996; Whitman 1997; Mech et al.

1998). In July 2000, a search of the Sunshine Mountains was conducted from the Cloudy Mountains north to Von Frank Mountain, mostly along ridges and open hillsides. No caribou were observed; however, Sunshine Mountains caribou were observed calving in the Nixon Fork of the Takotna River during 2002, 2003, and 2004.

The Rainy Pass herd probably numbers 1500–2000 caribou based on observations and composition surveys. This herd likely declined during RY02–RY03 based on previous composition survey data and hunter information. In July 1996, 1093 caribou were counted in Unit 16 incidental to sheep surveys. Whitman (ADF&G, personal communication) suspected that 1000–1500 more caribou of the Rainy Pass herd were located in Unit 19 at that time but were not counted.

The current estimate for the Big River–Farewell herd is 750–1500 animals. Whitman (1997) estimated the Big River–Farewell herd at 1000–2000 animals. The herd probably declined since that estimate, including during RY02–RY03, based on previous composition surveys and mortality of radiocollared caribou from the adjacent Rainy Pass herd (Boudreau 2003).

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

The Mulchatna herd is not a subject of this report. However, this herd of approximately 147,000 caribou has extended its range into the Kuskokwim drainage. The ranges of the Beaver Mountains, Sunshine Mountains, and Big River–Farewell herds currently overlap the periodic dynamic winter range of the Mulchatna herd. Some local residents have speculated that the Mulchatna herd migration through the Beaver Mountains herd range did coincide with their observed declines in the herd, but no definitive data were collected to substantiate this speculation.

Composition

No composition surveys were conducted during this reporting schedule due the combination of funding constraints and the remoteness of the herds' range.

Distribution and Movements

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

Sunshine Mountains. The range of the Sunshine herd is predominantly in the drainages of the Nixon Fork from Cloudy Mountain to Von Frank Mountain and in the headwaters of the Susulatna River, including Fossil Mountain and the Cripple Creek Mountains. Calving occurs throughout the range, mostly on the Nixon Flats. Other than the Kenai Lowlands herd, the

Sunshine Mountains herd is the only herd in Alaska known to regularly calve in forested habitat in muskeg and low-lying areas. Wintering areas are mostly in the drainages of the Nixon Fork. In midsummer these caribou are found predominately in the Sunshine Mountains, and small groups were observed in summer 2003 and 2004 in the Nixon Flats.

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

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

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

MORTALITY

Harvest

Season and Bag Limit.

Herd/Unit/Bag limit	Resident open seasons	Nonresident open seasons
Mulchatna		
Unit 19A, Lime Village Management Area.		
RESIDENT HUNTERS: 4 caribou.	10 Aug–31 Mar	
4 bulls or 4 cows without calves.	1 Apr–9 Aug	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–31 Mar
Mulchatna, Beaver Mountains		
Remainder of Unit 19A and all of Unit 19B.		
RESIDENT HUNTERS: 5 caribou, no more than 2 may be bulls.	1 Aug–15 Apr	
NONRESIDENT HUNTERS: 1 caribou (RY03). (*Note*: In 2002 a nonresident closed area was established in Unit 19A. See description in Alaska Hunting Regulations #43. This area is closed to all nonresidents for caribou hunting.)		1 Aug–15 Apr

Herd/Unit/Bag limit	Resident open seasons	Nonresident open seasons
Tonzona, Big River/Farewell, Rainy Pass Unit 19C.		
RESIDENT AND NONRESIDENT HUNTERS: 1 bull.	10 Aug–20 Sep	10 Aug–20 Sep
Sunshine Mountains Unit 19D, drainage of the Nixon Fork.		
RESIDENT AND NONRESIDENT HUNTERS: 1 bull (RY03).	10 Aug–20 Sep	10 Aug–20 Sep
Beaver Mountains, Tonzona, Big River/Farewell Unit 19D, remainder.		
RESIDENT HUNTERS: 1 bull (RY03).	10 Aug–20 Sep 1 Nov–31 Jan	
or 5 caribou.	Season to be announced.	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–30 Sep
Beaver Mountains, Sunshine Mountains Unit 21A.		
RESIDENT AND NONRESIDENT HUNTERS: 1 caribou.	10 Aug–30 Sep	10 Aug–30 Sep
Beaver Mountains Unit 21E.		
RESIDENT HUNTERS: 1 caribou and 2 additional caribou during winter if season announced.	10 Aug–30 Sep	
NONRESIDENT HUNTERS: 1 caribou.		10 Aug–30 Sep

Alaska Board of Game Actions and Emergency Orders. During the March 2004 meeting, the Alaska Board of Game passed a proposal to reduce the caribou bag limit for nonresidents to 1 caribou in Units 19A and 19B. 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 seasons with Unit 19C from 30 September to 20 September. The Unit 19D bag limit was changed from 1 caribou to 1 bull, except for the winter season in the remainder of Unit 19D, which retained the 1 caribou bag limit. The Unit 21A season during 10–20 December was also eliminated. These changes took effect in RY04.

During the March 2002 meeting, the board passed regulations that went into effect in RY02. A 4-mile-wide nonresident closed area was created in a corridor along the mainstem and

tributaries of the Kuskokwim River in Unit 19A from and including the Holitna River to Kalskag. This restricted nonresident caribou hunters to areas in Unit 19A less frequently hunted by local residents. The board also passed a proposal at the March 2002 meeting to include the Aniak drainage into the Holitna–Hoholitna Management Area, which requires hunters entering Unit 19B by aircraft to fly all big game taken in Unit 19B out of the area by aircraft. This prohibits hunters who float rivers in Unit 19B from transporting big game carcasses from Unit 19B into Unit 19A by boat or raft. The object was to reduce meat spoilage by shortening travel distance and time spent in the field with harvested big game.

Hunter Harvest. The reported harvest of local caribou herds declined in the McGrath area during RY02–RY03 (Table 1). During RY90–RY94 the average reported caribou harvest was 172. Harvest declined between RY95 and RY99 to an average of 97 caribou. These declines in harvest (Table 1) coincide with population declines in the Rainy Pass, Big River–Farewell, and Tonzona herds. Harvests declined each year during RY00–RY03. The average reported McGrath area caribou harvest during RY02–RY03 was 72. The percent females in the harvest increased from an average of 1% during RY93–RY98 to an average of 7% during RY99–RY03 (Table 2).

Hunter Residency and Success. During RY02–RY03, local hunters took 4% of the reported harvest of local caribou herds (Table 3). However, local users are less likely to report hunting activities than nonlocal residents and nonresidents. During RY02–RY03, nonlocal residents took about 34%, and nonresidents took 62% of harvested animals. Historically (RY89–RY99) nonlocal Alaskans took 43% of the total harvest.

Harvest Chronology. The majority of caribou harvested were taken during August and September (Table 4). During RY02–RY03, about 32% of the harvest was during August and 58% was in September. This harvest chronology did not change significantly in the past 5 regulatory years.

Transport Methods. Aircraft were the most common means of hunter transportation to access the area caribou herds. During RY02–RY03, 80% of caribou hunters used aircraft, 10% used 3- or 4-wheelers, and <8% used snowmachines (Table 5).

Other Mortality

No specific data were collected concerning natural mortality rates or factors during RY02–RY03. However, wolf predation may be high within most McGrath area herds. The early calving dates noted during survey flights in the Beaver Mountains and the low percentage of calves (<1%) in the fall suggest the Beaver Mountains herd is highly productive but suffers from high neonatal mortality. The declines in the moose population in the upper Kuskokwim probably increased wolf predation on caribou in the Sunshine Mountains herd, potentially increasing predation mortality. Winter mortality of these herds during RY94 was probably substantial, based on the drop in harvest from RY94 to RY95. Winter 1994–1995 was the most severe winter on record, based on snow-depth data collected in McGrath by the National Weather Service. No severe winters occurred during this reporting period.

HABITAT

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

CONCLUSIONS AND RECOMMENDATIONS

We met our management objectives for all caribou herds in the McGrath area. The objective for the Big River–Farewell herd was to provide for a harvest of up to 100 bull caribou. The average reported harvest during RY02–RY03 was 14. The objective for the Rainy Pass herd was to provide for a harvest of up to 75 bull caribou, and the average reported harvest was 8. The objective for the Sunshine and Beaver Mountains herds was to provide for a combined harvest of up to 25 caribou, and the average reported harvest was 3caribou. The objective for the Tonzona herd was to provide for a harvest of up to 50 caribou, and the average reported harvest was 4 caribou.

Caribou harvests from the Big River–Farewell, Tonzona, and Rainy Pass herds decreased during RY02–RY03, and we estimate that herd size has also declined. Reasons for the decline are unknown, but predation may be a key factor, based on Rainy Pass herd data that show heavy calf weights and low calf numbers in the fall. A second factor may be the decline in sheep hunter numbers in Unit 19C, which could reduce incidental caribou harvest. A third factor could be the reduced season and bag limit in Units 19C and 19D over the past 2 Board of Game meetings.

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

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TABLE 1 McGrath[a] area caribou harvest by herd, regulatory years 1989–1990 through 2003–2004

Regulatory year	Successful Hunters						
	Beaver Mtns	Sunshine Mtns	Big River–Farewell	Rainy Pass	Tonzona	Unspecified	Total
1989–1990	12	2	49	84	12	9	168
1990–1991	5	2	72	115	15	2	211
1991–1992	13	0	65	101	37	1	217
1992–1993	4	2	51	62	5	2	126
1993–1994	3	1	61	35	15	19	134
1994–1995	2	0	82	57	25	6	172
1995–1996	1	0	55	30	13	3	102
1996–1997	5	0	35	42	12	1	95
1997–1998	0	0	44	24	11	2	81
1998–1999	5	0	35	28	13	21	102
1999–2000	3	0	41	24	11	26	105
2000–2001	3	0	25	26	8	22	84
2001–2002	2	4	31	16	6	12	71
2002–2003	2	0	21	5	5	45	78
2003–2004	4	0	6	11	3	42	66

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

TABLE 2 McGrath[a] area caribou harvest by sex, regulatory years 1989–1990 through 2003–2004

Regulatory year	Males	(%)	Females	(%)	Unspecified	Total
1989–1990	153	(92)	13	(8)	2	168
1990–1991	188	(90)	22	(10)	1	211
1991–1992	186	(86)	30	(14)	1	217
1992–1993	109	(87)	16	(13)	1	126
1993–1994	131	(98)	3	(2)	0	134
1994–1995	172	(100)	0	(0)	0	172
1995–1996	99	(97)	3	(3)	0	102
1996–1997	94	(100)	0		1	95
1997–1998	79	(99)	1	(1)	1	81
1998–1999	97	(97)	3	(3)	1	101
1999–2000	101	(98)	2	(2)	2	105
2000–2001	78	(93)	4	(5)	2	84
2001–2002	65	(92)	6	(8)	0	71
2002–2003	69	(88)	8	(10)	1	78
2003–2004	59	(89)	6	(9)	1	66

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

TABLE 3 McGrath[a] area caribou harvest by location of hunter[b] residence, regulatory years 1989–1990 through 2003–2004

Regulatory year	Local resident[c]	Nonlocal resident	Alien and Nonresident	Total[d]	% Nonresident
1989–1990	9	129	120	261	47
1990–1991	6	125	160	297	55
1991–1992	12	177	140	332	43
1992–1993	5	86	80	172	47
1993–1994	10	104	98	214	46
1994–1995	3	115	146	264	55
1995–1996	10	72	90	174	52
1996–1997	3	20	68	91	75
1997–1998	2	16	58	81	72
1998–1999	0	21	74	95	78
1999–2000	1	39	65	105	62
2000–2001	0	20	44	64	69
2001–2002	2	21	38	61	62
2002–2003	4	27	47	78	61
2003–2004	2	22	42	66	64

[a] Hunters for which residence was identified.
[b] Excludes Mulchatna caribou herd animals taken in Unit 19.
[c] Local resident is any resident of Unit 19.
[d] May include hunters with unknown residency.

TABLE 4 McGrath[a] area caribou harvest by month, regulatory years 1989–1990 through 2003–2004

Regulatory year	Harvest by month									
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Unk	*n*
1989–1990	0	47	104	14	0	0	2	1	1	169
1990–1991	0	47	150	8	0	2	0	0	4	211
1991–1992	0	80	122	11	2	0	0	0	2	217
1992–1993	0	41	80	4	0	1	0	0	0	126
1993–1994	0	53	73	0	2	3	1	0	2	134
1994–1995	0	60	103	9	0	0	0	0	2	174
1995–1996	0	32	69	1	0	0	0	0	0	102
1996–1997	0	34	58	0	1	0	0	0	2	95
1997–1998	0	27	52	1	0	0	0	0	1	81
1998–1999	0	24	70	2	0	0	0	0	0	96
1999–2000	0	30	66	8	0	1	0	0	0	105
2000–2001	0	31	49	0	0	0	0	0	0	80
2001–2002	0	19	46	1	0	0	0	0	5	71
2002–2003	0	12	20	0	0	0	3	3	0	38
2003–2004	0	7	14	0	0	0	0	0	0	21

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

TABLE 5 McGrath[a] area transport method of caribou hunters, regulatory years 1989–1990 through 2003–2004

Regulatory year	Harvest by transport method								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Unk	*n*
1989–1990	213	9	14	7	4	3	10	3	263
1990–1991	268	10	5	6	0	2	4	2	297
1991–1992	253	21	7	22	2	7	18	2	332
1992–1993	143	11	5	10	1	2	0	0	172
1993–1994	160	20	9	10	5	7	3	0	214
1994–1995	219	10	5	33	0	5	0	2	274
1995–1996	132	5	6	23	0	4	0	4	174
1996–1997	78	8	0	6	1	2	0	0	95
1997–1998	65	0	0	15	0	1	0	0	81
1998–1999	71	5	1	25	0	0	0	0	102
1999–2000	77	6	3	16	1	2	0	0	105
2000–2001	50	2	0	10	0	2	0	0	64
2001–2002	39	0	0	17	3	2	0	0	61
2002–2003	68	0	0	5	3	2	0	0	78
2003–2004	47	0	0	10	8	0	0	1	66

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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.

Since statehood in 1959, 2 wolf control programs have been conducted in Unit 20A. During 1976–1982, state biologists killed wolves from helicopters to increase moose numbers and harvest. Boertje et al. (1996) summarized the influence of this program on moose, caribou, and wolves. From October 1993 to December 1994 state biologists and trappers reduced wolf numbers by trapping to halt the decline of the caribou herd. This ground-based control program was terminated amid considerable controversy. Valkenburg et al. (2002) summarized the effects of this program on the Delta caribou.

Harvest and harvest regulations also varied widely due to population fluctuations and strong hunter interest. The Alaska Board of Game suspended hunting in 1992 in response to

declining numbers, and the herd remained closed to hunting through regulatory year (RY) 1995 (e.g., RY95 begins 1 Jul 1995 and ends 30 Jun 1996). Hunting has been by drawing permit for bull caribou only since the hunt was resumed in RY96.

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

MANAGEMENT DIRECTION

MANAGEMENT GOALS

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

MANAGEMENT OBJECTIVES

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

METHODS

POPULATION STATUS AND TREND

Population Census

We estimated population size using the radio-search technique and complete visual searching of areas where aggregations were most likely to occur (Valkenburg et al. 1985). We photographed large groups from a DeHavilland Beaver aircraft with a belly-mounted Zeiss RMK-A 9×9" camera and from Piper Cubs (PA18) and Bellanca Scouts with digital cameras. Caribou in photographs were counted with an 8× magnifying glass.

In 2002 the herd was counted on 28 June using 6 fixed-wing aircraft, including the DeHavilland Beaver. The crew of the DeHavilland Beaver photographed 7 major groups consisting of 1678 caribou. Also, 732 caribou in numerous smaller groups were photographed or counted from 5 fixed-wing aircraft. The majority of caribou photographed and counted were located in upper Mystic Creek and along the divide between the upper Wood and Yanert Rivers, although caribou were scattered across their entire range. Three radiocollared Delta

herd caribou, associated with 514 caribou, were located in the upper Nenana River and Butte Lake areas. Assuming 1 Delta herd radio collar represented about 50 caribou, we estimated that approximately 150 of these caribou found on the south side of the Alaska Range were Delta herd animals and, therefore, were included in the census. All other groups of caribou located during the census were believed to be composed entirely of Delta herd caribou. We were able to search all appropriate habitat between Jarvis Creek on the east and the Parks Highway on the west because conditions were good with clear skies and light winds.

In 2003 the herd was surveyed using 6 fixed-wing aircraft, including the ADF&G DeHavilland Beaver fitted with a Zeiss RMK-A, 9" format camera. Caribou were radiotracked with 2 ADF&G Scout aircraft (M. Keech/pilot and C.T. Seaton/observer; R. Boertje/pilot and K. Kellie/observer) and large groups of caribou were identified for the Beaver to photograph. The Beaver crew (B. Dale/pilot, D. Young/recorder, and D. Parker McNeill/camera operator) photographed 3 major groups of caribou. Forty additional smaller groups ranging in size from 1 to 130 caribou were located and counted by P. Zackowski/A. Keech, C. Gardner and T. Cambier, all in PA18s.

Searching began at approximately 7:00 AM. The temperature was 37°F at 6000 feet at approximately 9:00 AM; skies were mostly light overcast, although they varied from clear to heavy overcast across the search area; 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 to the south.

We counted 1136 caribou in the 3 large groups that were photographed near Keevy Peak (63°54.24, 147°57.15), the Grizzly/Dick Creeks divide (63°44.22, 148°06.76), and the south side of the Yanert River between Louis and Moose Creeks (63°33.76, 148°01.74). An additional 1122 caribou were counted in 40 smaller groups scattered across the herd's entire range. In all, we counted 2258 caribou and accounted for 63 of 72 (87.5%) active radio collars.

The 2004 census was conducted in July, and thus, will be reported in the next reporting period.

Population Composition

We conducted composition surveys using R-22 or R-44 helicopters and Bellanca Scout or PA18 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 2002 we classified 924 caribou on 28 September. Overall, survey conditions were fair to good (cloud cover ranged from complete in the Yanert drainage to broken with high overcast on the north side of the Alaska Range; winds were moderate and variable, which precluded classifying several small groups of caribou in steep, mountainous terrain). Caribou were found in small, scattered groups located primarily in the Yanert River drainage and the northern foothills of the Alaska Range between Dry Creek and the Little Delta River. During this composition survey we located 45 of 64 radiocollared caribou. On 29 September, during capture operations, we located about 6 additional radiocollared caribou with approximately 200 animals east of the Little Delta River. Composition of those groups appeared similar to that of groups sampled in the vicinity of Iowa Ridge on 28 September. We suspect the remaining radiocollared caribou representing several hundred animals were south of the Yanert River drainage, but those groups were not sampled. The largest number of caribou classified from a single group was 112 animals, the smallest group was a single animal.

In 2003 we classified 1023 caribou on 6–7 October. Caribou were found in relatively small, scattered groups primarily in the Yanert River drainage and the northern foothills of the Alaska Range between Dry Creek and the Delta River. The largest number of caribou classified from a single group was 74, the smallest a single animal, and mean group size was 9. We located approximately 80% of the 72 active radiocollared caribou. Overall, I considered survey conditions to be good for several reasons. First, because caribou were found in relatively small groups, they were easy to classify. Second, the lack of snow cover made it easy to locate groups with radiocollared animals and to spot incidental groups. Third, winds were mostly light to moderate and were not a factor. The only exception was in the Yanert Fork on 7 October when winds were moderately strong and variable, which precluded classifying only a few small groups of caribou in very steep, mountainous terrain at higher elevations. Finally, except for clouds obscuring the passes between the Yanert Fork and Upper Nenana River, which prevented searching the Wells Creek area, skies were mostly clear and cloud cover was not a factor.

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 2800 caribou in 2002.

In 2003 we estimated the Delta herd to be approximately 2540 caribou (Table 1). This is a decrease of approximately 260 (9%) caribou from the 2002 census. However, generally higher calf:cow ratios observed in 2002 (25:100), 2003 (20:100), and 2004 (35:100) may result in a stable or slightly increasing herd in the near term.

Population Composition

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

In general, calf:cow ratios have been relatively low and declining through the 1990s, and that trend continued into the early 2000s (Table 1). Ratios in 2000 and 2001 were the lowest observed since 1993. Calf mortality studies conducted during 1995–1997 indicate this was primarily due to predation by wolves, grizzly bears, and golden eagles (Valkenburg et al. 2002). Analysis of fecal samples collected in late winter 1989 and 1993 indicated depletion of the foothill lichen range in Unit 20A (Valkenburg 1997; Valkenburg et al. 2002). The proportion of lichens in the diet was relatively low and the proportion of mosses high compared to caribou from other Interior herds. Calf:cow ratios have shown improvement recently (2002 – 25:100; 2003 – 20:100; and 2004 – 35:100), 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 2003.

MORTALITY

Harvest

Season and Bag Limit (RY02 and RY03).

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

Alaska Board of Game Actions and Emergency Orders. In response to a proposal at the March 1996 meeting, the Alaska Board of Game authorized a drawing permit hunt beginning RY96. As noted previously, harvest had been suspended in RY92. We recommended 75 permits based on improvement in recruitment and large bull:cow ratios, and issued 75 permits in RY96 and in RY97. We issued 100 permits annually during RY98–RY03 in response to proposals to increase the number of permits. No emergency orders were issued during this reporting period.

Alaska Board of Game Actions, March 2004 — The board took the following actions for caribou in Unit 20A:

- Increased the authority of the department to issue up to 200 permits for the Delta caribou herd (DC827).

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 41% (RY96) (Table 2). The percentage who did not hunt in RY02 (33%) and RY03 (37%) was similar to the previous 6-year average (32%). Success rates of those who hunted have ranged between 71% (RY97) and 35% (RY00). Success rates of 55% in RY02 and 52% in RY03 were similar to the previous 6-year average (57%). 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 ATV.

Hunter Residency and Success. Through RY01, local residents of Unit 20 consistently harvested more caribou than nonlocal resident and nonresident hunters combined (Table 3). This may simply be a function of local hunters holding the majority of the permits. Sixty-seven percent of the hunters reporting from RY97 through RY01 were local hunters. In addition, local hunters have advantages over nonlocal hunters, such as proximity to the hunt area and local knowledge of access, herd distribution, and movements, which may result in differential harvest rates. However, in RY02 harvest by nonlocal resident and nonresident hunters (22caribou) surpassed that of local residents (15 caribou) for the first time since the hunt began in RY96, and harvests by nonlocal resident and nonresident hunters were similar in RY03 (Table 3). Slightly greater than 50% of the hunters reporting in RY02 (51%) and RY03 (52%) were nonlocal resident and nonresident hunters, up from 35% during RY97–RY01. This suggests that this hunt is either becoming more popular with nonlocal and nonresident hunters or less popular with local hunters. Success rates of nonresident hunters (69%) continued to be higher than that of resident (local and nonlocal) hunters (27%). 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 RY02 and RY03, 27% (3/11) of the nonresident hunters reported using a guide compared to 0% (0/114) for resident hunters.

Harvest Chronology. No clear trends were apparent in harvest chronology for RY96 through RY03 (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, RY02, and RY03 the highest harvest occurred early in the season. In RY99 the highest harvest occurred

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

Transport Methods. Overall, the most common mode of transportation used by successful hunters (RY96–RY03) was 3- or 4-wheelers followed by aircraft, ORVs, highway vehicles, horses, and boats (Table 5). Interestingly, RY00 was the first year since this permit hunt began that successful hunters accessed the hunt area by boat. The Fairbanks area received above average rainfall (Aug $\bar{x}$ = 1.96 in, Sep $\bar{x}$ = 0.95 in; National Weather Service) during August (2.59 in) and September (1.28 in) 2000, and water levels in local rivers and creeks were correspondingly high, which may explain this apparent anomaly. Above average rainfall (Jul $\bar{x}$ = 1.87 in) in July 2003 (5.96 in) may also explain the 1 successful hunter who accessed the hunt area by boat in RY03. It is also worth noting that RY01 was the first year since RY96 that horses were not reported as a method of transport used by successful hunters.

Other Mortality

Research staff conducted calf mortality studies during 1995–1997, and wolves, grizzly bears, and eagles were primary predators of caribou in the unit. Details of causes and trends in calf and adult mortality are in research reports and publications (Davis et al. 1991; Boertje et al. 1996; Valkenburg et al. 1996; Valkenburg 1997; Valkenburg et al. 1999; Valkenburg et al. 2002). Calf and adult survival were poor during the population decline; consequently, the Board of Game adopted a wolf predation control implementation plan in Unit 20A to reduce wolf numbers in order to rebuild the caribou population. In addition, Valkenburg (1997) and Valkenburg et al. (2002) tested a diversionary feeding program that addressed predation by a wolf pack in the Wells Creek area.

HABITAT

Assessment and Enhancement

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

CONCLUSIONS AND RECOMMENDATIONS

The primary concern at this juncture is whether the herd will be able to grow or support improved harvests with potentially increasing wolf densities. Currently, wolf numbers are believed to be moderately high (ca. 31 wolves/1000 mi^2; or ca. 12 wolves/1000 km^2) due to the abundant moose population. The degree to which high wolf:caribou ratios will influence predation rates on caribou is unknown. While high ratios seem bound to increase caribou mortality to some degree, a variety of mechanisms may have mitigating effects. Wolf

behavior patterns, prey selection, and hunting patterns may result in wolves primarily preying on moose. Low vulnerability of caribou due to improved nutritional status could also reduce kill rates on caribou. Adams et al. (1995) presented data indicating that caribou spatial distribution may also reduce wolf predation risk for caribou calves. Nonetheless, it is unlikely that the Delta herd will grow substantially at this time, and moderate declines are possible.

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

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 estimated annual harvestable surplus. The proportion of large bulls in the population has remained high, and our estimates indicate that additional bulls can be harvested from the population without affecting herd dynamics. We will continue to monitor sex ratios during fall surveys to ensure that our management objectives concerning bull:cow ratios continue to be met.

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TABLE 1 Delta caribou fall composition counts and estimated population size, 1983–2003

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]	
10/05/87	32	8	31	19	61	53	23	24	20	1682	7780[b]	
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	10,69027	18
10/4/90	38	6	17	11	65	45	39	16	24	2411	7886[c]22	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]		7	5	3	72	45	33	22	25	1525	3661	42
10/3–6/94[d]		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 3625	27	9	18	12	69	48	20	32	19	1598	3699	43
10/1/98	44	9	16	10	62	31	49	20	27	1519	3829	40
10/2/99	44	10	19	11	62	37	40	23	27	674	3625	19
10/3–4/00	46	10	11	7	64	41	37	22	30	1010	3227	31
9/30/01	39	9	13	8	66	46	30	24	26	1378	2965	46
9/28/02	50	17	25	14	57	43	23	34	29	924	2800	33
10/6–7/03	37	10	20	13	64	32	39	29	23	1023	2540	40

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

TABLE 2 Delta caribou harvest data by permit hunt, regulatory years 1996–1997 through 2003–2004

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
		75	13 (17)	18 (29)	44 (71)	44 (100)	0 (0)	0 (0)	44
		100	29 (29)	21 (30)	50 (70)	49 (98)	1 (2)	0 (0)	50
		100	37 (37)	25 (40)	38 (60)	37 (97)	0 (0)	1 (3)	38
		100	31 (31)	45 (65)	24 (35)	24 (100)	0 (0)	0 (0)	24
1997–1998		100	38 (38)	29 (47)	33 (53)	33 (100)	0 (0)	0 (0)	33
1998–1999		100	33 (33)	30 (45)	37 (55)	37 (100)	0 (0)	0 (0)	37
1999–2000	[a]	101	37 (37)	31 (48)	33 (52)	33 (100)	0 (0)	0 (0)	33
2000–2001									
2001–2002									
2002–2003									
2003–2004									

[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 2003–2004

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 (53)	10	14	4	28 (47)	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

[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 2003–2004

Regulatory year	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

[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 2003–2004

Regulatory year	Percent harvest by transport method[a]							
	Airplane	Horse	Boat	3- or 4-Wheeler	ORV	Highway vehicle	Unk	*n*
1996–1997	32	0	0	36	18	9	5	22
1997–1998	14	10	0	52	11	11	2	44
1998–1999	20	8	0	52	14	6	0	50
1999–2000	29	8	0	45	5	13	0	38
2000–2001	17	13	8	33	21	8	0	24
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

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004[a]

LOCATION

GAME MANAGEMENT UNIT: 20B, 20C, 20D, 20E, 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 1 of 5 international herds shared between Alaska and Yukon, Canada, and is an important herd for consumptive and nonconsumptive uses in Interior Alaska and southern Yukon. Like other caribou herds in Alaska, the FCH has displayed major changes in abundance and distribution. During the 1920s it was the largest herd in Alaska and was one of the largest in the world, estimated at 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 to be 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 (50,000 km^2), less than 25% of the range thought to have been used by the herd during the 1920s.

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

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 size around 22,000 caribou. Population growth stabilized due to high adult mortality, unusually poor pregnancy rate in 1993, and low to moderate calf survival during this period (Boertje and Gardner 2000*a*). During 1996–2002 the herd doubled in size due to elevated pregnancy rates and increased adult and calf survival.

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

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

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

The team developed a management plan that included recommendations for herd population, harvest, and habitat management. The plan recommended a combination of agency-conducted nonlethal wolf control and public wolf trapping to reduce wolf numbers within the herd's summer ranges and, specifically, to reduce wolf predation on calves. Harvest management recommendations required the state and federal management boards to develop new harvest regulations. The Alaska Board of Game (board), the Federal Subsistence Board (FSB), and

the Yukon Fish and Wildlife Management Board endorsed the plan, developed new harvest regulations that satisfied the plan, and guided regulatory decisions during 1996–2000.

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 on the goals of the Fortymile Caribou Herd Management Plan. These advisory committees, with input from the federal Eastern Interior Regional Advisory Council, YDRR, Yukon First Nations, and a long list of other interested parties, developed the 2001–2006 Fortymile Harvest Management Plan. This plan was endorsed by the board in March 2000 and guided regulation development and implementation during regulatory year (RY) 2002–RY03 (RY = 1 Jul through 30 Jun; e.g., RY03 = 1 Jul 2003 through 30 Jun 2004).

MANAGEMENT DIRECTION

A review of Fortymile caribou herd management direction during the 1970s through 2000 was presented in Gardner (2003). During RY02–03, herd management followed recommendations in the 2001–2006 Fortymile Caribou Harvest Management Plan. The harvest plan proved to be a highly successful joint state–federal management program benefiting users and the herd. Since 2001 the harvest plan has 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 a dual management system, to the detriment of users and the herd.

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 RY02–RY03, we attempted annual photocensus counts of the FCH between late June and mid July. Census counts were conducted once the herd formed 5–15 tightly aggregated groups in areas that provided for adequate visual counting and photographing. Prior to the census, we conducted several reconnaissance flights of the herd to determine if the caribou were adequately grouped. Once the herd was grouped, we attempted the census using 3–5 spotter planes (Super Cub PA-18 or Bellanca Scout), 1 radiotracking plane (Cessna 185 or 206, Bellanca Scout, or Super Cub), and a 1 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 in areas that allowed for visual counting and photographing, the census was not conducted and estimates were based on population models developed by P. Valkenburg and D. Reed (ADF&G unpublished data, Fairbanks) and by Boertje and Gardner (2000*b*).

Population Composition

We conducted aerial surveys during late September through mid October to estimate herd sex and age composition. To locate most of the herd, we radiotracked collared animals using a radiotracking plane and used a Robinson-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 50–70 radiocollared adults. In September 2003 and 2004, an additional 17–18 5-month-old female calves were collared annually to replace those that went off the air due to collar failure or mortality. Radiocollared caribou were located on approximately a weekly basis in August, September, and December and approximately once a month during the rest of the year.

Harvest

Harvest was monitored using a hunter checkstation, 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, and transportation type.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

During 1900–1995, the herd size remained relatively stable at around 22,000 caribou. 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*). Due to a low birth rate in 2003, the herd experienced a 4–6% decline during 2004 (Boertje, ADF&G, personal communication).

Population Composition

The percent calves observed during annual fall composition counts were good indicators of population trend. During growth phases in the 1980s, the herd had fall calf percentages averaging 18.1%, while during growth phases in 1996–1999 and 2001–2002, percent calves averaged 20.7%. During stable years (1990, 1992–1995, 2000 and 2004) percent calves averaged 16.7% and averaged only 10% during years of population decline (1991 and 2003 Table 1). Percent calves in the herd during 2003 were the lowest observed in the herd since 1991 and are thought to be a result of decreased pregnancy rate due to poor body condition of cows resulting from drought during the previous summer (Boertje, ADF&G, personal communication).

Due to low harvest rates during RY77–RY03, the bull:cow ratio remained similar to ratios observed in other lightly harvested herds. The bull:cow ratio was ≥43 bulls:100 cows (43–50) during RY02–RY03. Harvest quotas will remain conservative through 2006 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

During RY02–RY03, the herd did not expand its range use beyond that reported for the previous report period by Gardner (2003). In 2003 and 2004, the herd primarily calved along the eastern edge of the Yukon Charley Preserve in the Upper Seventymile and North Fork Fortymile River drainages. During both years, the majority of the herd spent June through mid September between Mosquito Mountain, Mount Harper, Glacier Mountain and the upper Goodpaster, Salcha and Chena River drainages. During the pre-rut and rut (mid September through October) the herd concentrated in the Chena and Salcha River and Birch Creek drainages.

During both winters (Nov–Mar) in RY02–RY03, 5000–15,000 caribou moved into Yukon, Canada for a portion of the winter, but the majority of the herd was scattered in small 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. See Table 2 for unit-specific bag limits and seasons for state and federal hunts during RY02–RY03. Gardner (2003) contains a regulatory history of the FCH.

Alaska Board of Game Actions and Emergency Orders. In spring 2000 the board reviewed and endorsed the 2001–2006 Fortymile Caribou Herd Harvest Plan, as noted above. Harvest quotas during this period will be set annually based on herd trend. The FSB also endorsed the Harvest Plan during its May 2001 meeting. This benefited Fortymile caribou harvest management by ensuring that regulatory changes through 2006 will meet the intent of the Harvest Plan, protecting joint state–federal management of the herd. Under joint management the state and federal hunts are managed as one permit with one harvest quota, reducing paperwork and confusion for hunters and protecting against overharvest. To better meet the intent of the Alaska National Interest Lands Conservation Act and to benefit federally eligible subsistence hunters, the FSB adopted a regulation that ensured that at least 50 caribou in the winter quota would be allocated to the federal season.

Increasing opportunity to hunt Fortymile caribou in recent years caused an increase in the number of hunters in Unit 20E, and the board was concerned about possible excessive incidental take of moose by caribou hunters. At the March 2002 meeting, the board adopted a proposal that allowed ADF&G to require hunters to hold either a moose or caribou registration permit while hunting in Unit 20E, excluding a portion of the Middle Fork Fortymile River. Hunters could hunt for one species, turn in the permit, and return to the field to hunt the other species. This change did not affect most subsistence hunters because they typically hunt moose and caribou in different areas of Unit 20E and at different times. In 2002 the board also established winter seasons for Fortymile caribou in portions of Units 20B and 20D. To guarantee hunting opportunity across the herd's range, the department was authorized to set a maximum winter quota of 60% in the unit with the most caribou, ensuring that 40% of the quota could be taken by hunters in other areas of the herd's range.

At the March 2004 meeting, the board passed a proposal to enlarge the area in which hunters were restricted to one species at a time by moving the boundary of the unrestricted area upstream on the Middle Fork Fortymile River to the Joseph Creek drainage. The board also consolidated the 3 fall registration hunt areas (RC863, RC865 and RC866) into a single area (RC860) beginning RY04, with the understanding that the harvest quotas for the old registration hunt areas would remain the same and ADF&G would close parts of the new RC860 hunt as the quotas were reached.

The following emergency orders were issued during the report period:

Effective date	EO number	Permit hunt and area affected	Action taken/reason
7 Sep 2002	03-08-02	RC865, which was all of Unit 20E.	Close entire hunt early. Quota met.
2 Dec 2002	03-12-02	The part of RC867 in Unit 20E (whole unit).	Close part of hunt early. Quota met.
7 Dec 2002	03-13-02	The part of RC867 in Units 20B (south and east of Steese Highway), 20D (north of Tanana River), and 25C (east of Preacher Creek).	Close remaining part of hunt early. Quota met.
20 Sep 2003	03-06-03	RC866, which was Unit 20B south and east of Steese Highway and north of Chena Hot Springs Road and Unit 25C east of Preacher Creek.	Close entire hunt early. Quota met.
26 Sep 2003	03-07-03	RC863, which was Unit 20B east of Steese Highway, south of Chena Hot Springs Road; Unit 20D north of Tanana River; and Unit 20E in Middle Fork Fortymile River.	Close entire hunt early. Quota met.
1 Dec 2003	03-09-03	The part of RC867 in Unit 25C (east of Preacher Creek).	Delay opening in part of hunt. Too many caribou near Steese Hwy.
1 Dec 2003	03-10-03	The part of RC867 in Unit 20E south of 60-mile Taylor Highway.	Close part of hunt. Prevent Nelchina caribou harvest.
6 Dec 2003	03-11-03	The part of RC867 in Unit 25C (east of Preacher Creek).	Open the part of hunt closed in EO 03-09-03. Caribou off road.
7 Dec 2003	03-12-03	The part of RC867 in Units 25C (east of Preacher Creek) and 20B (south and east of Steese Highway).	Close part of hunt early. Quota met.

Hunter Harvest. The annual harvest quota of 950 during RY02 and 850 during RY03 (Table 3) were established using the 2001–2006 Fortymile Harvest Management Plan. Annual quotas were subdivided between 3 fall hunts and 1 winter hunt in RY02 and RY03. Yukon, Canada had a quota of 300 in RY02 and RY03, but First Nation members and other Yukon residents chose to forego hunting by not exercising constitutional rights to hunt (Tr'ondëk Hwëch'in First Nation) or through regulation (for other hunters).

We issued 4163 registration permits in RY02 and 5718 permits in RY03; 2863 hunters reported taking 864 caribou in RY02, and 3427 hunters reported taking 800 caribou in RY03. Total human-caused mortality of Fortymile caribou, including harvest, accidental death, and illegal and unreported harvest, was estimated to be 875 in RY02 and 810 in RY03 (Table 4).

The 2001–2006 Harvest Plan recommended that Fortymile caribou harvest be administered using registration permits for at least 2 years or until harvest is no longer a concern or a reporting system is developed that allows a general hunt. Public interest in hunting Fortymile caribou is high and increasing. The Fortymile herd is the only relatively large caribou herd along the road system that allows both residents and nonresidents to participate without substantial access restrictions. Hunter knowledge of the herd and expanding hunting opportunity is also increasing because the hunt is well advertised. To ensure that the annual harvest quota is not exceeded, a registration hunt that requires hunters to quickly report success remains necessary. However, the increasing number of hunters and multiple hunts caused hunt administration to become very labor intensive.

To reduce the administrative burden of the Fortymile caribou permit hunts, the fall hunt was reduced from 3 separate hunt areas to a single area, to be implemented in RY04. The allocation of the harvest quota between the 3 areas associated with RC863, RC865 and RC866 will be retained, but will be tracked by reported kill location instead of registration hunt number. This will eliminate the problem of multiple permits issued to individual hunters who want to hunt Fortymile caribou in more than 1 area in the fall.

Hunter Residency and Success. During RY02–RY03, annual success rates for residents were 18–31% during the fall hunt and 38–39% during the winter hunt, while success rates for nonresidents residents were 31–34% for the fall hunt (Table 5). No open season was available to nonresidents in the winter. During the fall hunt, nonresidents composed 10% of the hunters in both RY02 and RY03 and took 9–16% of the harvest.

Harvest Chronology. During RY02, the herd was accessible along the Taylor Highway and adjacent trails in significant numbers, resulting in an early season closure on 6 September. Few caribou were available near the Steese Highway and Chena Hot Springs Road in fall RY02, and the season remained open through 30 September. During RY03 the herd was accessible along the Taylor Highway and adjacent trails throughout the majority (10 Aug through mid Sep) of the fall season, and harvest was spread out fairly evenly during the most of the season (Table 6). However, caribou were available during only the last 2–3 weeks of September along the Steese Highway and Chena Hot Springs Road and adjacent trails, resulting in delayed harvest in those areas.

At the beginning of the winter seasons in RY02–RY03, a large portion of the FCH was near the Steese Highway, which resulted in a 2-day season in RY02 (1–2 Dec) and RY03 (6–7 Dec) in this portion of the hunt area. In RY03, the season along the Steese Highway was delayed until 6 December to allow the herd to move far enough from the highway to avoid excessive roadside harvest. Significant numbers of caribou were still available to hunters, and the quotas for this area were met quickly each year (Table 2).

In RY02, a large number of caribou were near the Taylor Highway. The harvest quota was met in the first 2 days of December, and the hunting season in that area was closed on 2 December. In RY03, a large number of caribou from the Nelchina herd entered southern Unit 20E in late November. To protect the Nelchina herd, the Fortymile hunting season was closed south of milepost 60 on the Taylor Highway, except for federally qualified subsistence hunters on federal lands. During RY03, a fair number of caribou were available to hunters throughout the winter season along the Taylor Highway north of milepost 60. The harvest in this portion of the hunt area was moderate to low throughout the season. As a result, the winter season in the remainder of the hunt area closed as planned on 28 February.

Transport Methods. Transportation types used by successful hunters depended primarily on the number of trails available and whether air taxi companies worked in the area. During RY02–RY03, all successful hunters in the central portion of the FCH range used boats and airplanes. This hunt area is remote with no trails and cannot be reached by ground transportation.

During the fall season in Unit 20E, the primary transportation type used by successful hunters was ATVs, followed by highway vehicles. Chicken Ridge Trail, along with its spur trails, is the primary trail system used by ATV hunters to access the herd 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 a majority of the fall season in both RY02 and RY03. Interest from walk-in hunters increased during RY02–RY03. American Summit provided an ideal location for hunters who do not own equipment to access the herd when it is in the more remote portions of its range. During RY02–RY03, many of the successful hunters who marked highway vehicle under transportation type on their harvest report walked from American Summit to harvest their caribou. This mistake is a common occurrence and underestimated the proportion of the harvest taken by walk-in hunters during the fall season.

The Steese Highway and Chena Hot Springs area in northeastern Unit 20B and southeastern Unit 25C had little harvest success during the entire fall season in RY02 and most of the fall season in RY03. During the last half of September in RY03, the majority of the herd became accessible from the trail systems off the Steese Highway and Chena Hot Springs Road. The harvest quota was reached, and the season in this portion of the herd's range was closed on 20 September.

During the winter hunts, successful hunters primarily accessed the herd using snowmachines and highway vehicles along the Steese and Taylor Highways. Snowmachine hunters had excellent success along the trail system off the Steese Highway during early December in both RY02 and RY03, when large portions of the herd were in the area. The Taylor Highway had good numbers of caribou available to hunters who used highway vehicles and

snowmachines in RY02, but fewer caribou were available during RY03. However, hunters who traveled the Taylor Highway or the trails off the Taylor Highway in RY03 had good success throughout the entire winter season. In both RY02 and RY03, most successful hunters who used highway vehicles harvested their caribou in December, when caribou were close to the Steese Highway and before the Taylor Highway became impassible due to snow conditions.

Table 7 illustrates transportation use combined for all hunts and indicates that the Fortymile Herd is accessible to all hunters during some part of the season, regardless of transportation type they have at their disposal. Accessibility should improve if the herd continues to increase. The most important factor to ensuring access for all hunters is for the seasons to go to term and for hunters to have patience to wait for the herd to migrate to the areas they can hunt.

Other Mortality

Boertje and Gardner (1998*a*, 1998*b*, 1999, 2000*b*) and Gardner (2001) described in detail the factors limiting the FCH and management steps taken to benefit herd recovery during 1996–2000. These limiting factors have remained relatively constant through RY04, and evaluation of the effects of the 1996–2000 management steps are still being monitored and evaluated by ADF&G research staff.

HABITAT

Assessment

During winters 1991, 1992, 1995, 1996, and 1999, range conditions were excellent, as evidenced by high proportions of lichen fragments (72–81%) and a low proportion of mosses (8%) in fecal samples. Fecal samples from overgrazed winter ranges contain a relatively high proportion of mosses or vegetation other than lichens (Boertje 1984). W. Collins (ADF&G, personal communication) continued research in Unit 20E to evaluate Fortymile caribou winter range as part of an ongoing research study of caribou habitat in Interior Alaska. Preliminary data collected by Collins since 2000 indicate Fortymile winter range was in excellent condition during the report period, with high incidence of lichens. 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.

The multiyear density of the FCH exceeded 500 caribou/1000 km^2 (500/386 mi^2) in 1998, the first time in 3 decades. Beginning in 2001, the herd expanded its range use, apparently as a result of increased herd size. It moved farther west near the Steese Highway in fall 2001 and used winter range in Yukon, Canada during winters 2000–2001 through 2003–2004. Still, more than 60% 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.

Until 2001, we found consistent data for moderate to high nutritional status in the Fortymile herd compared to other Alaska herds (Boertje and Gardner 1998*b*, 1999, 2000*b*). However,

during May 2000 and 2001, birth weights were the lowest observed in the FCH since 1996. Also, weights of 5-month-old calves during October 2001–2004 were among the lightest observed during the past 15 years. We have not determined if these indicators of declining nutrition are due to declining range quality or were due to unfavorable weather on the summer range. Except for 2003, pregnancy rate data conflict with the hypothesis that herd condition is declining. Pregnancy ranged from average to above average (88–95%) during 2000–2002 and 2004 and was only below average (69%) in 2003. There are indications that drier than average conditions existed in the herd's range during the past 4 summers. These conditions may have contributed to reduced caribou nutritional status and may be the reason for the decreased fall calf weights and the low pregnancy rate observed in 2003. These data will be analyzed and presented in future reports.

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 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. It does not appear that future access decisions have been adequately addressed.

Enhancement

The Alaska Interagency Fire Management Plan, implemented in the early 1980s, should ensure a near-natural fire regime necessary for the long-term management of caribou range in Interior Alaska. No enhancement efforts were initiated during RY02–RY03.

One of the ongoing goals of the Fortymile Caribou Management Plan was to ensure adequate protection for the herd's range during and after recovery. Current habitat and development issues are mostly related to mining and military activities in the herd's calving and postcalving areas. The herd is most sensitive to disturbance during calving and postcalving. Working together with the mining community and the Air Force, we minimized the effects of mining exploration and low-flying military aircraft during calving and postcalving by maintaining a Web site that displayed the areas the herd was using. The Web site was updated when the herd changed distribution. The mining industry and military have used this Web site to plan their activities around the herd and have minimized their impacts during calving and postcalving during 1999–2004.

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

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

The Fortymile Caribou Herd Management Plan formally ended in May 2001. Two of the plan's objectives are ongoing—habitat protection and a public awareness program. Protecting caribou habitat and informing the public about herd status and consumptive and nonconsumptive use opportunities were essential components of the plan's goal to restore the Fortymile herd to its traditional range. It was also the plan's goal to promote healthy wildlife

populations for their intrinsic value. As of April 2003, habitat protection in Alaska was being addressed through land use plans and agreements made with the mining industry and the military.

Several public awareness projects are ongoing. Construction of highway informational signs along the Taylor and Steese Highways occurred in summer 2004. The Fortymile caribou newsletter *The Comeback Trail* was produced annually and is distributed to about 4500 Alaska and Yukon residents, advisory committees, regional councils, state and federal management boards, and area schools. Additional public awareness programs would help ensure continued public support for the Fortymile herd. Currently, the herd is increasing, and often those management successes are covered by state and Canadian media. A cooperative state–federal program enhancing the viewing, education, and hunting opportunities of the Fortymile herd would benefit the herd and people interested in the herd.

CONCLUSIONS AND RECOMMENDATIONS

We met our objective to provide conditions for the Fortymile Herd to grow at a moderate annual rate of 5–10%. During RY02–RY03, the herd estimate ranged between 41,600 and 44,100 caribou, below the intensive management objective for the herd of 50,000–100,000 caribou. Based on the sex and age structure of the herd, the FCH has the potential to continue to increase. Current winter range conditions are good, and >60% of its traditional range remains unused by the herd.

During RY02 and RY03, harvest was managed using the 2001–2006 Fortymile Caribou Herd Harvest Plan. During RY02–RY03, the annual harvest quota was set at 850–950 caribou (with up to 25% cows) following the guidelines of the current harvest plan. This is below the intensive management harvest objective of 1000–15,000 caribou annually.

During RY02 and RY03, 2863–3427 hunters took 800–864 caribou. Harvest was maintained at a level that did not affect the bull:cow ratio, and it met the objective to maintain an October bull:cow ratio of at least 35:100.

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

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

Failures of Fortymile caribou harvest management during RY02–RY03 were the high percentage of late reports by successful hunters and the incorrect reporting of transportation type by walk-in hunters hunting on American Summit. To meet the harvest objectives, we need to find methods to convince hunters to meet the reporting requirements and accurately

complete harvest reports. I recommend better education, hunter checkstations, and additional enforcement.

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 focused on future plans in this area. It does not appear that future access decisions have been adequately addressed. This project will continue to be monitored during the next report period.

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TABLE 1 Fortymile caribou fall composition counts and population size, 1986–2004

Date	Bulls: 100 Cows	Calves: 100 Cows	% Calves	% Cows	% Small bulls	% Medium bulls	% Large bulls	% Bulls	Composition sample size	Estimate of herd size[a]
10/13/86	36	28	17	61	35	24	41	22	1381	15,307
9/28/87	40	37	21	57	13	43	44	22	2253	
10/2–3/88	38	30	18	59	29	41	30	23	1295	19,975
10/13/89	27	24	16	66	34	41	25	18	1781	
9/27–28/90	44	29	17	58	42	39	19	26	1742	22,766
10/10/91	39	16	10	64	41	34	25	25	1445	
9/26/92	48	30	17	56	37	36	27	27	2530	21,884
10/3/93	46	29	17	57	48	36	17	26	3659	
9/30/94	44	27	16	57	45	33	22	24	2990	22,104
10/3/95	43	32	18	57	43	31	27	25	3303	22,558
9/30/96	41	36	20	57	46	31	23	23	4582	23,458
9/30/97	46	41	22	53	48	28	24	25	6196	25,910
9/29/98	40	38	21	56	49	27	24	23	4322	31,029
9/29/99	48	37	20	54	55	29	16	26	4336	33,110
10/01/00	45	27	16	58	48	28	24	26	6512	34,640
9/29/01	49	38	20	53	44	32	24	27	6878	36,000
9/28/02	43	39	21	55	42	28	30	24	6088	41,000
9/27/03	50	17	10	60	51	29	21	30	6296	43,375
9/28/04	45	28	16	59	31	37	32	25	4157	41,000

[a] Herd estimates were the result of the summer censuses, except in 2001, 2002 and 2004, when caribou were too scattered or visual conditions were inadequate and population models were used to derive total estimates.

TABLE 2 Fortymile caribou seasons and bag limits managed as joint state/federal registration permit hunts, regulatory years 2002–2003 and 2003–2004

	Unit 20B SE of Steese		Unit 20D N of Tanana River		Unit 20E		Unit 25C E of Preacher Creek	
		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
2002–2003								
Resident	8/10–9/30	No open	8/10–9/30	8/10–9/30	8/10–9/30[b]	8/10–9/30[b]	8/10–9/30	8/10–9/30
State	1 caribou	season	1 caribou	1 caribou	1 caribou	1 caribou	1 caribou	1 caribou
	12/1–2/28[c]		12/1–2/28[c]	11/1–2/28[c]	12/1–2/28[d]	11/1–2/28[d]	12/1–2/28[c]	11/1–2/28[c]
	1 caribou			1 caribou	1 caribou	1 caribou	1 caribou	1 caribou
Nonresident	8/10–9/20	No open	8/10–9/20	No open	8/10–9/20[b]	No open	8/10–9/20[b]	No open
	1 bull	season	1 bull	season	1 bull	season	1 bull	season
2003–2004								
Resident	8/10–9/30[ef]	No open	8/10–9/30[f]	8/10–9/30[f]	8/10–9/30[f]	8/10–9/30[f]	8/10–9/30[e]	8/10–9/30[e]
	1 caribou	season	1 caribou	1 caribou	1 caribou	1 caribou	1 caribou	1 caribou
	12/1–2/28[g]			11/1–2/28	12/1–2/28[h]	11/1–2/28	12/1–2/28[g]	11/1–2/28[i]
	1 caribou			1 caribou	1 caribou	1 caribou	1 caribou	1 caribou
Nonresident	8/10–9/20[ef]	No open	8/10–9/20[f]	No open	8/10–9/20[f]	No open	8/10–9/20	No open
	1 bull	season	1 bull	season	1 bull	season	1 bull	season

[a] Federal subsistence hunters are residents domiciled in communities or units in rural areas defined by the Federal Subsistence Board. Definition of who qualifies as Fortymile caribou federal subsistence users differs among subunits, i.e., in Unit 20E the definition is rural residents of Unit 12 north of Wrangell–St Elias National Park and Preserve, Unit 20D and Unit 20E; in Unit 25C eligible federal subsistence users are all rural residents in the state.

[b] Closed Unit 20E RC865 by emergency order on 7 Sep 2002 because harvest quota was met for this area.

[c] Closed this portion of RC867 by emergency order 7 Dec 2002 because harvest quota was met for this portion of the hunt area.

[d] Closed this portion of RC867 by emergency order 2 Dec 2002 because harvest quota was met for this portion of the hunt area.

[e] Closed by emergency order on 20 Sep 2003 in the portion of RC866 in Unit 20B southeast of Steese Highway and north of Chena Hot Springs Road because harvest quota was met for this portion of the hunt area.

[f] Closed by emergency order on 26 Sep 2003 in the portion of RC863 in Unit 20B east of Steese Highway, in Unit 20D north of the Tanana River, and in Unit 20E in the Middle Fork Fortymile River because harvest quota was met for this portion of the hunt area.

[g] Emergency orders for this area of RC867 are: 1) delayed the hunt opening from 1 Dec 2003 because large number of caribou were near the Steese Highway, 2) opened this area on 6 Dec 2003 when caribou dissipated, and 3) closed this area on 7 Dec 2003 when harvest quota was met.

[h] Closed by emergency order on 1 Dec 2003 in the portion of RC867 in Unit 20E south of milepost 60 of the Taylor Highway because significant numbers of Nelchina caribou were in the area.

[i] Closed this area of RC867 on 7 Dec 2003 when harvest quota was met.

TABLE 3 Reported Fortymile caribou harvest by joint state/federal registration permit, regulatory years 2002–2003 through 2004–2005

Regulatory year	Permits issued	% Did not hunt	% Successful hunters	% Unsuccessful hunters	Harvest			Total reported harvest[a]	Harvest quota
					Bulls	Cows	Unk		
2002–2003[a]	4163	31	30	70	667	185	12	864	950 total quota; 235 cows
2003–2004[a]	5718	40	23	77	613	181	6	800	850 total quota; 210 cows
2004–2005[bc]	4219	42	34	66	592	240	10	842	850 total quota; 210 cows

[a] Includes RC863, RC865, RC866 and RC867.
[b] Includes RC860 and RC867.
[c] Preliminary harvest data.

TABLE 4 Fortymile caribou harvest, regulatory years 1985–1986 through 2004–2005

Regulatory	Reported[a]				Estimated			Yukon	
year	M	F	Unk	Total	Unreported	Illegal	Total	harvest	Total
1985–1986	261	0	0	261	160[b]	20	180	0	441
1986–1987	223	0	0	223	137[b]	20	157	0	380
1987–1988	142	0	0	142	87[b]	20	107	0	249
1988–1989	399	2	0	401	244[b]	150[c]	394	0	795
1989–1990	326	98	0	424	74	0	74	3	501
1990–1991	285	20	8	313	28	2	30	0	343
1991–1992	434	5	2	441	59	5	64	0	505
1992–1993	382	14	0	396	0	21	21	50	467
1993–1994	326	0	0	326	0	10	10	10	346
1994–1995	309	0	0	309	0	12	12	7	328
1995–1996	200	0	0	200	0	20	20	5	225
1996–1997	138	0	0	138	0	7	7	1	146
1997–1998	143	0	0	143	0	8	8	0	151
1998–1999	151	0	0	151	0	4	4	0	155
1999–2000	142	0	3	145	0	10	10	0	155
2000–2001	142	0	1	143	0	7	7	0	150
2001–2002	493	196	4	693	5	10	15	0	708
2002–2003	667	185	12	864	5	5	10	1	875
2003–2004	613	181	6	800	5	5	10	0	810
2004–2005[d]	592	240	10	842	5	5	10	0	852

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

TABLE 5 Fortymile caribou hunter residency and success of hunters who reported residency, regulatory years 1989–1990 through 2004–2005

	Successful				Unsuccessful				
Regulatory Year	Local[a] resident	Nonlocal resident	Nonresident	Total[b] (%)	Local[a] resident	Nonlocal resident	Nonresident	Total[b] (%)	Total hunters
1989–1990	291			347 (35)	182	453		635 (65)	982
1990–1991	105	157		262 (25)	273	517		790 (75)	1052
1991–1992	91	260	23	374 (21)	339	1052	34	1425 (79)	1799
1992–1993	116	219		335 (35)	261	373		634 (65)	969
1993–1994	45	270	9	324 (16)	431	1278	15	1724 (84)	2048
1994–1995	87	211	11	309 (15)	296	1477	8	1781 (85)	2090
1995–1996	40	138	22	200 (14)	312	950	14	1276 (86)	1476
1996–1997	33	96	17	146 (22)	214	301	1	516 (78)	662
1997–1998	53	83	7	143 (16)	250	480	7	737 (84)	880
1998–1999	52	92	7	154 (29)	109	266	3	378 (71)	532
1999–2000	50	93	4	147 (17)	208	497	2	707 (83)	854
2000–2001	39	97	9	145 (17)	180	504	2	686 (83)	831
2001–2002	88	557	48	693 (24)	255	1885	98	2238 (76)	2931
2002–2003	182	617	59	864 (30)	224	1646	123	1999 (70)	2863
2003–2004	102	609	86	800 (23)	225	2236	163	2627 (77)	3427
2004–2005[c]	108	655	77	842 (34)	135	1356	108	1607 (66)	2449

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

[b] Unknown residency of residents and nonresidents included in total.

[c] Preliminary harvest data.

TABLE 6 Fortymile caribou autumn harvest by month/day, regulatory years 1988–1989 through 2004–2005

Regulatory Year	Harvest by month/day								*n*
	8/10–8/16	8/17–8/23	8/24–8/30	8/31–9/6	9/7–9/13	9/14–9/20	9/21–9/27	9/28–9/30	
1988–1989				189[a]					
1989–1990[bc]	5	8	5	8	0	1	1	1	29
1990–1991	48	61	35	50	19	14	7	10	244
1991–1992	187	67	17	9	17	22	–[d]	[d]	319
1992–1993[e]	289	0	1	0	1	0	47	7	345
1993–1994	167	16	12	15	10	4	1	0	225
1994–1995	51	16	21	21	17	9	4	19	158
1995–1996	33	10	6	5	12	2	3 –	1	72
1996–1997[f]	14	10	9	12	13	4	7	7	76
1997–1998[f]	22	3	1	18	12	9	16	6	87
1998–1999	57	20	4	1	0	0	0	0	82
1999–2000	50	8	2	7	19	7	0	0	93
2000–2001	81	13	11	4	1	0	0	0	110
2001–2002	91	45	60	53	49	14	9	7	328
2002–2003	147	75	133	258	11	15	9	5	653
2003–2004	110	77	92	85	42	127	3	0	536
2004–2005[g]	129	81	127	87	47	51	4	3	529

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

TABLE 7 Fortymile caribou harvest percent by transport method, regulatory years 1987–1988 through 2004–2005

Regulatory year	Harvest percent by transport method									
	Airplane	Horse	Boat/ Airboat	3- or 4- Wheeler	Snowmachine	ORV	Highway vehicle	Walking	Unk	*n*
1987–1988[a]	58	1	3	19	3	3	13	0	0	142
1988–1989[a]	29	1	2	36	1	4	27	0	0	401
1989–1990[b]	27	0	0	10	6	5	52	0	0	424
1990–1991[c]	1	1	0	43	10	1	43	1	0	313
1991–1992[d]	16	1	2	53	5	4	23	5	0	441
1992–1993[c]	5	0	1	58	5	7	21	0	3	378
1993–1994[c]	16	0	2	38	16	8	17	0	2	326
1994–1995[c]	11	0	1	23	28	7	28	0	2	298
1995–1996[c]	33	0	2	14	19	6	26	0	2	326
1996–1997[c]	29	0	4	18	12	5	30	0	1	146
1997–1998[c]	36	1	4	15	22	7	11	0	3	143
1998–1999[c]	10	0	2	34	18	5	27	0	5	155
1999–2000[c]	23	1	1	28	9	3	31	0	3	147
2000–2001[c]	18	0	3	38	16	10	11	0	5	145
2001–2002[c]	10	0	4	29	30	3	21	0	3	693
2002–2003[c]	8	0	3	39	15	4	26	1	3	864
2003–2004	13	0	7	35	20	4	15	6	3	800
2004–2005[e]	8	0	5	38	23	4	16	1	4	842

[a] General hunt numbers only.

[b] Drawing and registration permit hunt results.

[c] Registration permit hunt results only.

[d] Registration permit and general hunt results.

[e] Preliminary harvest data.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 Mountain 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 of Unit 21C, and the identity of these 2 herds was never 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 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 Mountain 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 the ADF&G did not survey them until 1977.

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

The origin of these herds is unknown. Some residents suggested they were reindeer from a commercial operation in the Kokrines Hills that ended around 1935. However, evidence suggests these animals are caribou because 1) reindeer physical characteristics are not apparent, 2) reindeer genes were not found when tested, and 3) reindeer calve earlier than these 3 caribou herds. 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 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 (RY = regulatory year which begins 1 Jul and ends 30 Jun; e.g., RY04 = 1 Jul 2004 through 30 Jun 2005) due to declines observed in that herd.

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 Mountain herd. On 20 October 2003, 2 adult female caribou were radiocollared in the Ray Mountain herd along with 4 caribou (2 adult females and 2 five-month-old females) in the Hodzana Hills east of the Dalton Highway. Currently there are 10 active collars in the Galena Mountain herd, no active collars in the Wolf Mountain herd, 10 active collars in the Ray Mountain herd, and 4 active collars in the Hodzana Hills herd.

We conducted aerial surveys with helicopters (Robinson R-22 or R-44) and fixed-wing aircraft (Super Cub or Scout) during October 1994 through 2003 following techniques outlined by Eagan (1993). Surveys conducted using helicopters allowed for composition data to be collected. Fixed-wing aircraft were used in RY98 through RY03 for 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, and hunter interviews were conducted opportunistically. 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 RY04. The highest number of caribou seen during RY02–RY04 was 102 animals in July 2002 (Table 1). The population probably declined due to 2 factors, predation and movement from the Galena Mountain herd to the Wolf Mountain herd. It is also likely that some caribou were missed during a December 2004 count. As reported in the previous management report, radiocollaring caribou did not increase the number of caribou found, but did demonstrate that caribou occupy dense black spruce habitat, where sightability is low, during the rut. Continuation of surveys or censuses during winter or spring postcalving aggregations will provide the best estimates of population size for this herd. Regardless, it appears the Galena Mountain herd is declining to a point where recovery is unlikely without intensive management.

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). In the previous report, a 2002 count and estimate were mistakenly overreported. A photocensus conducted on 17 July 2002 counted 516 caribou. Based on the 17 July 2002 count, and subsequent low counts in RY03 and RY04, I estimated the population of the Wolf Mountain herd had 300–500 caribou in RY04. 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. 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. On 1 November 1983, 400 caribou were counted. In 1987 the population estimate was 500 (Robinson 1988) based on a survey of all known upland ranges, but excluding the Caribou Mountain area. Composition counts during a radiotracking flight in October 2000 indicated a new minimum herd size of 1736 (Table 3). The 2001 survey yielded a count of 1685 caribou. Surveys conducted in June and October 2004 resulted in counts of 1705 and 1403 caribou respectively, and an estimate of approximately 1850 was generated following the June 2004 survey (M. Keech, ADF&G, personal communication 2004). The population probably declines in years of poor recruitment and increases when recruitment is good, but it has increased at a mean rate of about 10% per year since 1983. Continuation of surveys or censuses during summer or postcalving aggregations will provide the best estimates of population size for this herd.

For many years, small groups of caribou to the northeast of the Ray Mountains were more or less considered part of the Ray Mountain herd. Efforts over the past 2 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 were classified in 4 groups located in the upper drainages of the Kanuti and Hodzana Rivers. Radio collars were placed on 4 caribou in that herd in October 2003, and surveys will continue to be conducted to improve our understanding of movements and calving locations.

Population Composition

Because some counts of the 3 herds were conducted with fixed-wing aircraft, not all surveys yielded composition data (Tables 1–4). During RY02–RY04, only the Ray Mountains herd was classified.

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

Distribution and Movements

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

In late September–early October 1996, 10,000–15,000 caribou from the Western Arctic herd (WACH) moved east into Unit 21D. They crossed the Koyukuk River about 50 miles upstream of the mouth of the river. This group did not remain long in Unit 21D, and it is not known if there was any mixing with the Galena Mountain herd. With only 3 collars remaining from the 2002 efforts, no remarkable information relating to herd distribution was obtained. Seasonal movements appear to be generally consistent with earlier investigations.

Following the radiocollaring efforts in April 2002, 4 of the adults and 1 short 2-year-old died, apparently as a result of the capture operation. Mortalities in several other caribou capture operations also occurred in Alaska at the same time. Investigation into the mortalities was inconclusive, but deaths were likely the result of either capture myopathy, narcotic recycling,

or kidney failure from low blood oxygen levels, and not infection or trauma. However, there is no obvious reason why these caribou died at such a high rate in some herds and not in others, or why the mortality rate was so high in 2002 and so low in other years (P. Valkenburg, ADF&G, personal communication 2002). Between 17 July 2002 and 24 September 2002, 2 more radiocollared yearlings died due to unknown causes. Following radiocollaring activities in the Galena Mountain herd in October 2004, 10 radio collars remained active in that herd and were being monitored.

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.

Immediately following the radiocollaring efforts in April 2002, 7 of the adults died, apparently as a result of the capture operation. The previously described investigation of deaths in the Galena Mountain herd included these animals as well. Two additional captured adults died prior to 18 May, but it was not clear whether those mortalities were capture related. The final radio collar in the Wolf Mountain herd transmitted a mortality signal in 2004. No radio collars remain in the herd, and no new information relating to herd distribution was obtained.

Ray Mountains herd. Prior to October 1994 there were no radiocollared caribou in the Ray Mountains, and movements of the herd were not well known. Robinson (1988) found them north of the Ray Mountains and in the upper Tozitna River drainage. Based on the trails found, he suspected this herd made seasonal migrations between the 2 areas. During late October 1991, several hundred caribou were seen along the Dalton Highway near Old Man. Near Sithylemenkat Lake groups of 10–20 male caribou were regularly seen during March, and during this time 200 caribou were seen in the Kanuti Lake area. We do not know if these caribou were from the Ray Mountains herd or WACH.

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

Following the radiocollaring operations of 29 March 2002, 4 short yearlings and 1 short 2-year-old died, apparently from capture-related causes. The previously described investigation included these animals. Ten radio collars from that operation remain active in the Ray Mountain herd, with an additional 4 radio collars active in the 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). Weights of Wolf Mountain and Ray Mountains calves were also heavy in the 1996 report.

In contrast, caribou calves caught in the Ray Mountains on March 2002 were relatively light (avg = 114.1 lb; M. Keech, ADF&G, 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. Whether that decline in condition is due to a short-term event (summer weather) or is a density-dependent decline in condition is unknown.

Analysis of mitochondrial DNA by Cronin et al. (1995) indicated that none of the samples from Galena Mountain herd, Wolf Mountain herd, or Ray Mountains herd caribou contained any unique reindeer genes. Allele frequencies were similar to other Alaskan caribou and were not consistent with any known allele frequencies for reindeer. The Galena Mountain/Wolf Mountain samples also contained a rare allele not previously reported for reindeer or caribou in Alaska. The significance of this rare allele is unknown.

MORTALITY

Harvest

Season and Bag Limit.

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
Ray Mountain 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

Units and Bag Limits	Resident/Subsistence Open Seasons	Nonresident Open Seasons
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 caribou may not be taken 16 May–30 Jun	1 Jul–30 Jun	
NONRESIDENT HUNTERS: 5 caribou per day; however, cow caribou may not be taken 16 May–30 Jun.		1 Jul–30 Jun
Ray Mountain 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 Mountain/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–30 Sep	10 Aug–30 Sep

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

Alaska Board of Game Actions and Emergency Orders. In March 1991 the Alaska Board of Game gave ADF&G emergency order authority to open a portion of Unit 21D when WACH are present. A bag limit of 2 caribou was established. This action allowed hunters the opportunity to take caribou while protecting the smaller Galena Mountain herd that may be intermixed with the WACH. This special winter season is not opened unless the Galena Mountain herd constitutes 10% or less of the total number of caribou north of the Yukon River and east of the Koyukuk River in Unit 21D. It was not opened during RY98–RY04.

The Board of Game adopted several changes in regulations for the Galena Mountain herd at its 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 the RY02 and RY03 hunting seasons, only 4 bull caribou were reported taken. All 4 bulls were harvested in the Ray Mountains herd, and 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 open season in winter 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 during winter to prevent overharvest. The Wolf Mountain herd is almost never accessible for hunting because of the scarcity of aircraft landing areas. Several years ago, a guide who used horses was able to access a limited part of the Wolf Mountain herd's range and occasionally took caribou from this herd. Moose hunters on the Melozitna River incidentally took Wolf Mountain caribou, but only very rarely. Success of hunters was limited, and evenly distributed among residency status (Table 7).

The total reported harvest continues to average much less than 10 caribou per year. Each year 1 or 2 caribou are taken but not reported along the Yukon River near Ruby, and 3–5 caribou are taken along the Yukon River in the Rampart–Tanana section (Osborne 1995). These caribou, usually bulls, are occasionally found on remaining snowfields near the river in August or wandering to the river during September. In addition, 5–7 caribou are probably taken each year by hunters 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. Predation was probably the main limiting factor, but no studies to determine mortality factors have been completed for these herds. Judging from adult abundance, total adult mortality was probably very low. Black bears were probably the primary calving ground predators on the Wolf and Galena Mountain herds. Grizzly bears are found throughout the calving ranges of all 3 herds, and calf mortality studies in other areas indicate that they are important predators of caribou calves (Boertje et al. 1995). There was some concern that the recent high moose populations have supported higher levels of wolf and bear numbers, and that an increase of incidental predation on the Galena Mountain caribou may be causing a decline in that herd.

CONCLUSIONS AND RECOMMENDATIONS

The mountains between Galena and the upper Hodzana River on the north side of the Yukon River contain 2300–2750 caribou in 3 herds centered around 3 distinct calving areas, although the calving areas of the Galena and Wolf Mountain herds may overlap, 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). 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 decline in calf weights may be related to less high-quality summer range available for Ray Mountain herd caribou than previously thought.

Although there was a decline in the Galena Mountain herd, harvest was not responsible for the decline; therefore, the first management goal, to ensure harvest does not result in a population decline, was met. However, the second goal, to provide increased opportunity for people to participate in caribou hunting, was not achieved 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 when the WACH is not present. Maintaining radio collars in the Galena and Wolf Mountain herds would help managers distinguish them from the WACH. In addition, radio collars would help managers obtain better population estimates. Other management work on these herds will remain a low priority because of low harvest and relatively few animals in these herds.

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TABLE 1 Galena Mountain caribou counts, 1991–2004

Date	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

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

TABLE 2 Wolf Mountain caribou counts, 1991–2004

Date	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

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

[b] Photocensus (fixed-wing).

TABLE 3 Ray Mountains caribou composition counts and estimated population size, 1991–2004

Survey date	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]
Bulls: 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										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									1705	1858
10/04										1403

[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, 2003–2004

Date	Cows	Calves (%)	Bulls	Total caribou observed
10/03	173	43 (14)	90	306
06/04				242
10/04				136

TABLE 5 Galena Mountain caribou summer calving counts, 1991–2004

Date	Cows	Calves (%)	Bulls	Total caribou observed
6/91	97	11 (8)	27	135
6/92	191	13 (5)	37	241
5/93	65	12 (13)	16	93
6/93	130	24 (13)	40	194
5/94	56	13 (12)	40	109
6/94	104	34 (18)	53	191
1995–2004[a]				

[a] No counts completed.

TABLE 6 Ray, Galena, and Wolf Mountain caribou reported harvest, regulatory years 1990–1991 through 2003–2004

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

TABLE 7 Galena Mountain, Wolf Mountain and Ray Mountains caribou hunter residency and success, regulatory years 1990–1991 through 2003–2004

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

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004[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 (Figs 1–3). 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 the WAH has shifted its winter range from the Nulato Hills to the eastern half of the Seward Peninsula. Since the mid 1990s, this herd has generally been more dispersed during winter than prior to that time.

In 1970 the WAH numbered approximately 242,000 caribou (Fig 4). 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). This figure is misleading, though, because caribou exhibit a "clumped" distribution in both space and time. Seasonal densities provide a more useful measure for evaluating effects of density on range and on individual caribou. For example, during the 2003 census, 99% of the WAH (486,000 of 490,000 caribou) was on 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 were distributed over <25% of their total summer range. Therefore, seasonal densities only reduce rather than correct for the effects of clumping behavior on annual and seasonal density estimates.

[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" in the generic sense refers to individuals belonging to the WAH. Acronyms used for other caribou herds are: TLH for Teshekpuk Lake Herd; CAH for Central Arctic Herd; and PCH for Porcupine Caribou Herd.
>
> "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.

"Winter" is 1 November–31 March.

"Adult caribou" is any caribou >12 mos old.

"Calf" is any caribou <12 mos old.

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

"Maternal cow" refers to a female caribou accompanied by a calf or having ≥1 hard antler during June.

"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.

"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.

"Collar year" is the period 1 October–30 September of the subsequent year.

"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.

"c.i." is the abbreviation for "confidence interval."

"Photocensus" is the aerial direct count photo extrapolation technique (Davis et al. 1979).

The acronym "BOG" refers to the state Board of Game, and "FSB" refers to the Federal Subsistence Board.

"Transporter" is a commercial operator who provides transportation services only to hunters and others.

"Guide" is a commercial operator who accompanies a hunter in the field and provides professional services to assist in the taking of trophy wildlife.

Population Status and Trend. The first conventional radio collars on WAH caribou were deployed in the Wild River Flats during late February 1975. These collars were actually intended for CAH caribou, and the mistake was discovered when they were later found on the WAH calving grounds (P. Valkenburg, personal communication). The WAH telemetry program was initiated during 1979 (Davis and Valkenburg 1985). The primary objectives of the first WAH telemetry work were to determine if caribou formed persistent social bonds and to evaluate

winter range fidelity (P. Valkenburg, personal communication) Radio collars were not initially viewed as a tool to help census the WAH. In fact, some staff thought collars could compromise censuses because they would be used as a substitute for thorough visual searches. As a result, photocensuses conducted before 1986 did not use telemetry whatsoever to locate caribou. Instead, visual aerial searches were conducted using transects in selected areas. In all censuses during and after 1986, WAH caribou have been located mainly through conventional telemetry techniques; additionally, thorough visual searches have been conducted in the vicinity of groups containing collared individuals. During the early years of telemetry work, few collars were deployed in the WAH, and they were relocated infrequently compared to recent years. Although the number of VHF transmitters deployed in this herd has gone up in the ensuing years, we have never collared >0.03% of the herd. We have typically conducted $\underline{\geq}$15–20 relocation flights annually since the late 1980s.

During this reporting period, conventional and satellite radiotelemetry 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).

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. 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; also, we only deploy collars on large, healthy, adult bulls so that skeletal growth does not add to seasonal enlargement of their neck during rut and choke them. Collars are randomly deployed on cows $\underline{\geq}$2 years old annually irrespective of maternal status. Only cows in very poor physical condition are not collared.

We began the 2002–2003 collar year with 120 potentially active conventional collars on living caribou (104 cows and 16 bulls). Of these, 31 collars on cows and 4 on bulls were also equipped with a functional PTT. We began the 2003–2004 collar year with 123 potentially active conventional collars on living caribou (108 cows and 15 bulls), of which 26 cows and 6 bulls also had a functional PTT. Inconsistencies between consecutive WAH management reports regarding initial sample sizes of conventional- and PTT-collared caribou are because collars are retroactively dropped from the initial sample after we determine their batteries were likely exhausted or 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 not removed or replaced radio collars on WAH caribou since at least the mid 1980s.

In 2004 we deployed model ST-20 (A33-10 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-hr ON/12-hr 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 2002 we deployed 43 radio collars (30 conventional collars and 13 satellite collars) on 28 cows and 15 bulls. Three satellite collars deployed on cows in 2002 were provided by the Selawik National Wildlife Refuge (SNWR). Four satellite collars purchased by ADF&G in 2002 were deployed on bulls. In 2003 we deployed 33 radio collars: 22 conventional collars (19 cows and 3 bulls) and 11 satellite collars (9 cows and 2 bulls). In 2003 SNWR provided 3 satellite collars and Gates of the Arctic National Park (GAA) provided 1 satellite collar. In 2004 we deployed 32 radio collars: 23 conventional collars (19 cows and 4 bulls) and 9 satellite collars (7 cows and 2 bulls). In 2004 four of the PTTs were provided by the SNWR and one was provided by GAA. All satellite collars provided by federal agencies have been deployed on cows. All satellite collars provided by the SNWR have been equipped with a breakaway device (Telonics Cr-2a) programmed to release 3 years after the manufacture date.

Population Size and Composition. We determined population size using the aerial direct count photo extrapolation (photocensus) technique (Davis et al. 1979). Photographs were taken 9, 11 and 12 July 2003. Conditions were not ideal on any of the photography days. However, telemetry indicated about 98% of the herd was aggregated in the groups we located, and the weather pattern suggested we would get no better opportunities to photograph the herd during this attempt. As a result, we exposed 1157 photographs to completely photograph the herd; 1009 of these photos were eventually counted (the rest were redundant coverage and could be eliminated from the count). The Beaver photographed 37 groups of caribou. The large number of groups photographed by the Beaver in part reflected the diffuse distribution of the WAH. Additionally, we decided to minimize 35 mm photographs during visual mop-up operations. Region V staff put overlap lines on the photographs during 2 days in November 2003, and all photos were counted by early March 2004. We contracted Don Williams to count >80% of the photographs, which greatly expedited the process.

I calculated an expansion factor for caribou known to be alive at the time of the photography but not photographed based on radiocollared caribou. We located 2 collared individuals in 14 small groups totaling ~5000 caribou in the vicinity of the large aggregations photographed by the Beaver. This translated into approximately 1250 caribou/collar. We assumed missing collared caribou were distributed in small, widely scattered groups of similar size. Between July 2003 and March 2004 we located 3 radiocollared caribou that were alive but not found during the census. Three outstanding collared caribou at 1250 caribou/collar equates to an expansion factor of roughly 4000 caribou.

The greatest potential source of error in the 2003 census was visually estimating 26,300 caribou in small groups that were too dispersed for the Beaver to photograph on 12 July. ADF&G biologist Roger Seavoy and I made these estimates while flying 800–1500 ft above the ground in a PA-18 airplane. Most of the groups numbered <500 caribou, well within the range of group sizes we routinely deal with during other caribou work, and we ensured complete coverage of the area using a GPS (global positioning system) track record. Caribou were not moving rapidly, groups were not mixing, we were in low rolling hills, and the area was relatively small. Immediately after returning to camp we discussed our estimates with the rest of the census crew. Everyone involved felt these estimates were reasonably accurate.

Population composition for the WAH was estimated from calving surveys during June, composition counts during October, and short yearling surveys during April–May. Caribou collared at Onion Portage tend to move en masse through their first winter. Therefore, during the fall, winter, and spring we use ≤4 newly collared individuals for collecting composition information to avoid oversampling this segment of the population. Once caribou enter summer, individuals collared the preceding fall are thoroughly mixed throughout the population.

In 2002, calving surveys were conducted in C-185 and PA-18 airplanes during 1–3 and 5 June. Calving surveys were conducted via C-185 and PA-18 airplanes during 5–7, 9 and 12 June 2003, and via C-180 and PA-18 airplanes during 4–6 and 8 June 2004. In all years we attempted to conduct calving surveys on or slightly before the date of peak calving (assumed to be roughly 7–10 Jun); however, survey dates were ultimately dictated by weather. Calving survey techniques, criteria to determine maternal status, and geographic coverage were the same as previously described (Dau 1997).

Fall composition surveys were conducted 2–3 October 2004 (after this reporting period) using techniques previously described (Dau 1997). Fall composition surveys were not conducted during 2002 and 2003 because of poor weather, helicopter unavailability, or conflicts with other work.

Spring composition (short yearling or recruitment) surveys were conducted on 5, 6, 8, and 30 April and on 1 and 2 May 2003. In 2004 these surveys were conducted on 14, 18, 19, and 29 April. In 2005 (after the reporting period) they were conducted on 13 and 14 April, and on 16 and 20 May. In all years we used survey techniques previously reported (Dau 1997). Because we conduct recruitment surveys from a PA-18 airplane, we probably misclassify some 2-yr-old females as short yearlings and some short yearling males as 2-yr-olds. We feel these measurement errors are fairly constant through time; therefore, they likely do not affect temporal trends or negate its usefulness as an index of recruitment. Although we could reduce measurement error by conducting these surveys via helicopter, we don't believe the benefits would outweigh the costs. The expense of chartering a helicopter would be cost prohibitive, and helicopters are often not available when weather and caribou are conducive to count. Using the Kotzebue-based PA-18 to conduct spring composition is cost-effective and allows us to take advantage of brief periods of good survey conditions.

Distribution and Movements. Distribution and movements of the herd were monitored through rangewide conventional telemetry surveys and PTT data. Rangewide surveys were conducted during spring (Jan–May), summer (Jun) and fall (Aug–Dec), often in conjunction with

composition surveys. Flights were based out of Barrow, Kotzebue, Nome, and Fairbanks using survey techniques previously described (Dau 1997).

I reanalyzed WAH calving data to delineate the calving grounds using a kernel analysis similar to Kelleyhouse (2001); however, I increased the sample of collared cows by using a broader definition of "maternal." I used the following conditions to select observations for this analysis:

1. I excluded nonmaternal cows because they often associate with bulls and lag toward the rear of the spring migration. Individual cows were excluded only during years when they were determined to be nonmaternal.

2. I combined data from 1987 to 2004 with 2 exceptions. I excluded data from 1990 because it appeared calving occurred early that year in relation to when calving surveys were conducted. No data were collected during 1991 because of poor weather.

3. I included all cows accompanied by a newborn calf, regardless of their location.

4. To maximize sample sizes, I excluded maternal cows not accompanied by a newborn calf that were south of the northernmost crest of the DeLong Mountains (latitude N68˚39́). Some collared PCH cows travel up to 20 km/day until giving birth (B. Griffith, personal communication). This was why Kelleyhouse (2001) used a conservative definition of "maternal female" when delineating WAH calving areas. A drawback of this approach is that it reduces an already small sample of collared cows to assess distribution. Maternal cows in the Utukok uplands that have not given birth are probably no farther from their eventual parturition site than cows observed with calves that are 3–7 days old. Rather than delineate "extent of" and "concentrated" calving areas as reported by Kelleyhouse (2001), I used the 90% kernel to create a single depiction of the calving grounds.

I evaluated winter and summer range as described by Dau (2003) using 9 subareas of WAH range (Figure 5). For the years following the 2003 photocensus I estimated population size assuming the WAH continued to grow 1% annually as it did during 1990–2003.

Mortality. Mortality rates for adult WAH caribou were estimated from cows with conventional radio collars or lightweight satellite collars on a collar-year basis. Estimated mortality includes all causes of death. Two collar years (2002–2003 and 2003–2004) span portions of this reporting period. Radiocollared bulls were not included in the sample of collared caribou to estimate mortality because we suspect some bulls slip their collar even though we began using expandable collar sections on them in 2001.

In previous reports I excluded cows collared with ST-3 or ST-14 PTTs from the sample to estimate mortality because these large, 2-cannister satellite collars may have predisposed some cows to early mortality (Dau 1997). We last deployed old style (i.e., heavy) satellite collars in 1998. Three cows collared with old style satellite collars in 1998 were still alive in March 2005, as was 1 cow collared in 1996. Obviously, these individuals were not predisposed to early mortality by these heavy satellite collars. Therefore, to maximize the sample size of collared cows, I included them in the mortality estimate.

Mortality rates reported in consecutive management reports are inconsistent for the most recent 1–3 years. 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. 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 lived many years after its radio collar exhausted its batteries, we adjust our sample size accordingly.

Harvest. We monitored harvest using 3 systems: 1) registration permits for local hunters; 2) statewide harvest tickets for nonlocal hunters; and 3) community-based harvest assessments for selected communities within the range of the WAH. Beginning in the 1998–1999 regulatory year, the Division of Wildlife Conservation resumed administering the statewide caribou harvest ticket system as it does for other big game species, e.g. moose.

Community-based harvest assessments have been conducted in selected villages within the range of the WAH since 1985. In past reports (Dau 2001, 2003) we used 2 approaches to analyze this data to estimate caribou harvests by hunters that reside within the range of this herd. 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). The second approach employed statistical models based on Analysis of Covariance that considered the population size of individual communities and their accessibility to caribou. We developed the statistical approach because it was less time-consuming than the per capita approach. Also, the statistical approach could be more responsive to annual changes in caribou availability than the per capita approach, which uses average harvests calculated from previous years and similar communities. As we expanded the community harvest database, it became evident that harvest levels lacked independence through space and time. As a result, statistical harvest models were developed using a Generalized Least Squares technique because it accommodates dependent 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 accuracy of either approach. Therefore, in this report I provide only estimates of local harvest based on the statistical harvest model. 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 2002 we sampled 55 bulls and 39 cows. In 2003 we sampled 65 bulls and 48 cows, and in 2004 (after this reporting period) 49 bulls and 33 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. Samples were analyzed to assess haptoglobin levels (Dau 2001) and antibodies against *Brucella suis* bacteria.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The July 2003 photocensus produced a minimum estimate of 490,000 caribou (Table 1, Figure 4). There were 3 components to this estimate:

9 X 9 photo counts	455,012
direct counts and estimates of group size during census photography	31,111
expansion for caribou not photographed	4,000
Total estimate	490,123

The 2003 estimate supports our suspicion that we underestimated minimum population size during the 1999 census. In 1999 prolonged high wind prevented caribou from adequately aggregating until we were within a day of postponing the census until the following year. When the herd did aggregate, encroaching fog over the largest aggregation forced us to expose photographs at the highest possible altitude to expedite the process. As a result, images of caribou on the contact prints were small, and it appeared that calves were largely undetectable. Our failure to count a substantial portion of the calf cohort in early July 1999 could easily have caused us to undercount this herd by 30,000–40,000 caribou. Given trends in recruitment and adult cow mortality (see section below), it is unlikely this population actually declined from 1996 to 1999. Discounting the 1999 estimate, the WAH has increased about 1% annually since 1993.

In July 2003 density of this herd over its total range was 3.5 caribou/mi^2 (1.3 caribou/km^2). This is a conservative measure of density because it does not include reindeer or caribou from the TLH or CAH.

Population Composition

Calving. 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 "backhanded" way to assess body condition of mature cows the previous fall (Cameron and Ver Hoef 1994). Calf production per se has probably had little effect on the population dynamics of this herd since at least the mid 1980s.

We observed 68 calves:100 cows in 2003 and 59 calves:100 cows in 2004 (Table 2). There has been no clear trend in calf production since 1987; however, calf production generally declined from 1987 through 1998 and increased since 1998 (Fig 6). We assume WAH calving peaks during the first week of June; however, we have no data to evaluate that assumption beyond qualitative observations of antler status and distention of cows' bellies during calving surveys. 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.

There has been no correlation between the median date of calving surveys and the calf:cow ratio (Spearman rank correlation=-0.17, P=0.52, n=17). Our estimates of calf production are probably 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.

The strong negative correlation between the calf:cow ratio and the proportion of cows with velvet antlers during calving previously reported (Dau 1997) continued through this reporting period (1987–2004 excluding 1991, Spearman rank correlation = –0.89, n = 17 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 (Kruskal-Wallis P=0.002) than during years when this ratio was <70:100 (15.2%, n=10). Cows with substantial growth of velvet antlers during calving probably failed to conceive the previous fall. This suggests low WAH calf:cow estimates are real and not artifacts of sampling error.

Between 1992 and 2004 there was no correlation between the June and subsequent fall calf:cow ratios (r = 0.13, n = 10). This suggests calf survival through summer has a greater effect on the fall calf:cow ratio than initial production.

Fall Composition. We observed 35 calves:100 cows and 48 bulls:100 cows in a sample of 11,157 caribou classified during October 2004 (Table 3). No fall composition surveys were conducted in 2002 or 2003 because of poor weather, helicopter unavailability, and conflicts with other work.

Since 1992 the fall calf:adult ratio has ranged 24–33:100. 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 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. Between 1992 and 2004, the fall calf:cow ratio was correlated to the subsequent spring calf:cow ratio (Spearman rank correlation=0.65, P=0.04, n=10).

Since 1992 the fall bull:cow ratio has ranged 38–64:100 (Table 3). Sexual segregation and our inability to sample the entire herd probably account for more annual variability in this parameter than actual changes in population composition. From 1975 to 2004, the median bull:cow ratio has been 51:100. This is probably more representative of the actual WAH bull:cow ratio than any individual year.

Spring Composition. We observed 19 short yearlings:100 adults in spring 2003, 22:100 in spring 2004 and 12:100 in 2005 (Table 4, Fig 7). Recruitment has slowly declined since the early 1980s; even so, this parameter has exhibited 1–3-year spikes every 4–5 years. The general overall declining trend would not be evident without this long-term data set.

Distribution and Movements

Historical Summary. Our historical understanding of the distribution of the WAH has been previously reported (Dau 2001). During rangewide telemetry surveys we located 114 out of 130 (88%) radiocollared caribou through conventional telemetry techniques in fall 2003, 114 out of

130 collared caribou (88%) during spring 2004, and 108 out of 138 (78%) collared caribou during fall 2004 (after this reporting period).

Since spring 1995 when we began conducting rangewide surveys, we've located through conventional telemetry techniques an average 74% (SD = 10, n = 10) of all potentially active collars during spring and 75% during fall (SD=9, n = 10) surveys. Often, collars missed during a rangewide survey are located during the subsequent survey period mixed with caribou that were found. This suggests long telemetry receiver scan times, topography, errors while programming receivers, and infrequent relocation flights are responsible for "missed" collars, rather than incomplete coverage of the herds' range or unusual movements of caribou. The distribution of collars located during rangewide surveys is probably a reasonably accurate though rough approximation of the distribution of the entire WAH (i.e., there have been no "pockets" of caribou in areas we did not search).

General Movement Pattern: Pregnant cows and some nonmaternal caribou begin migrating from winter range toward the calving grounds in April. Typically, most pregnant cows reach the calving grounds by late May. Bulls, nonmaternal cows, and immature caribou lag behind pregnant cows during the spring migration, 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 large postcalving aggregations begin forming as cows with neonates move west toward the Lisburne Hills. As mosquitoes begin to emerge 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-northeast through the Brooks Range and its northern foothills toward Howard and Anaktuvuk Passes. By early to mid August insect harassment begins to diminish, and 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. The fall migration begins in mid August as caribou in the vanguard move southwest toward Kotzebue and Norton Sounds. By late September, before some WAH caribou have even begun to migrate, caribou near the front of the migration have reached the southernmost portions of winter range. The fall migration extends through mid to late November. No matter 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. Distribution and, to some extent, movements of this herd are shown in Figure 3.

Winter Range. Winter range is the most difficult of all WAH seasonal ranges to delineate because of the substantial annual variability in where caribou overwinter. The area identified as winter range on the seasonal range map (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 occur throughout most of their annual range, albeit at very low densities in some areas (Tables 5 and 6). 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 provide rough estimates of winter

range distribution through time (too few locations of caribou were recorded to evaluate winter range use before 1983–1984).

During winter 2003–2004, an unusually high percentage of the WAH wintered in the central Brooks Range (sub area 5, Figure 5) and Koyukuk River drainage (sub area 6; Figure 5 and Table 5). We located radiocollared caribou up to 40 mi east of Chandalar Lake, substantially farther east than previously observed. Residents of that area indicated it had been decades since large numbers of caribou had wintered in there (E. Jaynes, personal communication). Additionally, a substantial proportion of the herd wintered in the Nulato Hills (sub area 8, Figure 5) during 2003–2004 following 2 years of little use (Tables 5 and 6).

Most of the WAH wintered in the Nulato Hills or on the Seward Peninsula (sub area 7, Figure 5) during winter 2004–2005 (after this reporting period). The importance of the Nulato Hills to the WAH and expansion of WAH winter range onto the Seward Peninsula have been previously described (Dau 2003). Few WAH caribou wintered north of the DeLong Mountains during this reporting period.

The estimates of winter range density reported here do not include reindeer or caribou from the TLH or CAH; therefore, the figures reported here 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.

Calving Grounds. Two approaches have been used to delineate the WAH calving grounds, one qualitative and the other quantitative (Kelleyhouse 2001). Strengths and weaknesses of each approach have been previously discussed (Dau 2003). In this report, all references to the calving ground refer to the area delineated on the seasonal range map (Figures 1 and 2).

In 2003 we observed 80 collared cows during calving surveys (Table 2). Of these, 50 were within the calving grounds, 29 were south of it, and 1 was east of the calving grounds. Of the 30 individuals off the calving grounds, 19 were nonmaternal, 8 were maternal but did not have a newborn calf, and 3 were accompanied by a neonate. In 2004 we observed 86 collared cows during calving surveys and only 2 (both nonmaternal) were substantially outside the calving grounds. In 2005 we observed a collared cow with a newborn calf on the ridge dividing the headwaters of the Kallarichuk River and Timber Creek. This is the southernmost observation of a WAH calving site ever recorded.

The 90% kernel produced by our reanalysis of WAH calving data agrees closely with the area qualitatively delineated in the seasonal range map (Figs 1 and 2). Although the 1990 calving surveys were conducted within the range of dates that surveys were conducted in other years, the concentrated distribution of cows, the total absence of hard antlers on collared cows, and the extreme westerly distribution of collared cows all suggest postcalving aggregations were forming at the time we observed them. Additionally, during the 1990 calving surveys, we observed many large groups of caribou moving west as is typical of the WAH postcalving period. Therefore, we feel that including data from 1990 is probably misleading.

We included maternal cows not accompanied by a calf that were north of the De Long Mountain crest in the kernel analysis to maximize the sample size while minimizing the problem of cows

traveling long distances between when we observed them and when they gave birth. Because we locate collared cows only once during calving surveys, some cows have calves that are several days old based on the calves' mobility, while other cows appear on the verge of parturition based on their distended stomach. Cows observed on the calving grounds that possess ≥1 hard antler but lack a calf are probably no farther from their birthing site than cows with newborns that are several days old. In contrast, pregnant cows that are far from the calving grounds during the calving period are probably most likely to travel rapidly to get there; therefore, we excluded observations of these individuals. We modified the calving grounds shown on the WAH seasonal range map to correspond with the 90% and 95% kernels from this data set.

Summer Range. Conventional telemetry relocation flights associated with calving surveys and photocensuses, as well as PTT data, all indicate the vast majority of the WAH uses 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 and 2). In recent years up to several thousand WAH caribou, primarily bulls and immature cows, have reportedly summered on the Seward Peninsula as well (ADF&G biologist K. Persons, personal communication). In fact, 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. The importance of summer range to the WAH has been previously discussed (Dau 2003).

Satellite Collars. In 1987, when we began deploying satellite collars in the WAH, our primary objective was to use them to more effectively search for conventional radiocollared caribou. 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 exceeded 20 PTTs in this herd during the 1999–2000 collar year, and since 2001–2002, we have begun each collar year ≥20 PTTs on living WAH caribou. Since 2000, ADF&G has mapped real-time locations of PTT-collared WAH caribou and distributed them via Internet to federal management agencies, 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 in this herd (35 individuals) constituted only 0.01% of the entire population (using a population size of 490,000 caribou). Although PTT data sets now include thousands of locations, they are still based on only a tiny number of individual caribou. Additionally, we have deployed very few PTTs on bull caribou. Conventional telemetry and direct observations of caribou suggest PTT data should be used cautiously as a representation of the entire herd.

MORTALITY

Our estimates of adult mortality are conservative because they exclude bulls that tend to experience higher mortality rates than cows. Also, we do not collar emaciated, injured, or clinically diseased cows, even though such animals compose part of the population. Although these factors would elevate the WAH mortality curve, they should not affect its temporal trend (Dau 1997). We believe our estimates provide a reasonably accurate index of adult caribou mortality for the entire herd.

Since 1985, annual mortality has ranged from 8 (1997–1998) to 22 (1992–1993) deaths:100 collared adult cows (Table 7, Figure 8). Annual estimates of adult mortality have shown no statistically significant trend through time ($R^2 = 0.10$) and have exhibited more variability among years since 1992–1993 than prior to that time. Three-year moving averages reduce the effects of annual variability and suggest mortality has generally increased very slowly since the mid 1980s (Figure 9). Adult caribou mortality is most meaningful in relation to recruitment. The significance of Figure 9 is that these parameters have slowly trended toward convergence since the early to mid 1980s.

Harvest

Season and Bag Limit. On state-managed lands the following seasons and bag limits were in effect throughout the reporting period:

2002–2003 and 2003–2004 Unit and Bag Limits	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
Units 21D, 22A, 22B, 23, 24, and 26A		
Resident Hunters: 5 caribou per day		
Bulls	No closed season	
Cows	1 Jul–15 May	
Nonresident Hunters: 5 caribou total per year		
Bulls		No closed season
Cows		1 Jul–15 May

Federal hunting seasons were identical to state regulations during this reporting period. However, the bag limit under federal subsistence regulations was 15 caribou per day in Unit 23 and 10 caribou per day in Unit 26A. The federal bag limit in other units used by the WAH was 5 caribou per day.

Board of Game Actions and Emergency Orders. During this reporting period 2 emergency orders (EOs) were issued for caribou hunting within the range of the WAH, and both pertained to portions of Game Management Unit 22:

1. EO 05-03-02 closed caribou hunting in that portion of Unit 22D within the Pilgrim River drainage south of the Pilgrim River Bridge between 31 August 2002 and 30 June 2003. The purpose of this EO was to prevent people from taking reindeer because no caribou were in the area.

2. EO 05-04-02 opened caribou hunting in that portion of Unit 22D within the Pilgrim River drainage south of the Pilgrim River Bridge beginning 17 October 2002 through 30 June

2003. The purpose of this EO was to provide hunting opportunity after caribou had moved into the area.

The BOG did not pass a proposal to increase the state bag limit on WAH caribou to 10 per day in Unit 23 at its November 2003 meeting. This proposal was submitted with the understanding that a companion proposal would be submitted to the FSB to reduce the federal bag limit to 10 caribou per day in Unit 23. The intent of both proposals was to achieve consistency between state and federal caribou regulations. However, no proposal was submitted to the FSB, and the BOG voted against the proposal.

Human-Induced Harvest. Hunters (recreational and subsistence hunters combined) reported harvesting about 14,700 WAH caribou during the 2002–2003 regulatory year, and 11,600 caribou during 2003–2004 (Table 8). This constituted 3% and 2% of the population, respectively, 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, opportunistic observations by ADF&G staff 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 through 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 the low compliance with reporting requirements, the department has not sent letters to permit holders requesting harvest information since the year 2000.

Nonresidents and residents that live outside the range of the WAH must carry a statewide caribou harvest ticket when hunting. Alaska Bureau of Wildlife Enforcement officers indicate most nonlocal hunters possess a statewide caribou harvest ticket when hunting caribou (C. Bedingfield, J. Rodgers and D. Hildebrand, personal communication). We think this system is reasonably accurate for monitoring caribou harvested by nonlocal hunters.

Hunter Residency and Success. During the 2002–2003 regulatory year, 693 nonlocal hunters reported harvesting 697 caribou (650 bulls and 47 cows). In 2003–2004, 572 nonlocal hunters took 549 caribou (510 bulls and 39 cows; Table 9). As in the past, during this reporting period most WAH caribou taken by nonlocal hunters were harvested in Unit 23 (73% in 2002–2003 and 67% in 2003–2004).

Combining data from the 1998–1999 through 2003–2004 regulatory years, 63% of all nonlocal hunters took $\geq$1 caribou. Fifty-four percent of all nonlocal hunters took fewer than 3 caribou per

year, and only 8% harvested ≥3 caribou annually. The maximum number of caribou harvested by a nonlocal hunter was 8 during a regulatory year. Only 5% of all nonlocal hunters reported taking ≥1 cow.

Using the harvest estimation model (Table 8), hunters residing within the range of the WAH harvested about 14,000 caribou in 2002–2003 (80% c.i.=15,552–17,714 caribou), and 11,000 caribou in 2003–2004 (80% c.i.=12,743–14,906 caribou). Numerous community harvest assessments have been conducted within the range of the WAH (Table 10). We intend to check the accuracy of the harvest estimation model roughly every 6 years by comparing it to estimates derived from per capita harvest rates.

Harvest Chronology. Subsistence harvest patterns are primarily affected by seasonal movements and availability of caribou, and secondarily, by ease of travel while 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 impossible. 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 (88% in 2002–2003 and 93% in 2003–2004). This temporal concentration of nonlocal hunters, combined with their disproportionate use of Unit 23, continued to frustrate local residents. 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, nonlocal hunters depend almost entirely on aircraft to initially access caribou hunting areas. Once in a hunting area, many nonlocal hunters use boats 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. Serology results show no temporal trends in exposure to 8 selected bacteria and viruses in the WAH for samples collected during 1992–2000 (Table 11). This may be at least partly because serologic surveys are inherently poor for monitoring the prevalence of disease in wildlife populations (J. Blake and T. O'Hara, personal communication). Since 2001, WAH serum samples have been analyzed only for brucellosis and haptoglobin levels. Follow-up diagnostic serological tests may be conducted for individual caribou with an elevated haptoglobin level. Our primary objective for collecting caribou sera is to provide a "red flag" indicator of disease. Overall, about 9% of all caribou tested during 1992–2003 have 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 have been low since 1996 (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.

HABITAT

Assessment

The department did not monitor range condition for the WAH during this reporting period.

During the summer of 2000 the National Park Service (NPS) evaluated heavy metal levels in mosses and soils along the Red Dog Road (Ford and Hasselbach 2001). Although the results showed high concentrations of lead (Pb), zinc (Zn), and cadmium (Cd) near the road and indicated ore concentrate from the Red Dog Mine was the source of these metals, Teckcominco staff questioned whether the methods used near Red Dog were comparable to other studies. Even so, Tek Cominco has since taken steps, e.g., complete coverage of transport truck payloads, to reduce or eliminate escapement of ore dust from transport vehicles.

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 (WG) was organized in 1997. The purpose of the working group is to ensure the 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. The Bureau of Land Management, U.S. Fish and Wildlife Service, NPS and ADF&G support the WG.

During this reporting period, the WG held 1–2 meetings each year and produced a newsletter, *Western Arctic Caribou Trails*, that was mailed once or twice annually to about 9000 box holders within the range of the WAH. The technical committee, composed of agency staff with at least 2

WG members, met for the first time in January 2004 and again in January 2005 to discuss interagency cooperation, identify information needs, and begin a peer review of WAH management activities. During this reporting period the WG elected an executive committee and formed several subcommittees. These subcommittees are: 1) NPR-A committee; 2) education/newsletter committee; 3) planning committee; 4) membership committee; and 5) user knowledge committee.

Resource development

The Kuparuk and Prudhoe Bay oil fields as well as the trans-Alaska pipeline are located on the easternmost extent of WAH range. Most of this herd has little or no contact with oil-related structures throughout their lives. The Red Dog Mine, Road and Port Site are located wholly within the northwestern portion of WAH range. To date, this complex appears to have had only limited, localized effects on the movements and distribution of WAH caribou. This is partly because NANA-Teck Cominco has attempted to minimize its impacts on subsistence resources and users. It is also partly because locally hired truck drivers and other employees have voluntarily minimized activities that could affect caribou or other 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 south. Roughly 80% of the WAH calving grounds are within this area, and the area contains important insect relief habitat during summer.

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. The high cost of transporting this product to market has been a major barrier to its development. One alternative being considered for development of this resource is transporting coal to the Red Dog Mine via a road to provide a cheaper source of power than diesel. Another option is to burn coal at the deposit to generate electricity that would then be transported to the Red Dog Mine via high voltage power lines.

3. Expansion of the Red Dog Mine. Test drilling for additional lead and zinc deposits has been conducted in this area for several years. The western De Long Mountains are heavily used by WAH caribou during summer for insect relief terrain.

4. 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.

5. 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.

6. Develop mining in the Ambler Mining District (Bornite Mine). Nova Gold is currently conducting assessment work to evaluate the feasibility of mining in this area. One option being considered for transporting ore is a road from the Dalton Highway through the Ambler Mining District to the Red Dog Mine-Port Site road.

More information about potential industrial development within the range of the WAH is provided by Schoen and Senner (2002).

School programs

As in the past, department staff made presentations regarding WAH caribou in schools throughout the range of this herd. In 2002 eight high school students from Noorvik with their teacher and 4 chaperones (including an elder, Minnie Morris, who chaperoned the first group of students to ever participate in the collaring project during 1991) participated in the Onion Portage collaring project. In 2003 eight high school students from Noatak with 2 chaperones (a subsistence hunter from Noatak and a geneticist from the University of Alaska) participated in the project. Some Noatak students used caribou blood collected during the project for science fair projects to sequence selected genes. In 2003 nine White Mountain junior high school students and their teacher participated in this project. The White Mountain students published a book about their experiences at Onion Portage, hosted a community feast (featuring a caribou the students had harvested, butchered, and cooked) during which they showed PowerPoint presentations about the collaring project and participated in an oral presentation with department staff describing student involvement in the project at the 10th North American Caribou Workshop (Girdwood, Alaska, May 2004). Although students from Buckland and Deering were scheduled to participate in this project during September 2004, school district staff turnover and other factors forced them to cancel shortly before the project began. As a result, no students participated in the project during 2004. 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), the Seward Peninsula reindeer industry continued to lose deer to the WAH during this reporting period. Relatively few caribou wintered on the Seward Peninsula during the winter of 2003–2004, and as a result, fewer reindeer were lost than in any year since 1996. Only the Davis, Kakaruk (Teller) and Ongtowasruk (Wales) herds are still commercially viable as of spring 2005. 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, commercial operators (guides and transporters) and local hunters continued in portions of WAH range during this reporting period. These conflicts were most pronounced in Unit 23. This complex issue involves all hunters, not just caribou hunters, and is affected by: 1) use of aircraft by nonlocal hunters and commercial operators in contrast to local hunters' use of boats and snowmachines; 2) shortened seasons, reduced bag limits, crowding, and few trophy animals in other portions of Alaska; and 3) fewer places to hunt multiple big game species, especially for nonresidents. The limiting factor driving this conflict 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. During this reporting period, some high-volume transporters virtually controlled entire drainages within Unit 23 by contracting numerous clients and monopolizing access points.

CONCLUSIONS AND RECOMMENDATIONS

The WAH is still very large. However, converging trends in adult cow mortality and recruitment, isolated starvation events, and occasional years of generally poor pre-rut (September) body condition suggest this herd could decline in the foreseeable future. There is no evidence that any single factor, e.g., human harvests, predation, environmental contaminants, 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 illustrates levels of human demand when access to caribou is limited only by their distribution and not population size. Once this herd begins to substantially decline, however, and harvests become a potential limitation to population growth, 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 continued to be lost to the WAH during this reporting period. 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. The department should hire a planner position for Region V in part to address these issues.

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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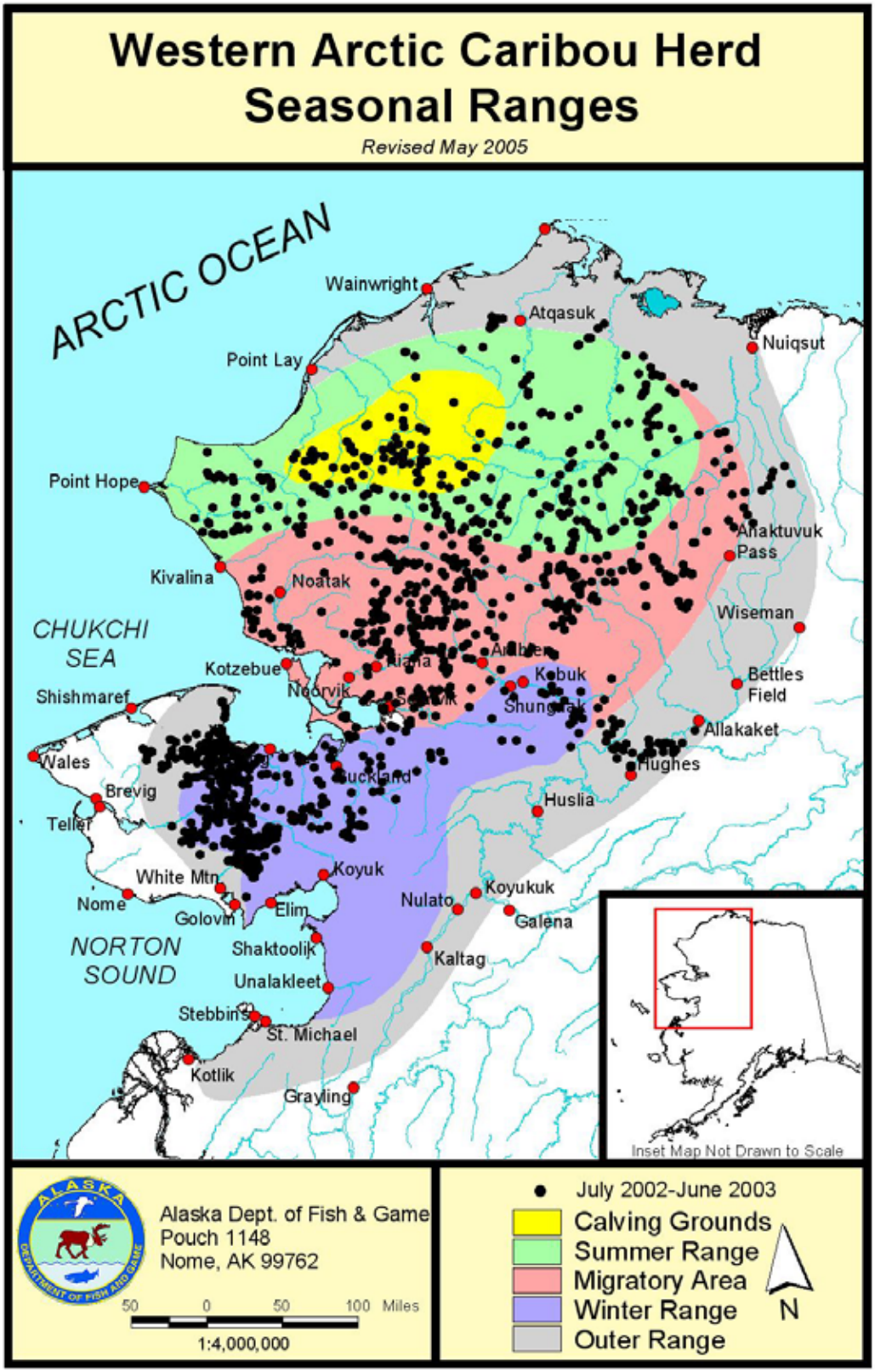

Figure 1 Seasonal ranges of the Western Arctic caribou herd with locations of satellite-collared caribou collected during regulatory year 2002–2003

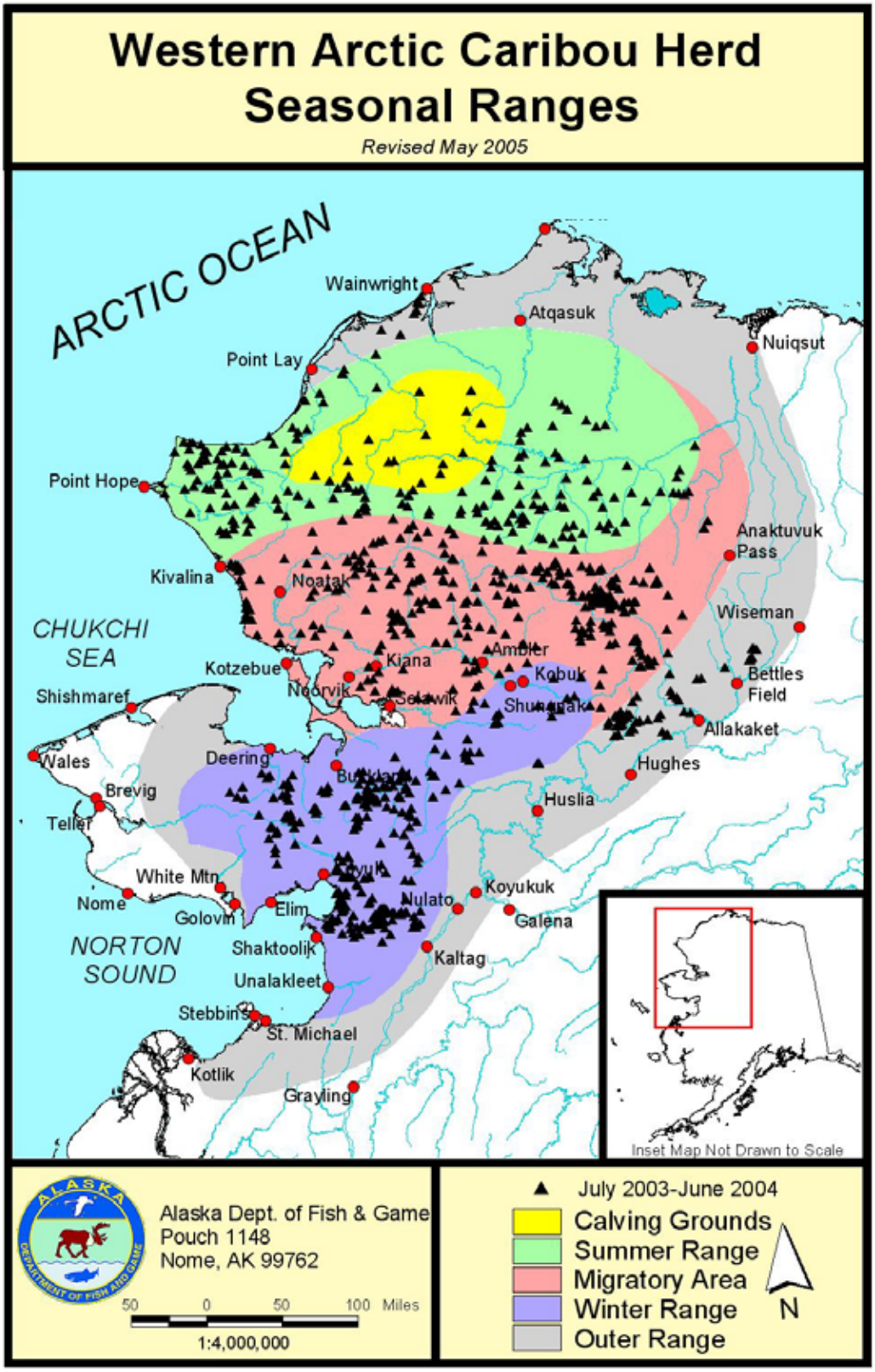

Figure 2 Seasonal ranges of the Western Arctic caribou herd with locations of satellite-collared caribou collected during regulatory year 2003–2004

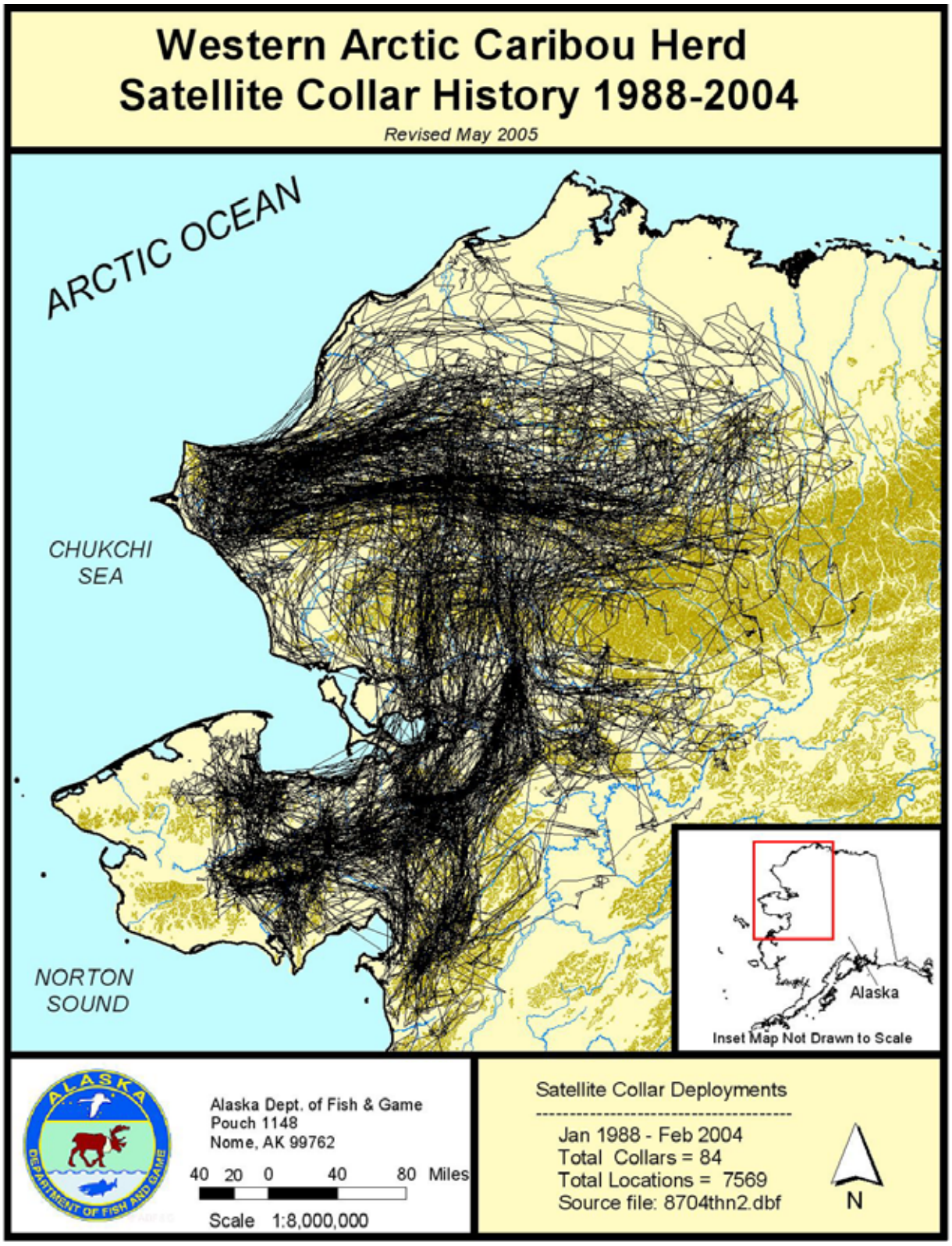

Figure 3 Distribution and movement of satellite-collared Western Arctic herd caribou, 1988–2004

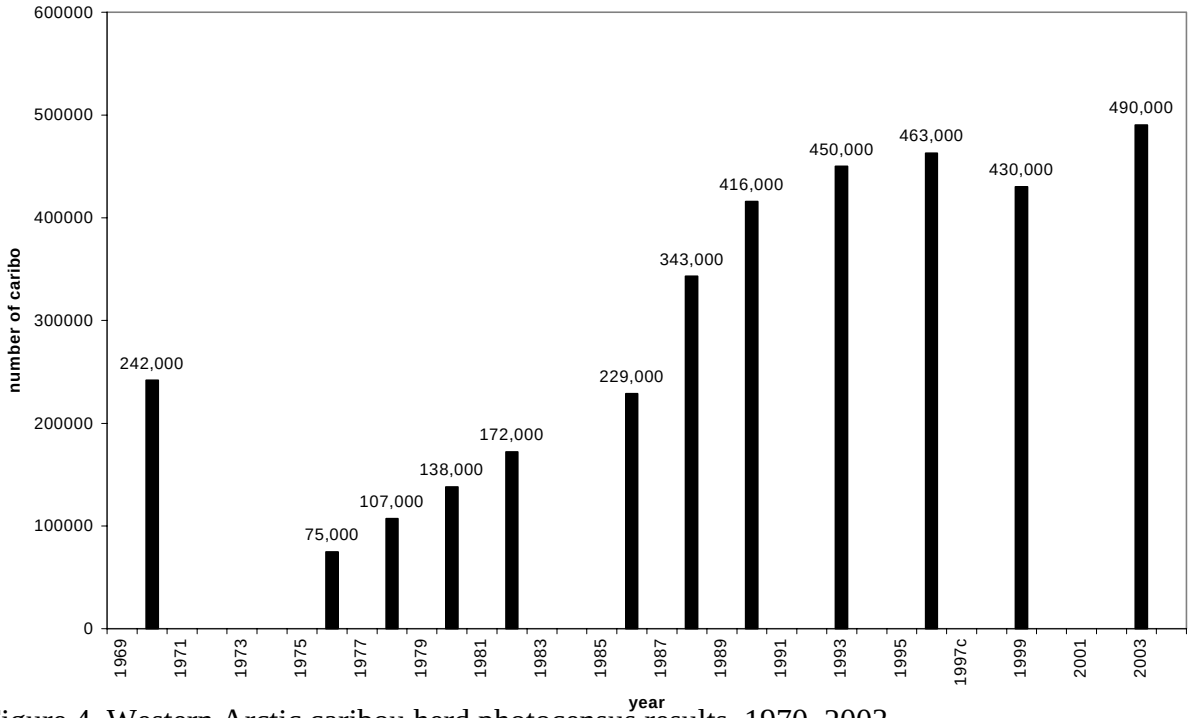

Figure 4 Western Arctic caribou herd photocensus results, 1970–2003

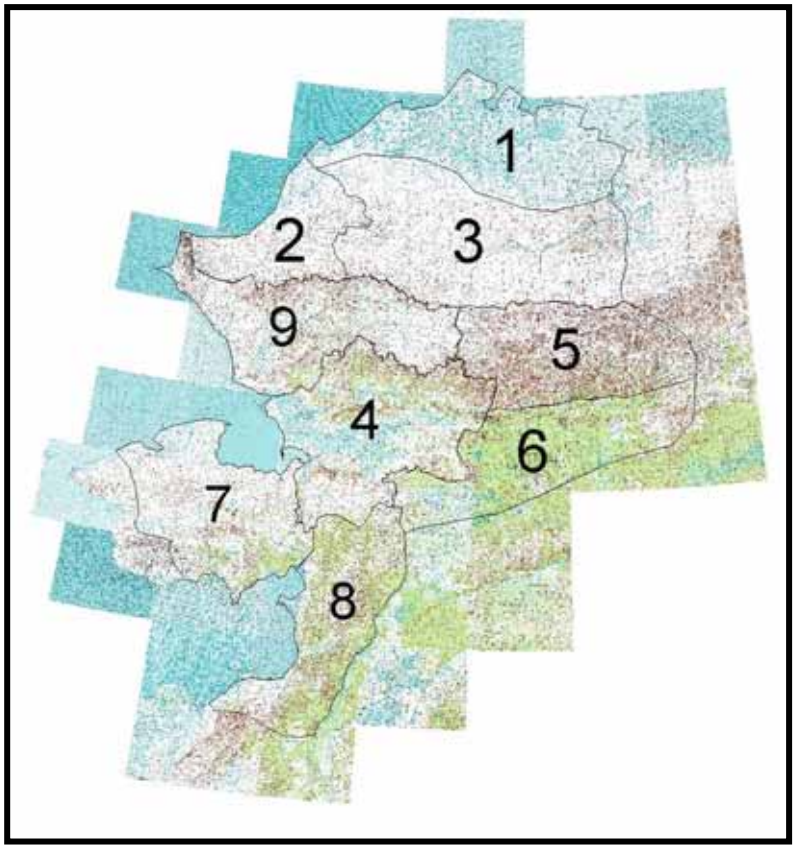

Figure 5 Sub-areas of Western Arctic herd range used to assess winter distribution

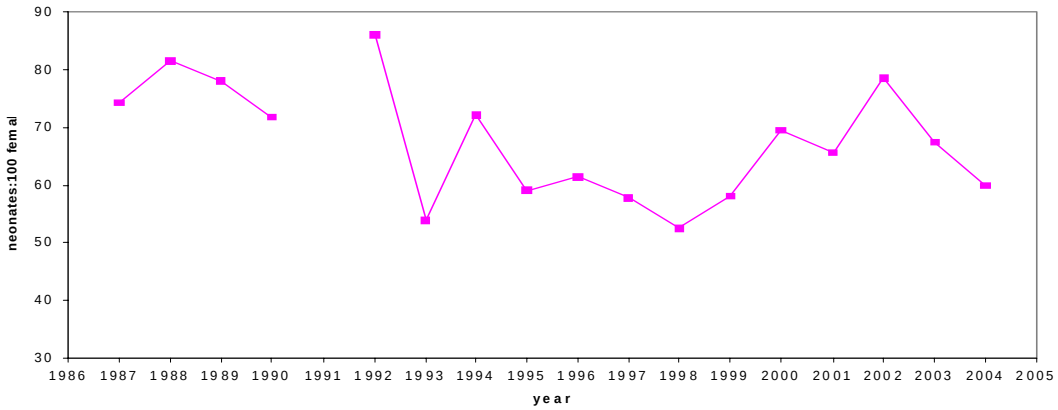

Figure 6 Western Arctic caribou herd June calving survey results, 1987–2004

Figure 7 Annual estimates of Western Arctic caribou herd spring calf recruitment, 1980–2005

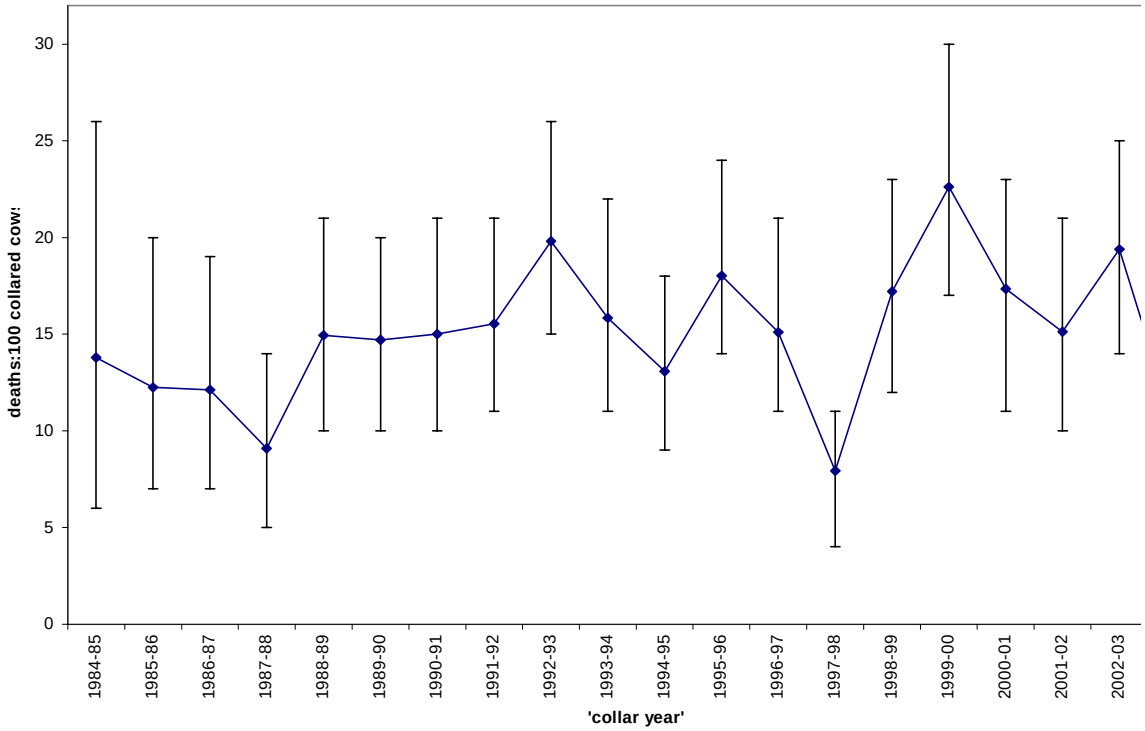

Figure 8 Annual estimates of adult cow mortality for the Western Arctic caribou herd, 1984–1985 through 2003–2004 (brackets indicate 80% binomial confidence intervals)

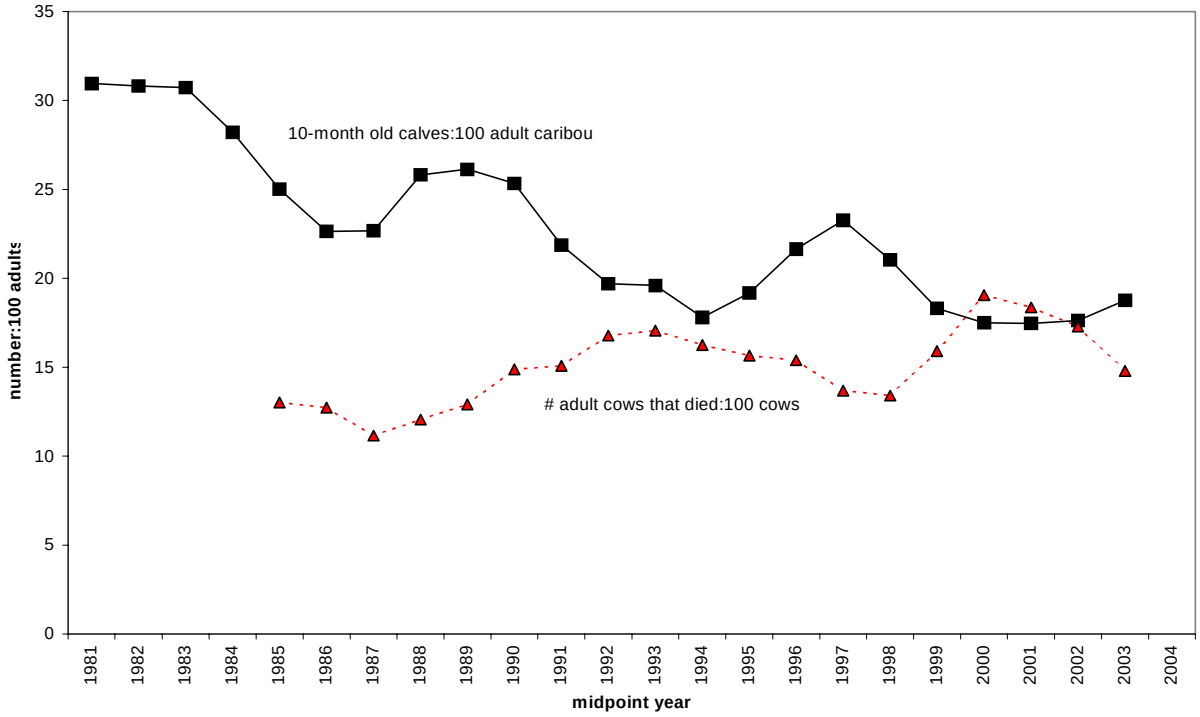

Figure 9 Three-year moving averages of Western Arctic caribou herd calf recruitment and adult cow mortality (Note: these indices of recruitment and adult mortality show trends but are not directly comparable)

Table 1 Photocensus population estimates of the Western Arctic caribou herd, 1970–1999

	Minimum population size	Mean annual growth rate[a]	Estimated population size
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[b]	430,000	1	474,400
2000		1	478,200
2001		1	482,100
2002		1	486,000
2003	490,000		

[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] 1999 census probably underestimated population size; therefore, annual rate of change computed from 1996 to 2003.

Table 2 Aerial calving surveys from observations of radiocollared cows in the Western Arctic caribou herd, 1987–2003

Year	Median June survey date	With Calf	No Calf ≥1 hard antler	No Calf soft antler	No Calf no antler	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									
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

Table 3 Fall population composition of the Western Arctic caribou herd, 1961–2001

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

Table 4 Short yearling[a] survey results of the Western Arctic caribou herd, 1980–2005

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[b]
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	

[a] Short yearlings are 10–11-month-old caribou.

[b] Calculates average using values from 1980–1982.

Table 5 Geographic distribution of radiocollared Western Arctic herd caribou during winter (Nov–Mar); numbers represent percentage of radiocollared caribou located in each subarea (Note: 9 subareas[a] are shown in Figure 5)

Area[a]	83 84	84 85	85 86	86 87	87 88	88 89	89 90	90 91	91 92	92 93	93 94	94 95	95 96	96 97	97 98	98 99	99 00	00 01	01 02	02 03	03 04	04 05
1	14	13	6	12	0	0	0	5	5	9	0	1	10	4	6	9	0	5	0	5	2	0
2	0	16	6	0	0	0	0	0	0	0	0	1	0	0	0	0	9	0	0	0	0	0
3	7	13	0	0	0	0	11	0	0	2	4	0	5	0	5	1	1	4	0	4	0	0
4	24	32	12	38	49	28	20	2	53	6	1	26	33	12	6	11	42	12	22	21	12	16
5	14	11	18	0	8	1	9	0	9	6	8	3	26	4	25	31	5	5	9	13	31	5
6	0	0	0	0	0	1	1	0	6	19	4	1	2	1	0	2	12	0	2	8	20	0
7	2	0	0	0	1	5	2	3	4	4	7	6	9	59	29	24	17	43	30	42	14	19
8	17	5	53	38	39	64	56	89	21	54	75	55	16	20	30	20	5	29	5	0	20	53
9	21	11	6	12	3	1	2	0	2	0	0	8	1	0	0	1	9	2	26	7	1	6
n_i[b]	14	19	17	34	38	76	57	75	60	70	90	77	63	79	87	67	72	62	56	67	86	77

[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 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 6 Caribou density (number/mi^2) in 9 subareas (Figure 5) of Western Arctic Caribou Range during winter (1 Nov–31 Mar)

Area[a]	83 84	84 85	85 86	86 87	87 88	88 89	89 90	90 91	91 92	92 93	93 94	94 95	95 96	96 97	97 98	98 99	99 00	00 01	01 02	02 03	03 04	04 05
1	1.73	1.71	0.82	2.01	0.00	0.00	0.00	1.39	1.34	2.55	0.00	0.18	2.69	1.08	1.65	2.59	0.00	1.42	1.56	1.34	0.70	0.00
2	0.00	3.81	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	4.89	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	0.00	0.40	0.73	0.00	0.92	0.00	0.90	0.29	0.28	0.81	0.00	0.76	0.00	0.00
4	2.49	3.55	1.42	5.66	8.82	5.65	4.43	0.55	12.34	1.53	0.27	6.30	7.96	2.97	1.38	2.80	10.52	3.08	5.63	5.54	3.04	4.12
5	2.27	1.80	3.25	0.00	2.18	0.40	2.93	0.00	3.23	2.07	3.04	0.96	9.75	1.43	9.58	11.66	1.87	1.88	3.43	6.37	12.49	2.09
6	0.00	0.00	0.00	0.00	0.00	0.19	0.28	0.00	1.95	6.38	1.54	0.46	0.56	0.45	0.00	0.81	4.31	0.00	0.65	2.98	7.40	0.00
7	0.30	0.00	0.00	0.00	0.29	1.13	0.47	0.86	1.18	1.25	2.12	1.93	2.62	17.81	8.88	7.33	5.38	13.35	9.94	12.32	4.54	6.31
8	2.30	0.78	8.41	7.43	9.39	16.90	16.20	26.39	6.33	16.72	23.62	17.36	5.10	6.56	9.70	6.62	1.61	9.71	1.77	0.00	6.79	18.47
9	2.57	1.36	0.81	1.99	0.55	0.15	0.44	0.00	0.44	0.00	0.00	2.16	0.22	0.00	0.00	0.43	2.61	0.70	7.47	2.21	0.35	1.96
N[b]	*198*	*213*	229	*280*	343	*378*	416	*426*	*438*	450	*454*	*459*	463	*467*	*471*	*474*	*478*	*482*	*486*	490	*495*	*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 represent estimates based on population growth rates. Other numbers are census estimates; 2003–2004 population estimate assumes 1% herd growth rate.

Table 7 Annual mortality rate and binomial confidence intervals for Western Arctic caribou herd cows collared with conventional or lightweight satellite radio collars[a], 1984–1985 through 2004–2005 collar years (1 Oct–30 Sep)

Collar year	Sample size	Nr died	Mortality rate[b] (%)	Binomial Confidence Level		
				80%	90%	95%
1984–1985	29	4	14	6–26	5–29	4–32
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	15	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	100	11	11	7–16	6–18	6–19
2004–2005	115	18	16	11–21	10–22	10–24

[a] Sample size = total 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 8 Annual harvests of Western Arctic herd caribou by game management unit and hunter residence ("%" is percent of total annual harvest)

		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 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		
Reg.	GMU	Succ.	Unsucc.	Total	Bulls	Cows	Total
1998–99	21	2	5	7	2	0	2
	22	14	12	26	17	1	18
	23	340	100	440	511	51	562
	24	17	51	68	19	2	21
	26A	34	17	51	46	4	50
	Total	407	185	592	595	58	653
1999–00	21	1	2	3	2	0	2
	22	24	12	36	28	4	32
	23	279	160	439	391	21	412
	24	10	48	58	12	1	13
	26A	39	14	53	49	4	53
	Total	353	236	589	482	30	512
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

Table 10 Summary of community-based harvest assessments (conducted by ADF&G unless otherwise noted) for communities within the range of the Western Arctic caribou herd, 1985–2002; human population numbers in parentheses estimated during household interviews rather than by Department of Commerce and Economic Development.

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	276	74	ADF&G[b]
	Golovin	1989	169	40	ADF&G[b]
	Golovin	2001	146	94	ADF&G[b]
	Koyuk	1998	277	263	ADF&G[b]
	Shaktoolik	1998	235	167	ADF&G[b]
	Shaktoolik	1999	216	125	ADF&G[b]
	Shismaref	1989	472	197	ADF&G[b]
	Shishmaref	1995	560	342	ADF&G[b]
	Shishmaref	2000	562	286	ADF&G[b]
	Wales	1993	152	4	ADF&G[b]
	Wales	2000	152	0	ADF&G[b]

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
	Elim	1999	306	227	ADF&G[b]
	White Mountain	1999	197	93	ADF&G[b]
23					
	Deering	1994	147	142	ADF&G[b]
	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]
	Shungnak	1998	245	561	ADF&G[b]
	Shungnak	2002	249		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		ADF&G[b]
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
	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]

Unit	Community	Survey Year	Human Population[a]	Number of WAH Caribou Harvested	Reference
	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
	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)
[b] Alaska Department of Fish and Game Community Profile Database

Table 11 Percent positive results and sample sizes (in parentheses) for selected pathogens and haptoglobin levels from serology analyses of the Western Arctic caribou herd, 1962–2003 (Note: percentages reflect levels of exposure to pathogens rather than incidence of actual infection)

	IBR[a]		BVD[b]		PI3[c]		RSV[d]		EHD[e]		BT[f]		Lepto.[g]		Bruc.[h]		Hapto.[i]	
Year	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)	%	(*n*)
1962															30	(56)		
1963															19	(74)		
1964															14	(37)		
1965															12	(149)		
1975	18	(11)	18	(11)	0	(12)		(40)					0	(9)	14	(14)		
1981	0	(20)	0	(19)	0	(20)		(55)	0	(20)	0	(20)	0	(19)	39	(23)		
1986	5	(40)	3	(40)	24	(41)	0	(63)	2	(41)	0	(41)	0	(41)	19	(37)		
1992	5	(59)	3	(59)	22	(58)	0	(60)	0	(59)	0	(59)	3	(59)	4	(52)	0	(14)
1993	2	(63)	8		8	(63)	0	(44)	5	(63)	0	(63)	5	(63)	12	(51)	4	(25)
1994	0	(61)	5	(61)	8	(61)	0	(71)	11	(61)	0	(61)	2	(61)	11	(47)	19	(27)
1995	2	(44)	18	(44)	2	(44)	0	(75)	0	(44)	0	(44)	0	(44)	12	(34)	5	(19)
1996	6	(71)	18	(71)	11	(66)	7	(112)	0	(71)			1	(70)	3	(76)	1	(73)
1997	0	(75)	15	(75)	16	(73)	1	(52)	0	(71)			0	(75)	0	(76)	11	(62)
1998	4	(112)	21	(11)	7	(111)	8	(72)	0	(104)			15	(112)	7	(113)	16	(112)
1999	6	(70)	14	(64)	4	(52)	0	(72)	0	(74)	6	(72)	12	(77)	5	(77)	10	(77)
2000	0	(116)	10	(11)	4	(70)	0				0	(116)			6	(115)	10	(116)
2001															2	(85)	0	(83)
2002															1	(92)	3	(92)
2003															6	(107)	5	(108)

[a]IBR = Infectious Bovine Rhinotracheitis
[b]BVD = Bovine Viral Diarrhea
[c]PI3 = Parainfluenza type 3
[d]RSV = Respiratory Synctial Virus
[e]EHD = Epizootic Hemorrhagic Disease
[f]BT = Bluetongue
[g]Leptospirosis = *Leptospira* spp.
[h]Brucellosis = *Brucella suis* type 4
[i]Haptoglobin level

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

LOCATION

GAME MANAGEMENT UNIT: 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 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 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. A variety of factors affect PCH management, including board recommendations, biological studies, and congressional actions regarding the potential opening of ANWR to petroleum development.

The PCH remained more stable than other Alaskan 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

Prior to the early 1970s, the PCH was a low priority for management and research because of its remote location and the small number of people who harvested PCH caribou. However, increasing pressure for oil development in northeast Alaska and growing international interest in the herd resulted in a higher management priority and heightened attention from biologists (Garner and Reynolds 1986; Griffith et al. 2002).

MANAGEMENT GOALS

The following goals, proposed by the International Porcupine Caribou Board (International Porcupine Caribou Board 1998:Appendix 1), were used to guide management activities during recent years.

- 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

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 methods described in previous reports (Davis et al. 1979; Valkenburg et al. 1985; Whitten 1993*a*). The most recent census was conducted on 3 July 2001. At that time the PCH was loosely aggregated on the Arctic coastal plain between the Kongakut and Jago Rivers, with most of the herd located near the Aichilik River. Movements, productivity, mortality, and seasonal distribution of the herd were also monitored, primarily through periodic relocation of radiocollared caribou (Fancy and Whitten 1991; Whitten 1993*b*, 1995*a*). Calf

production and survival were assessed by monitoring radiocollared cows in June (Whitten et al. 1992). In addition, personnel from YDOE conducted composition counts on the PCH winter range in March of each year.

Harvest tickets submitted by nonlocal hunters (nonresidents and Alaskans residing outside Units 25, 26B and 26C) provided most harvest data for the PCH in Alaska. ADF&G Division of Subsistence gathered additional data on harvest by local hunters through field interviews. Canadian harvest and composition data were obtained from YDOE. Harvest data were summarized by regulatory year (RY), which begins 1 July and ends 30 June (e.g., RY02 = 1 Jul 2002 through 30 Jun 2003).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Personnel from ADF&G, U.S. Fish and Wildlife Service (FWS), YDOE, and Canadian Wildlife Service counted 123,052 caribou in aerial photographs taken on 3 July 2001 (Table 1). During the most recent previous survey in July 1998, we estimated the herd at 129,000 caribou. The highest population ever recorded was 178,000 in 1989. These results indicate the herd declined by 3–4% per year from 1989 to 1998 and 1.5% per year from 1998 to 2001. Although these censuses may have slightly underestimated the population, all censuses used similar methods and it is unlikely that census errors account for the decline that has occurred since 1989.

A photocensus was planned for summer 2003. However, despite warm weather in June 2003, insect activity was very low. As a result, the PCH did not form the large aggregations necessary for the census, and the survey was postponed. On 23 June 2004, the PCH seemed to be forming the aggregations needed for a census. However, beginning on 24 June, fog covered most of the coastal plain south to the Brooks Range, where it met with smoke from Interior wildfires. The PCH then dispersed south and east into the mountains, and the census could not be conducted.

Population Composition

We have not estimated composition of postcalving groups since 1992, and the last fall composition count was done in 1980 (Table 2). The survey of radiocollared cows in late June 2003 found 69 calves:100 cows (Table 3). This ratio was not estimated in 2004 because of dense smoke from extensive wildfires that precluded survey flights in late June. March composition surveys by the YDOE found 38and 33 calves:100 cows, respectively, for the 2002 and 2003 cohorts (Table 3; D. Cooley, Yukon Department of Environment, Yukon Territory, personal communication). Composition surveys from different months are not directly comparable. The June survey included only mature, radiocollared cows, which were not representative of the entire herd. Although the March surveys were not limited to radiocollared caribou, only a small portion of the herd was classified.

Reproduction and Calf Survival

In spring 2003, snow had largely disappeared from most of the PCH migration route by late May, and many parturient caribou had reached the coastal plain of northern Yukon by 27 May. However, much of the Alaskan coastal plain remained covered by large patches of snow on 1 June, and most calving activity occurred in relatively snow-free areas along the southern edge of the coastal plain and in neighboring uplands. Calving began around 27 May (a radiocollared cow was observed with a calf during the initial reconnaissance flight on this date) and probably peaked around 1 June.

During 1–4 June 2003, most collared caribou cows were located along the coastal plain, extending from near the Hulahula River eastward across the Canadian border to the Babbage River. The largest concentration of caribou was in the uplands between the Jago and Kongakut Rivers. Seventy-nine radiocollared cows were observed in early June, including 9 yearling caribou collared in March 2003. Of the 70 radiocollared adult cows, 61 (87%) were judged to be parturient (pregnant or had given birth). Forty caribou were observed with calves, 21 were judged to be pregnant or to have produced and lost a calf (based on presence of hard antlers and enlarged udders), and 9 were judged not parturient (no hard antlers and udders not distended). During the peak calving period in early June, 92% of the radiocollared parturient cows were inside the Arctic National Wildlife Refuge (ANWR), and 36% of these were in the area of the coastal plain under consideration for petroleum development ("1002 area").

Sixty-seven radiocollared adult cows were observed during the postcalving survey on 24–25 June 2003. Most of the caribou had moved eastward and many were in the northern foothills of the British Mountains of northern Yukon. Two caribou judged to be parturient and one judged nonparturient in early June were not located in late June. Thirty-four (85%) of 40 calves observed in early June survived until late June. Including 12 calves born between 4–24 June, 46 adult cows (69%) were accompanied by calves in late June. Parturition rate and postcalving survival of calves were identical to rates from 2002, but late June calf:cow ratio increased and was the largest since 1999 (Table 3). This suggests that perinatal mortality was less in 2003 than in 2002.

Similarly, by late May 2004, snow had largely disappeared from most of the PCH migration route. However, the coastal plain in northeastern Alaska between the Aichilik River and the Canadian border was snow-covered on 1 June, and this evidently prevented most of the herd from entering Alaska at that time. Consequently, most calving occurred in relatively snow-free areas of the coastal plain and northern foothills east of the Canadian border. Some caribou that wintered in Alaska migrated north through the Brooks Range along the Kongakut River, and these caribou calved along the southern edge of the coastal plain in the uplands near the Jago River. Calving probably peaked around 3–4 June. Seventy-four radiocollared adult cows were observed in early June 2004, as well as two 2-year-old and 1 yearling caribou. Sixty-one adult cows (82%) were judged to be parturient, but all 3 younger cows were barren. Forty-six caribou were observed with calves, 15 were judged to be pregnant or to have produced and lost a calf, and 13 were judged nonparturient. During the peak calving period, 41% of the parturient cows were in ANWR and 25% were in the 1002 area. All collared cows that were within the 1002 area and 93% of cows in Alaska in early June were

parturient, whereas parturition rate for adult cows still in Yukon was 78%. On 23 June, 83 radiocollared cows and 8 collared bulls were located. Most of the caribou had moved into northeastern Alaska and had aggregated in large groups that prevented us from determining which cows were accompanied by calves. Judging by movements of 14 caribou equipped with satellite collars, most of the Porcupine herd subsequently moved southward into the Brooks Range and then eastward into northern Yukon during late June and early July. Few caribou from the PCH remained in Alaska after early July.

Distribution and Movements

Information on movements and distribution of the PCH has been 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).

During summer 2002 and 2003, the PCH began moving off the calving grounds in northeastern Alaska approximately 25 June, and most of the herd had moved eastward along the coastal plain into northern Yukon by 1 July. From there, the herd split apart and caribou moved south into the British Mountains or east into the Richardson Mountains. In 2002 most of the herd remained in Canada in late summer, fall, and winter. However, in 2003 approximately half the herd moved westward into Alaska in September and October and wintered in the vicinity of Arctic Village.

During winter 2002–2003, most of the PCH wintered in the Ogilve and Hart River basins and nearby mountains northeast of Dawson, Yukon. Snow cover in this area was moderate or light (Yukon Department of Environment, unpublished data). Caribou began moving toward the calving grounds in early May. Caribou migrated generally northward to the British Mountains, then followed the Babbage River north to the edge of the Arctic coastal plain, then moved westward into Alaska.

During winter 2003–2004, the PCH was split into 2 large groups, one of which wintered in the Ogilve and Hart River basins and nearby mountains northeast of Dawson, Yukon, while the other wintered in the vicinity of Arctic Village, Alaska. Snow cover in the Yukon area was moderately deep (YDOE, unpublished data), whereas in Alaska there was relatively little snow and many areas were windblown. Caribou from both areas began moving toward the calving grounds in early May. Most caribou migrated generally north or northeast to the British Mountains, then followed the Babbage River north to the edge of the Arctic coastal plain, then moved west toward Alaska.

MORTALITY

Harvest

Season and Bag Limit. The state of Alaska hunting season for all hunters during RY02–RY03 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 nonresidents was 5 caribou. The bag limit for all Alaska residents was 10 caribou.

Alaska Board of Game Actions and Emergency Orders. The Alaska Board of Game took no regulatory action regarding the PCH during RY02–RY03.

Hunter Harvest. We do not have an estimated total harvest for the PCH because harvest data from northern Yukon were not available for RY99–RY04. Harvest by local and nonlocal residents in Alaska was reported differently. Nonlocal hunters used statewide caribou harvest ticket report cards. This harvest was 76 in RY02 and 94 in RY03 (Table 4). Most harvest by nonlocal hunters occurred in Unit 25A (Table 5). Most nonlocal hunters were Alaska residents, and the majority of the caribou they harvested were bulls.

Reporting of harvest by hunters living north of the Yukon River was not required after 1989. Prior to 1989, most local residents did not report, even though it was required. Therefore, 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. Caribou were available to Kaktovik residents primarily in early summer during this report period. Caribou were briefly available to most villages south of the Brooks Range during late summer and fall. In winter 2003–2004, approximately half of the PCH wintered near Arctic Village, where they were easily accessible to local hunters. Consequently, the unreported harvest likely was higher than in most other years. Estimated harvests by local residents in Alaska were 300 and 500 caribou during RY02 and RY03, respectively.

Harvest in Canada probably continued to be relatively high because caribou often move through the Old Crow area several times each year. During fall and winter of RY02 and RY03, many caribou traveled south along the Dempster Highway, where they were accessible to residents of Aklavik, Fort McPherson, and other road-connected communities.

Hunter Success. Nonlocal hunter effort and success varied among game management units depending on herd distribution; however, in general, success rates were high (≥49%; Table 5). Word travels quickly when PCH caribou are scarce in Alaska, and few hunters travel to the PCH range. Because of their wide-ranging movements and the difficulty and expense of traveling to the area, the PCH has never been subject to a substantial harvest by nonlocal hunters.

In Alaska, local hunter success during this report period was generally low. Caribou left the Kaktovik area in both 2002 and 2003 soon after sea ice receded in late June, so there was little time during which local residents were able to travel to traditional hunting areas by boat. Caribou were available near Arctic Village for only a few weeks in late summer 2002, but approximately half the herd wintered in this area in RY03. Hunters from other Gwichin communities took small numbers of caribou along the Porcupine River near the Alaska–Yukon border in fall.

Harvest Chronology. Nearly all nonlocal harvest of the PCH in Alaska occurs during August and early September. Caribou were available in winter 2003–2004 near Arctic Village in Unit 25A, but there was little or no harvest by nonlocal hunters at that time. Local harvest chronology depends on availability of caribou near villages, and harvest occurs whenever caribou are present. However, caribou may be present but inaccessible at Kaktovik in June because traveling conditions are poor.

Transport Methods. Traditionally, nonlocal hunters fly into the PCH range, and a few travel by boat up the Porcupine River. Local residents use boats or ATVs in summer and snowmachines in winter.

HABITAT

Assessment

Population density of the PCH reached approximately 1.0 caribou/mi^2 (0.4/km^2) in the late 1980s. Studies on the calving ground 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. Preserving or protecting only portions of the calving area may not adequately protect the herd.

Enhancement

No habitat enhancement programs are underway or planned on the PCH's range. Much of the herd's range within Alaska is designated wilderness, and the northern portion of Yukon, Canada is a national park. Most of the area is classified as "limited" for fire suppression, and a natural fire cycle generally prevails.

CONCLUSIONS AND RECOMMENDATIONS

Although the actual population was likely higher than estimated, the 1998 and 2001 population estimates probably did not meet our management objective of 135,000 animals. However, the herd is probably still above levels observed in the 1970s when it numbered 102,000–110,000.

The most likely cause of the initial decline in numbers following the 1989 census was reduced calf production or survival during 1991–1993 due to adverse weather, as reflected in low March calf:cow ratios. Calf production (measured as a proportion of adult cows) from 1994 through 1999 was good, declined dramatically in 2000 and 2001, then increased in 2002 and 2003 (Table 3). Population modeling indicates the decline should have ended by 1998, as relatively large cohorts became adults. The continuing population decline indicates that adult survival may also have declined during the 1990s, perhaps due to increased predation or harvest (Arthur et al. 2003). Although no change in management strategy is needed at this time, the population should be monitored closely during the next 2–3 years. A continuing decline could make it necessary to reduce harvest of females.

The PCH was lightly hunted in Alaska, and harvest probably played a relatively small role in recent population changes. However, existing harvest levels will have a greater influence on population dynamics if the herd continues to decline. The generally high productivity, survival, and good physiological condition of caribou in the herd probably reflect adequate forage quality and quantity, as well as generally mild climatic conditions. If mild weather continues, the herd may increase.

ADF&G is cooperating with U.S. Geological Survey/Biological Resources Division, FWS, and Canadian government agencies to assess the importance of the ANWR coastal plain to the PCH. ADF&G previously identified a portion of the ANWR coastal plain between the Hulahula and Aichilik Rivers as especially important to calving and postcalving caribou and recommended this area for special consideration in any plans to develop ANWR. However, more recent studies 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). 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, 1961–2004

Year	Population estimate[a]	Type of estimate
1961	110,000	Calving ground census[b]
1972	99,959	APDCE[c]
1977	105,000	APDCE
1979	105,683	Modified APDCE
1982	125,174	Radiocensus[d]
1983	135,284	Radiocensus
1987	165,000	Radiocensus
1989	178,000	Radiocensus
1992	160,000	Radiocensus
1994	152,000	Radiocensus
1998	129,000	Radiocensus
2001	123,000	Radiocensus
2002–2004[e]		

[a] All estimates include calves except for the 1961 estimate.
[b] Data presented by R.O. Skoog at the 1962 Alaska Science Conference.
[c] Aerial photo-direct count extrapolation (Davis et al. 1979).
[d] Valkenburg et al. 1985.
[e] No estimates.

TABLE 2 Porcupine caribou herd historical postcalving composition counts, 1971–1992[a]

Approximate survey date	Bulls:100 Cows[b]	Calves:100 Cows	Percent calves	Percent cows	Percent yrlgs	Percent small bulls (% of bulls)	Percent large bulls (% of bulls)	Percent bulls	Composition sample size
7/71	24	38	21	56	10			13	29,197
7/72	23	49	26	53	9			12	11,721
7/73	16	47	27	58	6			9	19,101
7/74	9	67	37	55	3			5	14,127
7/75	23	52	27	52	9			12	18,814
7/76	5	58	32	55	10			3	13,762
7/77	7	39	24	61	11			4	25,520
7/78	30	68	32	47	7			14	18,669
7/79	15	55	30	55	7			8	19,154
7/80	59	66	26	39	11			23	9,046
7/82[c]	95	43	15	36	15		46	34	19,718
7/83	9	73	38	52	5	61	39	5	2,583
7/86[c]	57	52	22	42	12			24	19,499
7/87[c]	72	62	24	38	10	49	51	28	33,044
7/88	28	54	27	50	10	57	43	14	6,420
7/89	17	46	25	55	11	77	23	9	23,242
7/90[d]									
7/91	36	46	28	46	10			17	16,060
7/92	27	55	27	49	10	62	38	13	18,217

[a] Beginning in 1993 composition data were obtained from observations of radiocollared cows (see Table 3).

[b] These figures do not represent overall herd composition of bulls. Accurate bull:cow ratios are usually obtainable only during or prior to the rut in Oct.

[c] Only these surveys sampled all portions of the herd, including bull groups.

[d] No counts completed.

TABLE 3 Porcupine caribou herd demographic data, 1987–2004

Birth year	Early June calving surveys: Cows observed[a]	Early June calving surveys: Parturition rate	Late June Calves:100 Cows[b]	March Calves:100 Cows[c]	Population estimate
1987	51	0.78	55		165,000
1988	91	0.84	55		
1989	74	0.78	58	43	178,000
1990	74	0.82	74		
1991	77	0.74	61	22	
1992	78	0.86	49	33	160,000
1993	63	0.81	45	32	
1994	98	0.91	70	40	152,000
1995	95	0.69	59	41	
1996	74	0.89	72	46	
1997	48	0.75	58	38	
1998	58	0.83	68	27	129,000
1999	39	0.84	70	56	
2000	44	0.73	44	28	
2001	70	0.84	51	31	123,000
2002	68	0.87	56	38	
2003	70	0.87	69	33	
2004	74	0.82			

[a] Number of radiocollared cows observed in May and June.
[b] Includes only radiocollared adult cows ≥3 years old.
[c] As of Mar of the year following birth of each cohort. Includes all cows >1 year old.

TABLE 4 Porcupine caribou herd harvest, regulatory years 1984–1985 through 2003–2004

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	2874–2904	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	90	4	0	94	500	–[a]		

[a] Canadian data unavailable.

TABLE 5 Porcupine caribou herd nonlocal[a] and nonresident hunter success, regulatory years 1991–1992 through 2003–2004

Regulatory year/ Hunters	Unit				Total Units 25 and 26C
	25A	25B	25D	26C	
1991–1992					
Total hunters	62	8	2	22	94
Successful	43	1	0	7	51
% Successful	69	13	0	32	54
1992–1993					
Total hunters	67	23	0	6	96
Successful	48	11	0	4	63
% Successful	72	48	0	67	66
1993–1994					
Total hunters	45	9	1	28	83
Successful	33	1	1	19	54
% Successful	73	11	100	68	65
1994–1995					
Total hunters	49	13	2	14	78
Successful	36	2	0	8	46
% Successful	73	15	0	57	58
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	146	6	125
Successful	55	14	5	3	74
% Successful	69	61	3	50	59

Table 5 continued

Regulatory year/ Hunters	Unit 25A	25B	25D	26C	Total Units 25 and 26C
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	94	28	14	19	155
Successful	63	18	0	13	94
% Successful	66	64	0	68	61

[a] Nonlocal includes Alaskans residing outside Units 25, 26B, and 26C.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 (WMCH) was first discovered in the late 1970s, it numbered 100–200 caribou (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 ($\lambda = 1.14$).

The White Mountains National Recreation Area is managed by BLM and encompasses most of the WMCH'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 distribution. The WMCH 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 Jul through 30 Jun; e.g., RY00 = 1 Jul 2000 through 30 Jun 2001). 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, which had season dates of 1 November through 31 March and no motorized restrictions. However, the area open to hunting the WMCH was reduced.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

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

MANAGEMENT OBJECTIVES

- Maintain a 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. The herd was surveyed on 25 June 2004 using a radiotelemetry-equipped Bellanca Scout fixed-wing aircraft. The minimum count was 642 caribou and the estimated population size was 733. All radio collars were accounted for during the survey.

In our attempt to maintain at least 20 radiocollared caribou in the WMCH to aid in estimation of herd dynamics, we deployed radio collars on 3 female caribou calves on 28 October 2002 and 6 female caribou calves on 9 October 2003, bringing the total number of active radio collars to approximately 15 by the end of this reporting period. Mean weight of calves

collared was 121 lb (range 99–135) in 2002 and 137 lb (range 130–141) in 2003. The only calf radiocollared in 2004 weighed 153 lb.

Population Composition

We conducted composition surveys on 24 September 2002 and 5 October 2003 using an R-22 helicopter and a Bellanca Scout aircraft. The biologist in the fixed-wing aircraft located the radiocollared caribou. Observers in the R-22 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. In general, we surveyed groups of caribou located mainly in the Lime Peak and Preacher Creek areas in 2002 and 2003. Survey conditions were good in 2002 and 2003 with clear or high overcast skies and mild winds. We classified 405 and 308 caribou in 2002 and 2003 respectively (Table 1).

MORTALITY

Harvest

We estimated harvest by using data from returned harvest tickets and registration permit report cards. For RY02 and RY03, caribou harvested west of Preacher and American Creeks and north of the Steese Highway were considered WMCH 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 WMCH animals. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The June 2004 population estimate of 733 caribou was similar to the 2000 population estimate of 687–800 caribou. The WMCH population level could be considered stable during RY02 and RY03.

Population Composition

Fall calf:cow and bull:cow ratios in the WMCH have been variable (Table 1). However, productivity and early calf survival appeared sufficient (>25 calves:100 cows) to suggest herd growth in most years. Bull:cow ratios remained relatively high and met objectives. Variation in bull:cow ratios (23–62:100) for the WMCH probably reflected 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 Sep–6 Oct) yielded higher bull:cow ratios than surveys conducted later. Differences in composition among years may also be attributed to the

behavior of the WMCH. 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 WMCH animals were located infrequently; therefore, data concerning their movements are 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.

MORTALITY

Harvest

Season and Bag Limit.

<table>
<tr><th></th><th>RY90–RY97</th><th>RY98–RY99</th><th>RY00–RY01</th><th>RY02–RY03</th></tr>
<tr><td>Fall general season[a]</td><td colspan="4">10 Aug–20 Sep</td></tr>
<tr><td>Hunt area</td><td colspan="2">Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.</td><td colspan="2">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.</td></tr>
<tr><td>Bag limit</td><td colspan="2">1 bull</td><td>1 caribou</td><td>1 bull</td></tr>
<tr><td>Motor vehicle restrictions</td><td colspan="4">None</td></tr>
<tr><td>Winter season[a]</td><td>Drawing; 1 Feb–31 Mar</td><td colspan="2">Registration; 1 Nov–31 Mar</td><td>Registration; 1 Dec–31 Mar</td></tr>
<tr><td>Hunt area</td><td colspan="2">Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.</td><td colspan="2">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.</td></tr>
<tr><td>Bag limit</td><td colspan="4">1 caribou</td></tr>
<tr><td>Motor vehicle restrictions</td><td colspan="2">Yes</td><td colspan="2">No</td></tr>
</table>

[a] Residents and nonresidents.

Alaska Board of Game Actions and Emergency Orders. No emergency orders were issued by the department during this reporting period.

At the March 2002 meeting, the board changed the fall general season bag limit back to 1 bull and changed the registration hunt (RC879) dates to 1 December–31 March, beginning in RY02. These changes provided consistent caribou hunting regulations along the Steese Highway. 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 51 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 during RY01–RY03. Due to these factors, the fall harvest declined to normal levels during RY01–RY03.

Permit Hunts. Participation was high and harvests were low for registration hunt RC879 (Table 3) in RY02; 313 permits were issued and 2 bull caribou were reported harvested. In RY03, 259 permits were issued, with a reported harvest of 1 bull 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 WMCH 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 RY01–RY03.

A high ratio of large bulls:100 cows is an indication of bull harvest below sustainable limits. The proportion of large bulls per hundred cows averaged 13 during RY92–RY01 (Table 1), and 9 during RY02–RY03. Based on reported harvest and population modeling, the lower large bull:100 cow ratio seen in RY02 and RY03 is likely a result of caribou distribution during composition surveys rather than overharvest. However, these data suggest the large bull segment of the WMCH should be monitored for a decreasing trend in years to come.

Hunter Residency and Success. The majority of WMCH caribou were harvested by resident hunters who are mostly local residents (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 WMCH. This tended to artificially reduce success rates for the WMCH hunts.

Harvest Chronology. From RY90 (when the winter seasons were opened) to RY03, 58–100% of the harvest occurred during the fall season (10 Aug–20 Sep). In RY02 and RY03, 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 RY02 and RY03 was 3- or 4-wheelers, which accounted for 83% 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 number is stable, and the fall composition counts indicated a bull:cow ratio of 35:100.

As the FCH harvest is liberalized, hunting pressure on the WMCH seems to have decreased. 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 decline.

Population data for the WMCH are generally limited to annual composition counts with an occasional census. To obtain a better understanding of population dynamics of the WMCH 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 contribute to meetings about development of BLM lands. This cooperation will help effect better management strategies for the WMCH.

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

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TABLE 1 White Mountains caribou herd fall composition counts and estimated population size, 1983–2004

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]–1000
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	733[c]

[a] Fixed-wing aircraft.
[b] Actual count of herd size.
[c] Summer 2004 photo census estimate.

TABLE 2 White Mountains caribou harvest during fall general season[a], regulatory years 1987–1988 through 2003–2004

Regulatory year	General season harvest			
	M	F	Unk	Total
1987–1988	6	0	0	6
1988–1989	12	0	0	12
1989–1990	14	0	0	14
1990–1991	17	0	1	18
1991–1992	19	0	0	19
1992–1993	15	0	0	15
1993–1994	21	0	0	21
1994–1995	18	0	0	18
1995–1996	10	0	0	10
1996–1997	17	0	0	17
1997–1998	25	0	0	25
1998–1999	13	0	0	13
1999–2000	26	0	0	26
2000–2001	30	20	1	51
2001–2002	15	8	0	23
2002–2003	11	0	1	12
2003–2004	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 2003–2004

Hunt	Regulatory year	Permits issued	Did not hunt (%)	Unsuccessful hunters (%)	Successful hunters (%)	Bulls	Cows	Unk	Harvest
DC877 & DC878	1990–1991	89	66 (74)	18 (86)	3 (14)	2	1	0	3
		100	88[a] (88)	12 (100)	0 (0)	0	0	0	0
		100	76 (76)	19 (86)	3 (14)	1	2	0	3
		150	120 (80)	26 (100)	0 (0)	0	0	0	0
		149	116 (78)	26 (90)	3 (10)	1	2	0	3
		137	98 (72)	37 (100)	0 (0)	0	0	0	0
		106	86 (81)	17 (100)	0 (0)	0	0	0	0
		67	46 (69)	20 (95)	1 (5)	1	0	0	1
RC877 & RC878	1998–1999[b]		25 (34)	49 (98)	1 (2)	0	1	0	1
1991–1992		119	28 (24)	91 (88)	13 (13)	3	10	0	13
1992–1993									
RC879	2000–2001 74	333	137 (41)	178 (95)	10 (5)	4	6	0	10
1993–1994		405	252 (62)	128 (88)	17 (12)	15	1	1	17
1994–1995		313	200 (64)	111 (98)	2 (2)	2	0	0	2
1995–1996		259	198 (76)	60 (98)	1 (2)	1	0	0	1
1996–1997									
1997–1998									

[a] Includes those that did not report.

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

1999–2000

2001–2002

2002–2003

2003–2004

TABLE 4 White Mountains caribou herd hunter residency and success during fall general seasons, regulatory years 2002–2003 and 2003–2004

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

[a] Residents of Units 20 and 25C.

TABLE 5 White Mountains caribou herd harvest[a] by transport method during fall general seasons, regulatory years 1988–1989 through 2003–2004

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

[a] Excludes winter permit hunts.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004

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 2500 caribou were harvested from the TCH during 1999–2000 (Carroll 2001) and 2766 in 2000–2001 (Carroll 2003).

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 but was unsuccessful due to weather conditions.

Spring short yearling and fall composition surveys were flown using a Piper PA 18 on 1 and 6 April 2003, 6 and 10 April 2004, 25 and 26 October 2002, and on 28 October 2004. 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 2–13 June 2003 and 3–12 June 2004. 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. For cows that were never seen with a calf, we recorded their location midway through the observation period as their location during calving. ArcView GIS was used to map locations of cows that calved successfully (were seen with a live calf) and those that did not calve successfully (were not seen with a live calf).

Through a cooperative effort with the North Slope Borough and BLM, we captured 14 caribou (11 females and 3 males) north of the Inigok landing strip on 8 and 9 September 2002 and attached 10 Platform Transmitter Terminal collars (PTT = satellite radiocollar transmitters) and 4 VHF radio collars. We also captured 26 caribou (6 males and 20 females) north and west of Teshekpuk Lake on 26–27 June 2003 and attached 20 PTT and 6 VHF radio collars. 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.

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. In addition to receiving caribou locations from ARGOS, 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 16.2% 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 recruitment between 1995 and 1999 (24%, 21%, 14%, 21%, respectively), 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 but were unsuccessful due to unfavorable weather conditions.

Population Composition

Calving. In 2003 calving surveys were flown on 2, 3, 4, 5, 6, 9, 11, and 13 June. We located 34 collared cows, and 23 of these had calves at heel, for a calf:cow ratio of 65 calves:100 cows (Table 2).

In 2004 surveys were flown on 3, 5, 6, 7, 8, 11, and 12 June. We located 36 collared cows, and 16 were seen with calves, for 44 calves:100 cows, which made it one of the lowest years for calving success (Table 2). The TCH was very scattered during the winter of 2003–2004, with approximately 1/3 of the herd traveling 250 miles east of their normal range and spending the winter in the Arctic National Wildlife Refuge (ANWR) and many others traveling south of the Brooks Range. The other 2 years of lowest calving success were 1987, when the herd made an unusually long migration to the south, and 2001, when unusually deep and persistent snow conditions hindered the spring migration to the calving area.

For the first time since we have been conducting calving surveys, collared TCH animals calved in the CAH calving area. Three collared TCH cows that spent the winter in ANWR were seen with calves east of the Sagavanirktok River; 2 calved between the Sagavanirktok and the Colville Rivers, and 3 calved in the normal calving area near Teshekpuk Lake (Figure 1).

Fall composition counts. Fall composition surveys were flown on 25 and 26 October 2002. We located 26 collared caribou, including 4 bulls, 8 cows without calves, and 14 cows with calves (36 calves:100 collared cows). We classified 3510 caribou in the vicinity of the collared animals and counted 723 calves, which computed to 21% calves, or 26 calves:100 adults (Table 3). Fall surveys were not flown in 2003 because of a mechanical breakdown in the survey plane.

Short yearling counts. Short yearling counts were flown 1 and 6 April 2003. We located 18 collared cows, 6 of which had short yearlings at heel (33 calves:100 collared cows). We also classified 2141 caribou in the areas surrounding the collared animals and counted 1705 adults and 436 short yearlings. This computes to 20% short yearlings or 26 short yearlings:100 adults (Table 3).

Because a substantial portion of the herd wintered in ANWR in 2003–2004, we flew surveys there and in their normal wintering area near Atqasuk and found that the percentage of calves surviving the winter was remarkably similar in the 2 areas. We flew short yearling counts in ANWR on 6 April 2004 and located 12 collared caribou—1 was a male, 4 were cows with calves, and 7 were cows without calves (36 short yearlings:100 collared cows). We also classified 1378 caribou in the areas surrounding the collared animals and counted 1127 adults and 251 short yearlings. This computes to 18% short yearlings or 22 short yearlings:100 adults. We flew short yearling surveys in the Atqasuk area on 10 April and located 16 collared caribou—3 were males, 5 were cows with calves, and 8 were cows without calves (39 short yearlings:100 collared cows). We also classified 1314 caribou in the areas surrounding the collared animals and counted 1090 adults and 224 short yearlings. This computes to 17% short yearlings or 21 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 the TCH was spread along the coast during the July insect season from the Teshekpuk Lake area to Barrow. Many caribou stayed in the Barrow area during the summer, providing ample hunting opportunities. During the late summer and fall, they gradually moved south and were scattered across the coastal plain. 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. During June most of the collared cows calved near Teshekpuk Lake, while the bulls stayed well south of the calving area.

In 2003–2004 most of the herd moved north of Teshekpuk Lake during the July insect season and gradually moved south during late summer. During late September and early October, most of the herd was south of Teshekpuk Lake. On 8 October the herd split, 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, and substantial numbers were near the Atqasuk area and in ANWR.

The segment of the TCH that traveled to ANWR began their eastward movement south of Nuiqsut and most of the oil field infrastructure. The first major development they encountered was the trans-Alaska pipeline (TAP) and Dalton Highway (Haul Road) on 16 October, which caused them to divert north a short distance to just outside the Prudhoe Bay complex. They stayed in that area until 20 October, when they moved east past the TAP and Dalton Highway and then along the Beaufort Sea coast to ANWR. Most of the Teshekpuk caribou in ANWR

wintered in the mountains, with some wintering on the coastal plain. Hundreds of caribou were seen on and near Barter Island, providing people from Kaktovik with a winter supply of caribou, in contrast to most years.

About half of the Teshekpuk caribou that wintered in ANWR began migrating west in mid April. Two of the satellite-collared caribou (along with thousands of other TCH animals) reached the TAP/Dalton Highway in different places on 19 April and both were stopped. They remained to the east of the TAP/Dalton Highway corridor, moving north and south until 29 April, when they crossed and moved on to the west. (Figure 3)

The rest of the Teshekpuk caribou that wintered in ANWR began migrating west in mid May. Most of these (including 3 satellite-collared caribou) were stopped by a combination of the TAP, Dalton Highway, and Sagavanirktok River, which was flooding. A substantial portion of these caribou (including 3 collared caribou) stayed east of TAP during the June calving period, while others (including 2 collared caribou) stayed in the area between the Colville and Sagavanirktok Rivers (Figure 1). These 3 satellite-collared caribou, along with thousands of TCH animals, spent the summer in the CAH area.

MORTALITY

Harvest

Season and Bag Limit. The hunting seasons and bag limits were the same for both regulatory years of the reporting period.

2002–2003 and 2003–2004 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	
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 4463 TCH caribou were harvested in

2002–2003 (Tables 4 and 5). This represents a 9.9% harvest of the herd. 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. We will gain more confidence in this estimate as more harvest monitoring projects are completed, and as we increase the 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).

Overall, mortality was high in 2002–2003 at 20%. Five of the mortalities were among bulls, giving them a mortality rate of 50%. Mortality rate among cows was 11%, which is on the low end of the range for most years.

The mortality rate for 2003–2004 was the highest ever at 25% and was high for both bulls (29%) and cows (25%). Much of the herd migrated long distances into unfamiliar territory. The highest previous mortality rate was in 1996–1997 (24%), when much of the herd migrated south of the Brooks Range. Reasons for increased mortality in years of extraordinarily long migrations may include higher stress from the long migration, increased hunter harvest, and increased risk of predation (Carroll 1999). Another reason could be that the cause of an unusual migration is unfavorable fall conditions, such as icing, which could also increase mortality.

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 critical for calving; the area to the north of the lake is critical 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 the 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). Trend data collected since the photocensus provide mixed results as to whether the population will increase or decline. Estimated recruitment in 2002–2003 (20%) and 2003–2004 (18%) was good. Estimated calving success was fairly high in 2003 (65%) but very low in 2004 (44%). Estimated mortality was high among collared males at 50% but low in

females at 11% in 2002–2003, and was the highest for any year that we have recorded in 2003–2004 at 25%. We will attempt a photocensus in 2005 to estimate the population trend.

During most years most Teshekpuk caribou winter on the coastal plain as they did during 2002–2003. However, during some years much of the herd makes an unexpected movement to an area that is quite distant from the normal wintering area, such as in 1996–97, when most of the herd migrated south of the Brooks Range, as far as the Seward Peninsula. During the fall and winter of 2003–2004 the herd became very widely scattered, with some of the herd traveling south of the Brooks Range, part moving west to a commonly used wintering area near Atqasuk, and about 1/3 of the herd making an unprecedented move of about 250 miles to the east and wintering in ANWR. It is difficult to explain the movement to such disparate areas, but the reason for the initial movement appeared to be bad icing conditions in the area south of Teshekpuk Lake during early October. Freezing rain on top of thawing and melting snow created a situation that would make it very difficult for caribou to feed, and they appeared to move away from it. The Teshekpuk caribou that moved east appeared to encounter unfavorable icing conditions until they reached ANWR area. According to U.S. Weather Service records, icing conditions were also worse than usual during 1996–97 and other years when the TCH made unusually extensive fall migratory movements, indicating that this may be at least part of the reason for these extensive movements.

The estimated mortality rate among collared cows in 2002–2003, when most the herd wintered on the coastal plain, was low at11%; but it was the highest ever recorded in 2003–2004 at 25%, when much of the herd migrated long distances into unfamiliar territory. The highest previous mortality rate was in 1996–1997 (24%), when most of the herd migrated south of the Brooks Range. Reasons for increased mortality in years following extraordinarily long migrations may include higher stress from the long migration, increased hunter harvest, and increased risk of predation (Carroll 1999). Another reason could be that the fall conditions, such as icing that prompt the extensive migration, could contribute to increased mortality.

The movements of the segment of the TCH that traveled to ANWR in 2003–2004 were affected by the TAP/Dalton Highway during both their fall eastward migration and their spring westward migration. During their eastward migration, they encountered the TAP/Dalton Highway corridor on 16 October and were diverted north to just outside the Prudhoe Bay complex. They remained in that area until 20 October when they crossed the TAP/Dalton Highway and moved east along the Beaufort Sea coast to ANWR. In mid April about half of the Teshekpuk caribou that wintered in ANWR began migrating west. On about 19 April, 2 of the satellite-collared caribou (along with thousands of other TCH animals) reached the TAP/Dalton Highway corridor in different places and both were stopped. They remained to the east of the pipeline and road until 29 April, when they crossed and moved on to the west. The rest of the Teshekpuk caribou that wintered in ANWR began migrating west in mid May. Most of these (including 3 satellite collared caribou) were stopped by a combination of the TAP, Dalton Highway, and the Sagavanirktok River, which was then flooding. A substantial portion of these caribou (including 3 collared caribou) stayed east of TAP during the June calving period, while others (including 4 collared caribou) stayed in the area between the Colville and Sagavanirktok Rivers. Most of these collared caribou, along with thousands of TCH animals, spent the summer in the CAH area.

The results of several harvest monitoring projects, human population numbers, and caribou distribution data were used to estimate that approximately 4463 TCH caribou were harvested in 2002–2003. 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 2002–2003. A harvest of 4463 caribou represents a 9.9% harvest of the herd, so the herd will need to maintain a fairly high recruitment rate to sustain this level of harvest in addition to other natural mortality. This 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 hand-held 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.

Radiotelemetry has been very useful in all aspects of monitoring the TCH, and satellite collars have revealed movements within the herd that were previously unknown. The radio collars 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 shown in 2003–2004, 250 miles east of the normal TCH range in ANWR. TCH bulls were collared for the first time in 2001, and 4 out of 7 of the satellite-collared bulls wintered in the CAH wintering area southeast of Anaktuvuk Pass. During 2002–2003, 4 of 6 collared bulls wintered in the Brooks Range mountains, but not as far east as the CAH wintering area. VHF collars have also been very useful, primarily in conducting censuses, composition surveys, and productivity studies.

The 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.

Because the TCH population remains high, we 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]	
1985	13,406[a]	N/A
1989	16,649[b]	
1993	27,686[b]	
1995	25,076[b]	
1999	28,627[b]	
2002	45,166[b]	[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 calving and post-calving composition counts, June–July, 1991–2004

	Calving survey[a]		Summer composition counts[b]			
Date	Calves:100 cows	bulls	Calves: 100 cows	Percent Calves	Percent cows	Composition sample size
1991		13	66	35	52	3673
1992		34	80	29	37	3047
1993		37	39	15	38	2959
1994	63					
1995	73	29	73	30	41	1987
1996	86					
1997	50	18	46	26	56	3771
1998	56	31	67	28	41	3302
1999	67					
2000	85	23	63	30	47	3921
2001	44					
2002	73					
2003	65					
2004	44					

Percent

7.1%
13.5%
-4.8%
3.4%
-6.2%

[a] Surveys conducted early to mid June
[b] Surveys conducted in July

Table 3 Spring and fall composition data for the Teshekpuk caribou herd, 1990–2004

Year	Adults	Short yearlings	Total	Short yearlings:100 adults	Percent short yearlings
1990(spring)	278	74	352	27	21
1991(spring)	532	168	700	31	24
1992(spring)	635	223	858	35	26
1993(spring)	1197	265	1462	22	18
1994(spring)	1281	205	1486	16	14
1995(spring)	1382	255	1637	18	16
1996(spring)	1787	575	2362	32	24
1996(fall)	733	191	924	26	21
1997(fall)	895	145	1040	16	14
1998(fall)	368	90	458	25	20
1999(spring)	1608	432	2040	26	21
2000(spring)	1591	394	1985	25	20
2001(spring)	1168	201	1369	17	15
2001(fall)	1295	163	1458	13	11
2002(spring)	2070	200	2270	10	9
2002(fall)	2787	723	3510	26	21
2003(spring)	1705	436	2141	26	20
2004(spring)					
ANWR*	1127	251	1378	22	18
Atqasuk*	1090	224	1314	21	17

* In 2004 a segment of the herd traveled to ANWR, and short yearling surveys were flown both there and near Atqasuk.

Table 4 Summary of community-based harvest assessments for communities within the range of the Teshekpuk Caribou Herd, 1985–2003.

Community	Survey year	Human population	Nr of caribou harvested	Reference for harvest information
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
Atqasuk	1994–1995	237	262	Hepa et al. 1997
Atqasuk	2002–2003	228	259	Pedersen 2005
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
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 2002–2003 regulatory year 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		259	60	155	2002–2003 Harvest Survey[a]
Barrow	4581		4935	70	3454	2002–2003 Harvest Survey[a]
Nuiqsut	433		364	60	218	2002–2003 Harvest Survey[a]
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					4463	

[a]The Estimated Total Community Harvest was derived from an ADF&G Subsistence Division harvest survey (Pedersen 2005)

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[b]

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

[b]Data from Brower et al. 1996, 1997 and Hepa et al. 1997.

Table 8 Annual mortality for radiocollared Teshekpuk Caribou, 1990–2004

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*	45	5	11%
2001–2002**	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%
Totals	473	75	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.

*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.

**Beginning in 2001–2002, males as well as females were collared

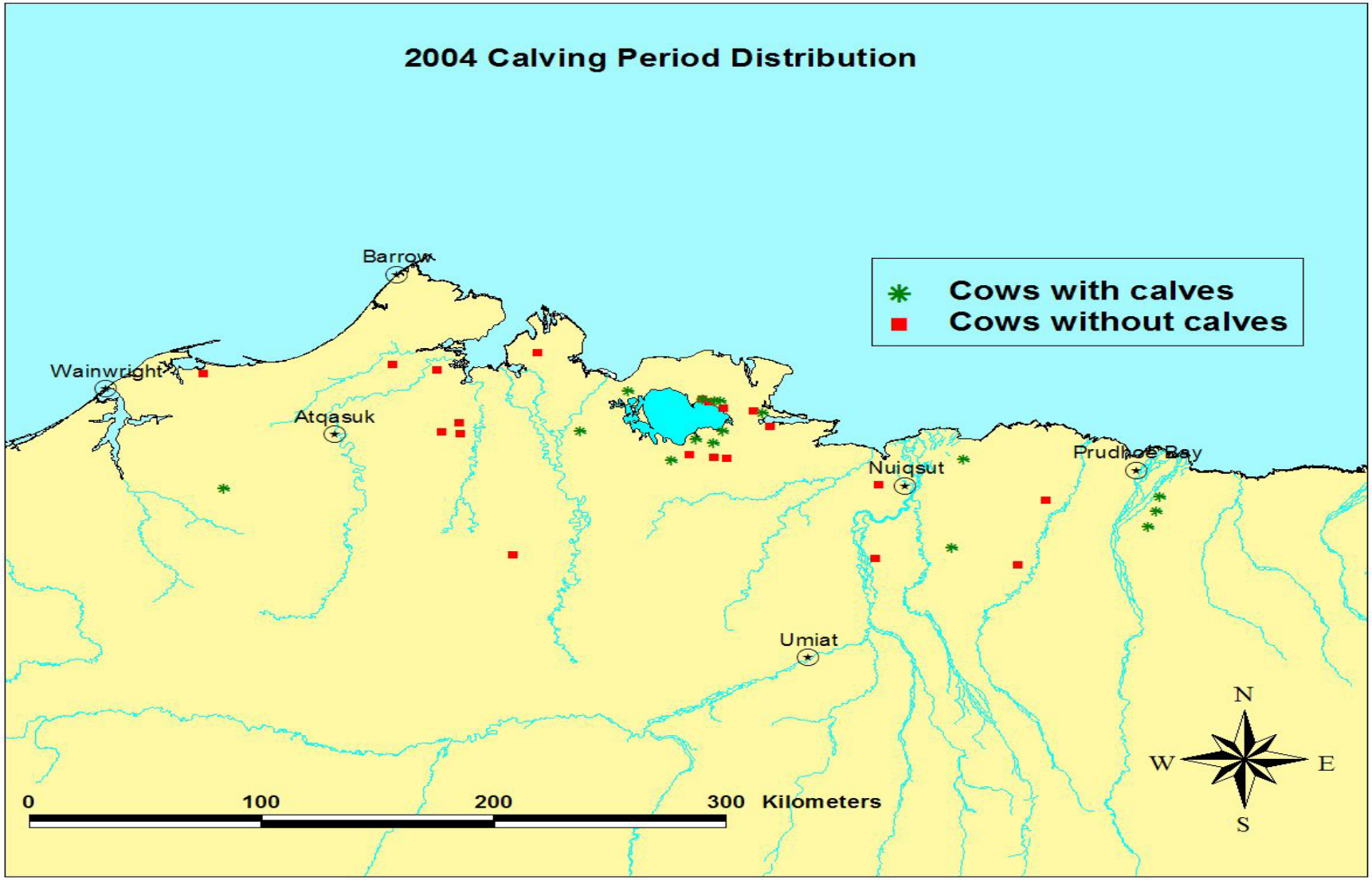

Figure 1 Calving locations of collared TCH cows during 1–16 June 2004. This is the first time collared TCH caribou have been observed calving in the Central Arctic Caribou Herd calving area.

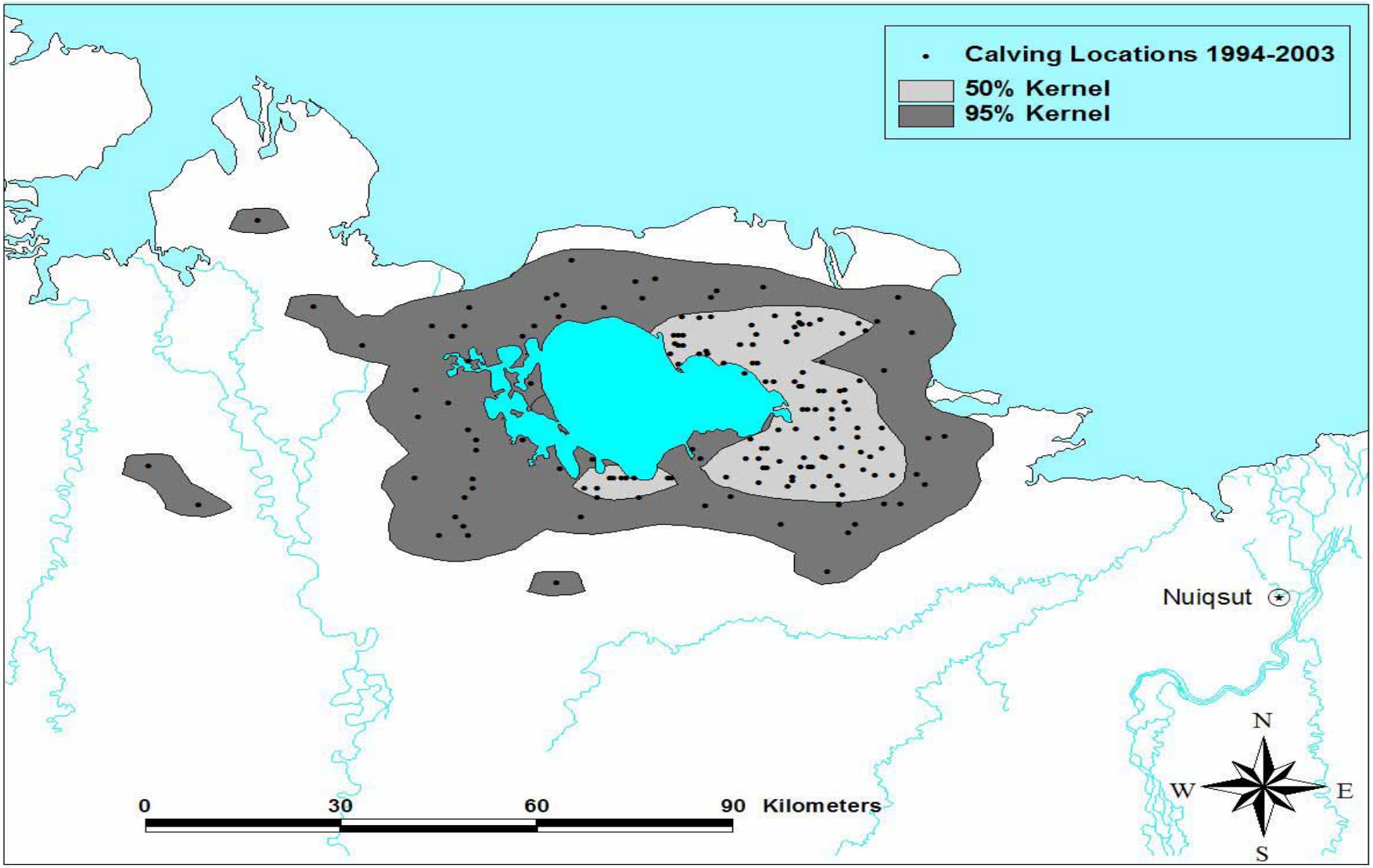

Figure 2 Calving locations of collared TCH cows, 1 June–16 June, 1994–2003, with fixed Kernel Probability of 50% and 95%.

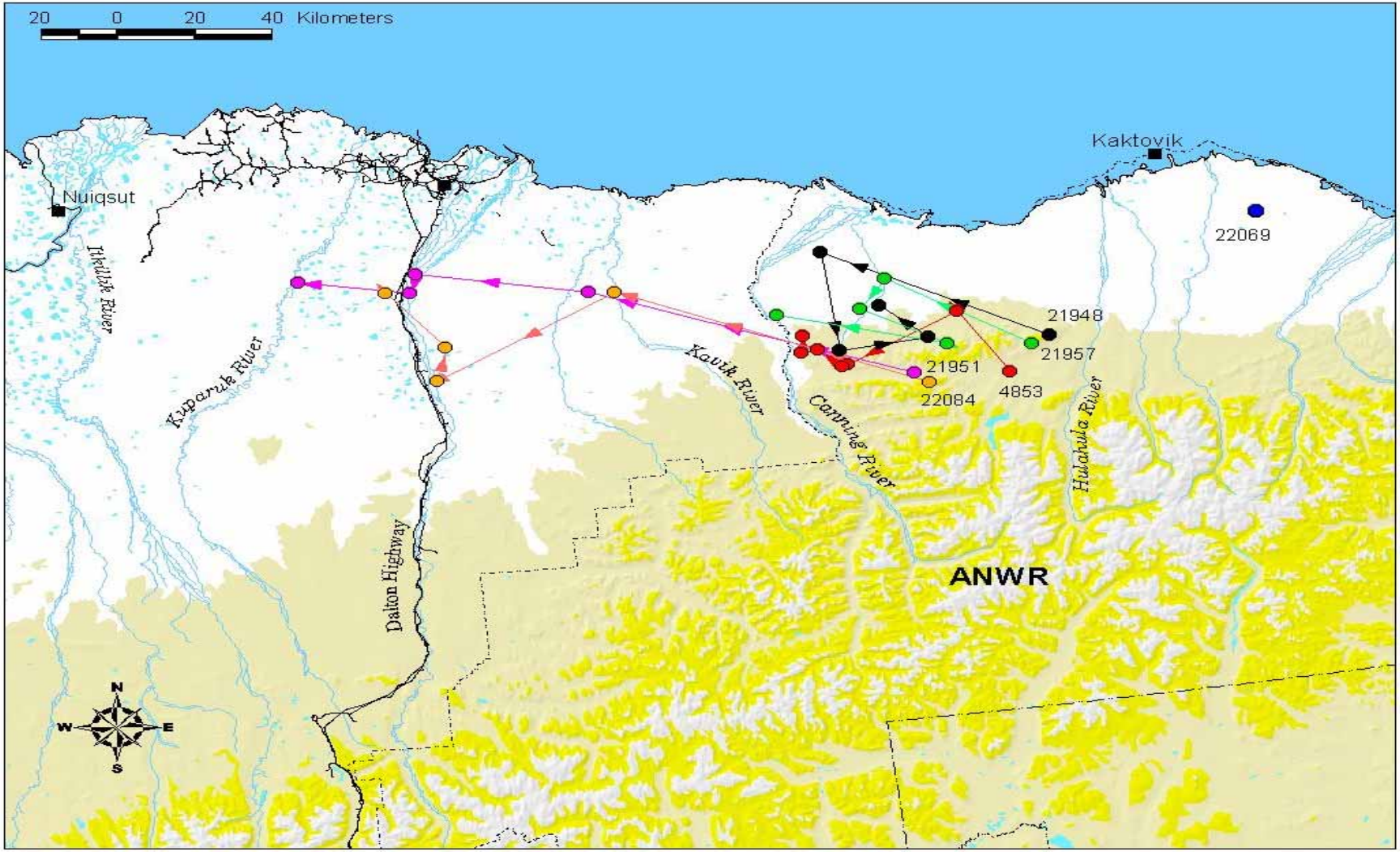

Figure 3 Routes of 2 satellite-collared TCH cows that wintered in ANWR as they traveled west during spring migration. They, along with thousands of other Teshekpuk caribou, were stopped by the trans-Alaska pipeline/Dalton Highway on 19 April 2004 and stayed east of the pipeline until 29 April 2004, when they crossed and continued to the west.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2002
To: 30 June 2004[a]

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. 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 has changed over time, probably as a result of regulatory modifications and changes in hunting pressure. In regulatory year (RY) 1986 (RY = 1 Jul through 30 Jun, e.g., RY86 = 1 Jul 1986 through 30 Jun 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 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

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

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 (WAH) 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 Central Arctic herd 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 2004).

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 meeting, "Intensive Management" population and harvest objectives were established for the CAH. The population objective 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 3)

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 Ziess RMK-A

9×9-inch aerial camera mounted in a DeHavilland Beaver aircraft. Caribou were counted directly from photographs.

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 Cameron (ADF&G, unpublished data) estimated that 80% of CAH cows maintain fidelity to these calving areas from year to year. These 2 calving areas may not be totally separate, but are nonetheless somewhat distinct. Because some overlap does occur, we arbitrarily chose the Sagavanirktok River as the line that separates Unit 26B West, where there is substantial oil exploration and development, from Unit 26B East, where little exploration and development has 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, and the target date was 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 corroboration with an ongoing research project (Arthur and Del Vecchio 2004). 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 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." 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 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 2004). We were unable to observe whether a cow was with a calf or not 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 in 2003 and 2004 due to budget constraints. 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/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, 1992, 1993, 1996, 1997, and 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 2003 or 2004. However, parturition rates and late June calf:cow ratios were good in all 3 years (see below); thus it is likely that the Central Arctic caribou herd continued to increase from an estimated 31,857 caribou in 2002 or was at least stable during 2003–2004. 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 increased substantially since 1997 when the herd was estimated at 19,730 caribou. Population modeling indicated this increase can 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 rates of radiocollared females ≥4 years old for all of Unit 26B in 2002, 2003, and 2004 were 87%, 96% and 89%, respectively, and have been high since 1998 (≥85%; Table 2). These high parturition rates contributed to the increase in population size observed in the 2000 and 2002 censuses (Tables 1 and 2). Parturition rates for 3-year-olds were high in 2002 (83%) and 2004 (87%), but were not estimated for 2003 because no 3-year-olds were collared. In general, parturition rates for 3-year-olds have been high since 1998 (≥75%, 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). We also observed parturition rates between Unit 26B West and Unit 26B East. Parturition rates in 2002, 2003, and 2004 were somewhat higher in Unit 26B East than in Unit 26B West, and we noted that this pattern was consistent during the past 5 years (2000–2004; Table 2).

Late June calf:cow ratios of radiocollared females ≥4 years old in all of Unit 26B in 2002, 2003, and 2004 were 79%, 77% and 79%, respectively, and have been high since 1997 (≥75%; Table 3). This indicated a consistently high early calf survival during the past 8 years, 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 3-year-olds in 2002 was 57% and was not estimated in 2003 because no 3-year-olds were collared. In 2004, late June calf:cow ratios were only estimated for GPS-collared cows that had radiocollared calves, of which none were 3 years old. During 1998–2003, variability in calf:cow ratios was higher for 3-year-olds than for the overall sample in the herd (33–60%, Table 5). This suggests that calves born to 3-year-olds tend to have lower survival rates, although our sample sizes were small (n = 4–12). We also observed calf:cow ratios between Unit 26B West and Unit 26B East. Similar to differences observed with parturition rates, late June calf:cow ratios in 2002, 2003, and 2004 were higher in Unit 26B East than in Unit 26B West. This pattern was consistent during the past 5 years (2000–2004; 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 is lower near the Sagavanirktok River than in areas farther east or west, there is not a 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. Furthermore, 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 in 2003 or 2004. 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). These high bull:cow ratios indicate that harvest has had little effect on sex ratios. Calf:cow ratios were high in 2000, 2001, and 2002 (>50:100), indicating that 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

Distribution of calving during 2002, 2003, and 2004 was similar among years and similar to years previous to 2002, except in 2001 when snowmelt and calving occurred later in June (Lenart 2003; Arthur and Del Vecchio 2004). During 2002–2004 the greatest concentration of calving in Unit 26B West occurred between the Conoco–Philips 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 with another concentration between the Shaviovik and Canning Rivers in 2003, and between the Sagavanirktok and the Shaviovik Rivers in 2004 (Arthur and Del Vecchio 2004).

Movements in 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 were concentrated along the coast during warm weather but moved inland on cool and windy days. No unusual summer movements were noted in 2002 and 2003. In July 2004 most of the GPS radiocollared caribou that had calved in Unit 26B West moved into Unit 26B East. CAH caribou were found as far east as the Hulahula River (S. Arthur, ADF&G, personal communication; ADF&G files). Other unusual movements have also been noted in the past. In late July 2001 an estimated 5000 Central Arctic caribou were found inland in the Fish Creek drainage in Unit 26A. Commonly, though, the CAH summer range extends from the Colville River to just east of the Canning River and from the coast inland to the foothills. 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 will sometimes remain on the coastal plain as far north as the White Hills and Franklin Bluffs until about mid October. 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 2003 no unusual movements were detected during September. However, the Teshekpuk caribou herd made a very unprecedented movement from Teshekpuk Lake area across the coastal plain in Unit 26B, continuing east into the Arctic National Wildlife Refuge (ANWR) and to Barter Island, spending the winter in that region. In 2004 the CAH caribou that had moved east during July 2004 migrated back in early September. Many crossed the Brooks Range and continued eastward and southward to the Coleen River.

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 2002 and 2003 no unusual movements were detected during the rut in October. 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.

In RY02 and RY03, approximately 80% of the herd wintered on the south side of the Brooks Range between the North Fork Chandalar and Wind Rivers. In RY04, approximately 60% of the herd wintered on the south side of the Brooks Range between the North Fork Chandalar and Wind Rivers, with another large concentration wintering farther east, just south of Arctic Village.

The caribou that wintered on the north side in RY02 and RY03 were found on the east side of the Dalton Highway, along the foothills in the Upper Sagavanirktok, Accomplishment Creek, and

Lupine drainages; some caribou were as far east as the Canning River. Almost all of the radiocollared caribou were located east of the Dalton Highway. Additionally, in RY02, many caribou were distributed across the coastal plain, west of the Dalton Highway, and approximately 2500–3500 caribou wintered along the Kuparuk River. We suspected that the caribou west of the Dalton Highway were a mixture of Teshekpuk, Western Arctic, and Central Arctic caribou, as some radio collars from each herd were found there. Winter distribution of the CAH during 2002–2004 was somewhat similar to what was observed during the late 1990s, except that it appears they are expanding their winter range. During the mid 1990s, many Central Arctic 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). March 2003 experienced heavy snows on the south side of the Brooks Range, and it appeared that the spring migration north was delayed.

Mixing with the Teshekpuk caribou herd frequently occurs in both summer and winter because both herds' ranges overlap along the Colville River. As mentioned previously, we suspected that during winter RY02, extensive overlap among the Teshekpuk, Central Arctic, and Western Arctic herds occurred along the Kuparuk River. In RY03 some mixing occurred when the TCH traveled to ANWR to 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 Western Arctic herd may have occurred during winter 2003–2004 when approximately one-third of the Western Arctic caribou herd 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 did not repeat itself in winter 2004–2005. During the early 1990s, we suspected some mixing with the WAH occurred during September on the north side of the Brooks Range when large groups of caribou (>5000) were observed.

It is unlikely that any mixing with the PCH occurred during summers 2002–2004. In RY03 a large concentration of PCH caribou wintered near Arctic Village, and some overlap with the CAH probably occurred. Indeed, 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 collared PCH caribou, and a hunter killed a Central Arctic radiocollared female near Arctic Village in January 2002. Additionally, one collared 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) was recorded as harvest for a different herd (e.g., PCH). In addition, parts of the Western Arctic herd 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–RY04).

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
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 and Success and Residency. During RY02, 877 hunters reported hunting caribou in the CAH range and 358 hunters reported harvesting 423 caribou. In RY03, 741 hunters reported hunting and 355 hunters reported harvesting 419 caribou. In RY04, 965 hunters reported hunting and 501 hunters reported harvesting 613 caribou. Reported harvest was considerably higher beginning in RY00 (Table 7). Number of hunters and harvest increased again in RY04, which may be related to caribou distribution and accessibility.

Hunter success has always been good for the Central Arctic Herd (≥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 their report cards; thus, the reported success rate after RY97 probably more closely reflects the actual success rates compared to years before RY97.

A small proportion of hunters were nonresidents (20%, 21%, and 21%) during RY02–RY04, and they took 26%, 25%, and 22% of the harvest, similar to previous years. Nonresident hunters were highly successful (58%, 63%, and 60%, respectively). Nonlocal resident hunters during the same period also had good success (41%, 49%, and 56%). 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 Central Arctic herd during periods when much of the harvest occurs.

Reported harvest of cows was low during RY02–RY04 (12–38), similar to previous years (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 23%, 33%, and 36% of the harvest in RY02, RY03, and RY04, respectively. The lower value in 2002 was probably related to distribution of caribou. In general, there has been a steady increase in the number of bowhunters using the DHCMA.

Harvest Chronology. During RY02–RY04, most reported harvest occurred in August (43–59%), similar to previous years (Table 8). The remaining harvest occurred primarily in September and then in October. In RY01 a substantial increase in the proportion of harvest occurred in October (25%). This was likely related to warmer weather persisting into October in fall 2001. A small number of caribou were taken in late winter and spring, primarily in March and April (1–5%).

Harvest by Nuiqsut residents occurs in July, August, and September and in March and April. A little over 50% of the harvest 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 RY02–RY04, the proportion of hunters who used highway vehicles ranged from 50 to 53%. This value was slightly lower than years previous to 2000; 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–RY04, the proportion of hunters who used boats increased to 16–28% compared with a range of 5–15% during RY92–RY01. This transport method competed with airplanes as the second most common transport method for successful hunters during RY02–RY04 (Table 9). 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). Grizzly bear numbers may have increased in the oil field, in part because of the availability of garbage associated with oil development (Murphy and Lawhead 2000), and predation by grizzly bears may have increased in recent years. 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 are probably more abundant than on the north side of the range and where snowfall is heavier. However, there have been no studies of predation rates on the CAH. During the 8 years from RY97 to RY04, we confirmed the following mortalities among cow caribou ≥ 1 year old with functioning radio collars:

Regulatory year	Number of mortalities	Number of radiocollars 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 61.5% in the Central Arctic caribou herd in 5 years (Tables 1, 2, and 3). Although we have not conducted a population estimate survey since 2002, the CAH experienced high parturition rates and late June calf:cow ratios in 2003 and 2004 and low adult mortality in RY03. This suggests that herd size probably increased or at least remained stable. Harvest increased beginning in RY00 but has 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 has 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 Conoco–Phillips Alaska, Inc. in developing mitigation measures. 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 is growing and harvest exceeds 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—was met because in 2002

population size was 31,857 caribou and in both RY02 and RY03, reported and estimated harvest combined exceeded 600 caribou. 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 is 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 in 2002—because the board established the North Slope Closed Area, which was closed to big game hunting for ¼ mile on either side of the highway in Unit 26B. However, in 2004 the board rescinded this regulation. Few conflicts between consumptive and nonconsumptive appeared to have arisen since the regulation was rescinded.

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TABLE 1 Central Arctic herd estimated population size, 1978–2002

	Population survey		
Year	Date	Method[a]	Estimated size
1978	Jul	STS	5000
1981	Jul	AC	8537
1983	Jul	APDCE	12,905
1991	18–20 Jun	GM	19,046[b]
1992	8–9 Jul	APDC	23,444
1995	13 Jul	APDC	18,100
1997	19–20 Jul	APDC	19,730
2000	21 Jul	APDC	27,128
2002	16 Jul	APDC	31,857

[a] STS = Systematic transect surveys; AC = Aerial count; APDCE = Aerial Photo Direct Count Extrapolation; GM = Gasaway Method; APDC = Aerial Photo Direct Count.
[b] Ninety-percent confidence interval was 14,677–23,414.

TABLE 2 Central Arctic herd caribou percent parturition of radiocollared females, 1994–2004

		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)	90 (10)	92 (24)
1999	5, 9 Jun	100 (14)	100 (10)	100 (24)
2000	6–7 Jun	89 (9)	100 (16)	96 (25)
2001	3–9 Jun	89 (19)	94 (16)	91 (35)
2002	4–7 Jun	83 (29)	92 (25)	87 (54)
2003	30 May–8 Jun	93 (28)	100 (26)	96 (54)
2004	31 May–11 Jun	86 (36)	93 (28)	89 (64)

[a] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River. Beginning in 2004, we captured unknown age adult females that were classified as "young," "medium," and "old." Females that were in the "medium" and "old" categories 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, 1994–2004

		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	50 (4)	75 (4)	63 (8)
1997	29–30 Jun	85 (13)	64 (11)	75 (24)
1998	29–30 Jun	79 (14)	85 (13)	81 (27)
1999	22–24 Jun	92 (12)	80 (10)	86 (22)
2000	17–19 Jun	79 (14)	72 (18)	75 (32)
2001	23–25 Jun	78 (18)	81 (16)	79 (34)
2002	23–25 Jun	75 (28)	83 (24)	79 (52)
2003	24–26 Jun	78 (27)	77 (26)	77 (53)
2004[b]	24 Jun	72 (25)	86 (14)	79 (39)

[a] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River. Beginning in 2004, we captured unknown age adult females that were classified as "young," "medium," and "old." Females that were in the "medium" and "old" categories 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, 1994–2004

Year	Date	2-year-olds (*n*)	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 (2)	29 (7)	100 (2)	67 (3)
1998	3–4 Jun	0 (6)	75 (4)	0 (1)	88 (8)	100 (3)
1999	5, 9 Jun	9 (11)	82 (11)	100 (2)	100 (1)	100 (17)
2000	6–7 Jun	0 (8)	80 (10)	100 (9)		94 (16)
2001	3–8 Jun	8 (13)	77 (13)	100 (10)	78 (9)	94 (16)
2002	4–7 Jun		83 (12)	75 (12)	100 (9)	100 (20)
2003	30 May–8 Jun	0 (8)		100 (12)	83 (12)	100 (24)
2004	31 May–11 Jun	0 (6)	83 (12)		83 (12)	93 (27)

TABLE 5 Central Arctic herd caribou known-age late June calf:cow ratios (calves:100 cows) of radiocollared females, 1994–2004

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)				64 (14)
1995	27–30 Jun	0 (6)	0 (3)			62 (8)
1996	15–16 Jun		71 (7)	50 (4)		83 (6)
1997	29 Jun		0 (1)	57 (7)	100 (3)	100 (3)
1998	29–30 Jun	<1 (7)	50 (4)	0 (1)	86 (7)	100 (5)
1999	22–24 Jun	<1 (11)	40 (10)	100 (2)	100 (1)	80 (15)
2000	17–18 Jun	0 (11)	60 (10)	82 (11)	0 (1)	75 (20)
2001	23–25 Jun	0 (3)	33 (12)	70 (10)	89 (9)	81 (16)
2002	23–25 Jun		57 (14)	75 (12)	100 (11)	81 (21)
2003	24–26 Jun			100 (12)	50 (12)	78 (23)
2004[a]	24 Jun				50 (2)	81 (16)

[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 2004–2005

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	571	38	4	613	(221)	965	52	200–250	813–863

[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 2004–2005[a]

Regulatory year	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 (3)	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 (5)	8 (2)	1 (<1)	1 (<1)	0 (0)	8 (2)	17 (5)	4	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	21 (3)	363 (59)	113 (18)	73 (12)	6 (1)	1 (<1)	0 (0)	0 (0)	17 (3)	16 (3)	3	613

[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 2004–2005[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	(5)	6	(2)	0	(0)	0	(0)	243	(64)	18	(5)	380
1993–1994	49	(15)	4	(1)	20	(6)	4	(1)	2		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	(9)	29	(8)	1	(<1)	0	(0)	1	(<1)	218	(60)	6	(2)	362
2000–2001	90	(18)	17	(17)	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	(50)	7	(2)	423
2003–2004	87	(21)	2	(<1)	97	(23)	3	(<1)	0	(0)	3	(<1)	222	(53)	5	(1)	419
2004–2005	101	(16)	6	(1)	172	(28)	0	(0)	1	(<1)	3	(<1)	326	(53)	4	(<1)	613

[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.

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