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

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

GAME MANAGEMENT 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 the Yukon and Northwest Territories in Canada. Most of the herd's 130,000-mi^2 range is remote, roadless wilderness. The PCH typically calves on the coastal plain of the Arctic National Wildlife Refuge (ANWR), which is also the most promising onshore petroleum prospect in the United States (Clough et al. 1987). Both industry and government have an interest in developing potential oil resources on the coastal plain. Therefore, various state and federal agencies and their Canadian counterparts are cooperating to carry out baseline ecological studies of the PCH. These studies are expected to provide the basis for mitigation of any adverse effects of petroleum development on caribou.

In 1987 the United States and Canada established the International Porcupine Caribou Board to coordinate management and research among government and user groups. The board includes a representative of ADF&G, representatives of the governments of the United States, Canada, Yukon and Northwest Territories, and members from 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., in press).

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 during June (Whitten et al. 1992). In addition, personnel from YDOE conducted composition counts on the PCH winter range during 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 this region of Alaska. The ADFG 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., RY00 = 1 Jul 2000 through 30 Jun 2001).

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Personnel from ADF&G, US 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.

Population Composition

We have not estimated composition of postcalving groups since 1992, and the last fall composition count was done in 1980 (Table 2). Surveys of radiocollared cows during late June 2001 and 2002 found 51 and 56 calves:100 cows, respectively (Table 3). March composition surveys by the YDOE found 28 and 31 calves:100 cows, respectively, for the 2000 and 2001 cohorts (Table 3; D Cooley, Yukon Department of Environment, Yukon Territory, personal communication). Composition surveys from different months are not directly comparable. The June surveys included only mature, radiocollared cows, and 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

Calf survival was relatively high in 1999 but declined in 2000 and 2001, probably because of unusually late snowmelt that delayed migration during those 2 years. As a result of the delay, most calves were born before the cows reached the calving grounds. Parturition rate and early calf survival were both very low during these years (Table 3). In spring 2002, weather was milder and most caribou reached the arctic coastal plain by the time calving occurred, and parturition and calf survival both were higher than during the 2 previous years.

On 1 June 2001, when calving probably began, most collared caribou cows were located in northern Yukon between the mouth of the Babbage River and Old Crow. Most caribou that initially were located south of the Babbage River continued to move northward during 1–5 June,

despite the presence of newborn calves. This required calves to cross the Porcupine River and several other major rivers soon after the ice broke up and the water was high. As of 11 June, 58 (83%) of 70 radiocollared cows were judged to be parturient (pregnant or had given birth). Forty-three cows were observed with calves, 15 were judged to be either pregnant or had produced and lost a calf (based on presence of hard antlers and enlarged udders), and 12 were determined to be not parturient (no hard antlers and udders not distended). The peak of calving appeared to occur between 5–8 June, several days later than usual but similar to 2000. During 26–28 June, 71 radiocollared cows were observed. Most cows were moving westward along the coastal plain of Canada and Alaska, and many had already entered Alaska. Additional tracking flights were conducted on 2–3 July in conjunction with a complete photocensus of the PCH. All radiocollared caribou were located on the Alaskan coastal plain or the foothills immediately south of the plain. Thirty-four calves (79%) observed in early June survived until late June, a lower survival rate than for 1993–2000. This estimate did not include calves that died before they could be observed, so it overestimates actual calf survival. Although data from previous years also include a similar bias, the bias probably was greater during 2000 and 2001 because of the adverse conditions during which calves were born (cows continuing to migrate through deep snow), which likely increased perinatal mortality of calves. Thirty-six adult cows (51%) were accompanied by calves during late June, including 2 with calves born between 11–26 June. This proportion was higher than during 2000 but still among the lowest recorded for the PCH (Table 3).

On 1 June 2002, most radiocollared caribou cows were located along the arctic coastal plain, extending from the Hulahula River in Alaska eastward across the Canadian border to the Babbage River. The largest concentration of caribou was between the Jago and Kongakut Rivers in Alaska. Most of the caribou that initially were located east of the Kongakut River continued to move westward during 1–7 June. Sixty-eight radiocollared cows were observed during early June. Of these, 59 (87%) were parturient (pregnant or had given birth). Forty-one of these were observed with calves, 11 were pregnant (based on presence of hard antlers and enlarged udders), 7 appeared to have produced and lost a calf between successive observations (2 were observed with placentas present but no calf; 5 had lost one or both antlers but had distended udders), and 9 were not parturient (no hard antlers and udders not distended). The peak of calving appeared to be around 5 June, several days later than normal but earlier than during 2000 or 2001. Forty-eight (81%) of 59 parturient cows had given birth by 7 June.

During 25–26 June, 77 radiocollared cows were observed, including 7 that had been located but not observed (due to adverse weather) during 1–7 June and 3 that had not been detected during previous flights. One barren caribou with a nonfunctional VHF collar was observed during 1–7 June but was not seen during 25–26 June. Thirty-five calves (85%) observed in early June survived until late June. Forty-three adult cows (56%) were accompanied by calves during late June, including 7 with calves born between 7–25 June and 1 that was not located during early June. The parturition rate and late June calf:cow ratio were greater than during 2000 and 2001 (Table 3). However, the proportion of cows accompanied by calves at the end of June was lower than during 1994–1999, suggesting that current levels of reproduction may not be sufficient to halt the decline in population that has occurred since 1989.

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 1997, 1998, and 2002 snowmelt and new plant growth occurred earlier than in some other years. Due to relatively light snow cover, caribou began their spring migration to the coastal plain earlier than in years with more snow, and most reached ANWR and the coastal plain by 1 June. In contrast, during 1999, 2000, and 2001, deep snow and cold weather delayed the spring migration, and prolonged the calving period. This was especially pronounced in 2000 and 2001, when calving occurred over a much wider area than usual, including parts of northwestern Yukon and northeastern Alaska, and most calves were born south and east of the traditional calving area. Caribou left the coastal plain and moved into the Brooks Range foothills of Alaska and Canada during late June and early July. Most of the PCH was in Canada by mid August. During fall and winter 1999–2000 and 2001–2002, a substantial proportion of the PCH returned to Alaska during late August and September and wintered in the vicinity of Arctic Village. Few caribou wintered in Alaska during 2000–2001 or 2002–2003. Satellite collar data and anecdotal observations suggest a long-term decline in the number of PCH caribou wintering in Alaska. Consequently, fall subsistence harvests in Alaska were probably low. In the Yukon, caribou were accessible from the Dempster Highway during much of the winter, and harvests were relatively high.

MORTALITY

Harvest

Season and Bag Limit. The state of Alaska hunting season for all hunters during this reporting period 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 RY00 and RY01.

Hunter Harvest. We do not have an estimated total harvest for the PCH because harvest data from northern Yukon were not available for RY99–RY02. Harvest by local and nonlocal residents in Alaska was reported differently. Nonlocal hunters used statewide caribou harvest ticket report cards. This harvest was 72 in RY00 and 114 in RY01. The harvest in RY01 was slightly higher than previous years (Table 4). Most harvest by nonlocal hunters occurred in Unit 25A (Table 5). Most nonlocal hunters were Alaska residents, and harvested primarily bull caribou.

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. Estimated harvests by local residents in Alaska were 300 and 400 caribou during RY00 and RY01, 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 2000 and 2001, 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 2000 and 2001 before sea ice receded, and local residents were unable to travel to traditional hunting areas by boat. Caribou were available near Arctic Village for only a few weeks in late summer 2000, but approximately half the herd wintered in this area during RY01. 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 during winter 2001–2002 near Arctic Village in Unit 25A, but there was little or no harvest by nonlocal hunters. 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 during 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) during 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 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 1994–1999 was good, but declined dramatically in 2000 and 2001 (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., in press). 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 US 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, 1961–2001

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

[a] All estimates include calves except for the 1961 estimate.
[b] Data presented by RO Skoog at the 1962 Alaska Science Conference.
[c] Aerial photo-direct count extrapolation (Davis et al. 1979).
[d] Valkenburg et al. 1985.

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, 1987–2002

Birth year	June calving surveys: Cows observed[a]	June calving surveys: Parturition rate	July 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		

[a] Number of radiocollared cows observed during May and Jun.

[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 2001–2002

Regulatory year	Reported				Estimated unreported			Total
	M	F	Unk	Total	Alaska	Canada	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	--	--	--
2000–2001	62	10	0	72	300	--	--	--
2001–2002	105	9	0	114	400	--	--	--

[a] Pending Canadian data.

TABLE 5 Porcupine caribou herd nonlocal[a] and nonresident hunter success, regulatory years 1991–1992 through 2001–2002

Regulatory year/ Hunters	Unit 25A	25B	25D	25	26C	Total Units 25 and 26C
1991–1992						
Total hunters	62	8	2	72	22	94
Successful	43	1	0	44	7	51
% Successful	69	13	0	61	32	54
1992–1993						
Total hunters	67	23	0	90	6	96
Successful	48	11	0	59	4	63
% Successful	72	48	0	66	67	66
1993–1994						
Total hunters	45	9	1	55	28	83
Successful	33	1	1	35	19	54
% Successful	73	11	100	64	68	65
1994–1995						
Total hunters	49	13	2	64	14	78
Successful	36	2	0	38	8	46
% Successful	73	15	0	59	57	58
1995–1996						
Total hunters	57	9	1	67	21	88
Successful	32	2	0	34	10	44
% Successful	56	22	0	51	48	50
1996–1997						
Total hunters	47	20	0	67	9	76
Successful	29	16	0	45	2	47
% Successful	62	80	0	67	22	62
1997–1998						
Total hunters	56	10	3	69	17	86
Successful	34	5	0	39	6	45
% Successful	61	50	0	57	35	52
1998–1999						
Total hunters	85	12	3	100	17	117
Successful	63	3	2	68	9	77
% Successful	74	25	67	68	53	66
1999–2000						
Total hunters	80	23	146	6	6	125
Successful	55	14	5	2	3	74
% Successful	69	61	3	33	50	59
2000–2001						

Regulatory year/ Hunters	Unit 25A	25B	25D	25	26C	Total Units 25 and 26C
Total hunters	91	13	12	116	6	122
Successful	56	0	2	58	2	60
% Successful	61	0	17	50	33	49
2001–2002						
Total hunters	121	27	14	162	14	176
Successful	85	5	2	92	9	101
% Successful	70	18	14	57	64	57

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

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

LOCATION

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

HERD: White Mountains

GEOGRAPHIC DESCRIPTION: White Mountains area north of Fairbanks

BACKGROUND

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

When the White Mountains caribou herd was first discovered in the late 1970s, it numbered 100–200 caribou (Valkenburg, ADF&G, personal communication). By the time of the first Alaska Department of Fish and Game (ADF&G) annual management report (Valkenburg 1988), the Bureau of Land Management (BLM) estimated the herd's size at around 1000, 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 encompasses most of the White Mountains caribou herd's range and is managed by BLM. The recreation area was created by the Alaska National Interest Lands Conservation Act in 1980. In 1982 BLM and ADF&G initiated a cooperative project to determine the identity and distribution of caribou in the White Mountains. Caribou radiocollared during that project provided information on herd movements and distribution. The herd also provides a low-density comparison population for the long-term Delta Herd research project.

Public use of the White Mountains is increasing, especially during late winter. The Bureau of Land Management continues to improve access and increase recreational opportunities through development of roads, 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, RC877 and RC878 were combined to create RC879 which had season dates of 1 November through 31 March and no motorized restrictions, but the area open to hunting White Mountain caribou was reduced.

MANAGEMENT DIRECTION

MANAGEMENT GOALS

1 Ensure that increased recreational use and mining development do not adversely affect the White Mountains Herd.

2 Provide the greatest sustained opportunity for hunting caribou.

3 Provide an opportunity to view and photograph caribou.

MANAGEMENT OBJECTIVES

1 Maintain a fall bull:cow ratio of 30 bulls:100 cows.

2 Develop a creative strategy to increase winter hunting opportunities, while minimizing potential for overharvest.

3 Maintain a reported harvest of up to 75 caribou, including up to 30 cows during the winter registration hunts.

4 Maintain at least 20 radiocollared caribou in the herd to adequately measure herd dynamics.

METHODS

POPULATION STATUS AND TREND

Population Size

ADF&G and BLM estimated population size using the radio-search technique (Valkenburg et al. 1985). We photographed large groups from aircraft with 35-mm cameras loaded with slide film. The herd was counted on 7 July 2000 using 2 radiotelemetry-equipped aircraft, a Piper Cub and a Bellanca Scout. The total count was 687 caribou.

In our attempt to maintain at least 20 radiocollared caribou in the herd to aid in the estimation of herd dynamics, we deployed radio collars on 3 female caribou calves on 6 April 2001, and 9 female caribou calves on 26 September 2001, bringing the total number of active radio collars to approximately 17 at the beginning of winter 2001–2002.

Population Composition

We conducted composition surveys in September using an R-22 helicopter and Bellanca Scout or Piper Super Cub aircraft. Biologists in the fixed-wing aircraft located the radiocollared caribou. Observers in the R-22 helicopter classified caribou that were in groups with radiocollared animals and also classified any caribou found in a search of the surrounding area. We broadly searched areas containing numerous radiocollared caribou for additional groups. We also classified any caribou encountered while in transit between search areas. Classification categories consisted of cows; calves; and large, medium, and small bulls. Observers identified bulls by the absence of vulva and classified bulls by antler characteristics (Eagan 1993). We tallied the composition of each group on a 5-position counter and recorded the tallies on a data sheet. We classified 399 caribou on 29 September 2000 and 441 caribou on 25 September 2001.

MORTALITY

Harvest

We estimated harvest by using data from returned harvest tickets and registration permit report cards. For RY00 and RY01, caribou harvested west of Preacher and American Creeks and north of the Steese Highway were considered White Mountains 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's harvest in Unit 20F, caribou killed south of the Yukon River were considered White Mountains animals. Harvest data were summarized by regulatory year.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

The July 2000 minimum population of 687 caribou was below the 1992 minimum population of 832 caribou. However, the difference is only 145 caribou, and herd distributions during either survey could have contributed to the difference between these counts.

Population Composition

Fall calf:cow and bull:cow ratios in the White Mountains Herd have been variable (Table 1). However, productivity and early calf survival appeared 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 White Mountains Herd probably reflected biased sampling because bulls are often segregated after the rut (i.e., 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 White Mountains caribou herd. Because these caribou are usually in small, scattered groups and in timbered areas, it is easy to miss groups that could affect the overall composition estimates.

Distribution and Movements

Radiocollared White Mountains caribou are 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.

	RY90–RY97	RY98–RY00	RY00–RY01	RY01–RY02
Fall season bag limit	1 bull		1 caribou	1 bull after 3/02
Winter season hunt	Drawing	Registration		
Winter season motor vehicle restrictions	Yes		No	
Winter season dates	Feb–Mar		Nov–Mar	Dec–Mar
Winter season hunt area	Units 20B, 20F, and 25C, north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway.		Units 20B and 20F north and east of the Elliott and Dalton Highways, and north and west of the Steese Highway, and Unit 25C west of Preacher and American Creeks.	

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

At the March 2002 meeting, the board approved ADF&G's proposal to change the fall general season bag limit back to 1 bull, and change the registration hunt (RC879) dates to 1 December–31 March. These changes provided consistent caribou hunting regulations along the Steese Highway.

That portion of hunts RC877 and RC878 east of Preacher and American Creeks in Unit 25C was closed by emergency order on 16 February 2000. The emergency order was issued due to the presence of a large number of FCH animals near the Steese Highway. The adjustments to the borders for hunting the White Mountains caribou and FCH should prevent closures of this type in the future.

Hunter Harvest. Harvest during fall hunts was low from RY87 to RY99 (6–26). However, the fall harvest almost doubled in RY00 to 51 (Table 2). In RY00 FCH animals came north of the Steese Highway and may have been the source for 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 fall harvest then dropped to normal levels in RY01.

Permit Hunts. Participation was high and harvests were low for registration hunt RC879 (Table 3) in RY00 with 333 permits issued and a reported harvest of 10 caribou (6 cows and 4 bulls). In RY01, 405 permits were issued with a reported harvest of 17 caribou (1 cow, 16 bulls, and 1 of unknown sex).

To estimate a harvest quota for the winter hunt, we used a computer population model designed by P. Valkenburg and D. Reed (ADF&G). The model indicated the White Mountains Herd could sustain a maximum total fall and winter harvest of 40 bulls and 25 cows. The higher-than-average harvest of RY00 approached sustainable limits with 34 bulls and 26 cows taken, but harvest was well below sustainable limits in RY01 with 30 bulls, 9 cows, and 1 caribou of unknown sex taken.

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 over the 10 years RY92–RY01 (Table 1), and 11 during RY00–RY01. These data suggest the bull segment of the White Mountains herd is in no danger of being overharvested and may even provide limited trophy-hunting opportunity.

Hunter Residency and Success. The majority of White Mountains caribou are harvested by resident hunters, and most live locally (Table 4). Success rates are usually quite low in both fall and winter hunts. The low success rates are presumably due to the inaccessibility of caribou during both seasons.

Harvest Chronology. From RY90 (when the winter seasons were opened) to RY00, 84–100% of the harvest occurred during the fall season (10 Aug–20 Sep). However, in RY01 the higher winter harvest decreased the fall season proportion to 58%.

Transport Methods. The most common method of transportation used by successful hunters during the fall seasons of RY00 and RY01 were 3- or 4-wheelers, which accounted for 73%

(37 of 51) and 74% (17 of 23) of the respective transportation use (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 most caribou winter in dense spruce forest, making hunting difficult.

CONCLUSIONS AND RECOMMENDATIONS

We met most of the objectives for this reporting period. Objective 1, to maintain a fall bull:cow ratio of 30 bulls:100 cows, was met. Objective 2, to develop a creative strategy to increase winter hunting opportunities, while minimizing potential for overharvest, was met with unlimited registration permits for winter hunts, and harvest within sustainable limits. Objective 3, to maintain a reported harvest of up to 75 caribou, including up to 30 cows during the winter registration hunts, was met, but the herd could provide additional hunting opportunity and harvest. In the future, increased hunter effort and harvest during fall may occur because there are limited opportunities to hunt Interior caribou, and BLM has improved access in this area. However, as the FCH harvest is liberalized, hunting pressure on the White Mountains Herd may decrease. We failed to meet Objective 4 – maintain at least 20 radiocollared caribou in the herd to adequately measure herd dynamics – maintaining only 17 functioning radio collars in the herd.

The objectives for the next reporting period are being revised here. Objective 2 will be omitted because it was an activity rather than an objective, and has largely been completed by liberalizing the winter hunting season. We will replace Objective 3 with a population objective that includes Objective 1. Specifically, this objective will be to maintain a stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows. Objective 4 was also omitted because it is an activity rather than an objective. We will also continue the population modeling activity as a guide for estimating sustainable harvest limits.

Management objective for the next reporting period is:

1 Maintain a stable or increasing population with a fall bull:cow ratio of at least 30 bulls:100 cows.

Population data for the White Mountains Herd are generally limited to annual composition counts with an occasional census. To obtain a better understanding of population dynamics for the White Mountains Herd we need to allocate more funds to data collection in the form of 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 on development of BLM lands. This

cooperation will help effect better management strategies for the White Mountains caribou herd.

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, 1983–2002

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	0	31	18	60	0	0	0	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	

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

TABLE 2 White Mountains caribou harvest[a], regulatory years 1987–1988 through 2001–2002

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

[a] Excludes winter permit hunt harvest.

TABLE 3 White Mountains caribou herd harvest by permit hunt, regulatory years 1990–1991 through 2001–2002

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
	1991–1992	100	88[b] (88)	12 (100)	0 (0)	0	0	0	0
	1992–1993	100	76 (76)	19 (86)	3 (14)	1	2	0	3
	1993–1994	150	120 (80)	26 (100)	0 (0)	0	0	0	0
	1994–1995	149	116 (78)	26 (90)	3 (10)	1	2	0	3
	1995–1996	137	98 (72)	37 (100)	0 (0)	0	0	0	0
	1996–1997	106	86 (81)	17 (100)	0 (0)	0	0	0	0
	1997–1998	67	46 (69)	20 (95)	1 (5)	1	0	0	1
RC877 & RC878	1998–1999[a]	74	25 (34)	49 (98)	1 (2)	0	1	0	1
	1999–2000	119	28 (24)	91 (88)	13 (13)	3	10	0	13
RC879	2000–2001	333	137 (41)	178 (95)	10 (5)	4	6	0	10
	2001–2002	405	252 (62)	128 (88)	17 (12)	15	1	1	17

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

[b] Includes those that did not report.

TABLE 4 White Mountains caribou herd hunter residency and success during fall general seasons, regulatory years 2000–2001 and 2001–2002

	Successful				Unsuccessful				
Regulatory year	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Local[a] resident	Nonlocal resident	Nonresident	Total (%)	Total hunters
2000–2001	45	38	6	89 (38)	106	29	9	144 (62)	233
2001–2002	22	13	1	36 (18)	127	31	6	164 (82)	200

[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 2001–2002

Regulatory year	Harvest by transport method								
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV	Highway vehicle	Other/Unk	*n*
1988–1989	4	0	0	4	0	2	2	0	12
1989–1990	0	0	0	4	0	4	4	2	14
1990–1991	1	0	1	10	0	1	4	1	18
1991–1992	3	1	0	8	0	4	3	0	19
1992–1993	2	0	0	4	0	2	5	1	14
1993–1994	4	0	0	11	0	0	5	1	21
1994–1995	0		1	13	0	1	3	0	18
1995–1996	4	0	0	4	0	0	2	0	10
1996–1997	1	0	0	12	0	1	3	0	17
1997–1998	5	0	1	14	0	2	1	2	25
1998–1999	1	0	1	9	0	1	1	0	13
1999–2000	2	0	2	17	1	2	1	1	26
2000–2001	1	1	2	37	2	6	2	0	51
2001–2002	0	0	0	17	0	1	5	0	23

[a] Excludes winter permit hunts.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 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.

The 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, and Silva 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), and 28,627 in 1999 (Carroll, 2001).

The TCH is an important subsistence resource to hunters from several North Slope villages. Approximately 2503 caribou were harvested from the TCH during 1999–2000 (Carroll, 2001).

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 mid-summer and fall to determine relative numbers of bulls, cows, and calves; and
- 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.

Spring short yearling and fall composition surveys were flown using a Cessna 207 on 17 and 25 April 2001, a Piper PA 18 on 4 April 2002, and a Bianca Scout on 27 October 2001. 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 Cessna 207 on 5–18 June 2001 and a Bianca Scout on 2–12 June 2002. Weather permitting, we flew surveys every 2 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, whether the cow had a calf, and whether the cow had hard antlers, soft antlers (covered with velvet), or no antlers. We continued to observe each collared cow until it was seen with a calf and that was recorded as the approximate successful 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). In 2001 we distinguished between cows that had calves, cows that did not have calves, and cows that had calves but the calf died. We also used GIS to look at calving locations for all years and calculate the number of caribou calving within the traditional calving area. We also looked at the calving success of caribou found within the calving area and the calving success of caribou that were found outside the calving area during the calving period. We defined the calving area as the area surrounding Teshekpuk Lake that BLM gave protective status to because of its importance as caribou and goose habitat in its 1998 Integrated Activity Plan for the northeast section of the National Petroleum Reserve–Alaska (BLM, 1998).

We used a Hughes 500 helicopter on 10 July 2000 to conduct post calving composition surveys. We flew transects north and west of Teshekpuk Lake and categorized caribou as cows, calves, or bulls.

Through a cooperative effort with the NSB and BLM, we captured 20 female caribou north of Teshekpuk Lake from July 8–10, 2000 using a Hughes 500 helicopter with a skid-mounted net gun, and attached 5 Platform Transmitter Terminal collars (PTT = satellite radiocollar transmitters) and 12 VHF radiocollars. We also captured 13 caribou (9 males and 4 females) north and west of Teshekpuk Lake on 26–27 June, 2001 using a Robinson 220 helicopter with a hand-held net gun, and attached 10 PTT and 3 VHF radiocollars. In both capture operations caribou were restrained using blindfolds, hobbles, and ropes. We collected blood, fecal, and hair samples and measured, weighed, and assessed the body condition of the captured caribou. The radiocollars 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. The estimated harvest from the survey reports and the human population for the year of the survey were used to calculate the number of caribou harvested per person per year. We obtained current human population estimates from the Department of Commerce and Economic Development and multiplied this by the per capita harvest for each village to estimate the total caribou harvest for 2000-2001. Because villages harvest caribou from more than one herd we had to estimate the percentage of the caribou harvested in each village from the TCH. VHF radiotracking and satellite collar information was used to make our best estimation of which herds were in the hunting areas of the villages when hunting was taking place in 2000–2001. We multiplied the total number of caribou harvested times the percentage of caribou that were most likely from the TCH to determine the total number of TCH caribou harvested by each village, and totaled these to calculate the total TCH harvest for 2000–2001. 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 by conducting more VHF radiotracking flights and analyzing satellite collar information to determine the when caribou from the various herds are present in local hunting areas

We determined mortality rates of radiocollared caribou by examining radiotracking survey data. From 1990-1998 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, so since then we used data from both types of collars. 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) In addition to collars heard on mortality mode, some collars were simply not detected after some date. We assumed that these "not detected" caribou died somewhere out of the survey area during the collaring year previous to the first calving period when they were not heard. We totaled the number of caribou found on mortality mode and "not detected" caribou for each collaring year, which ran from 1 July to 30 June. We then divided this by the number of active conventional radiocollars that were on the air at the beginning of the collar year to calculate the mortality rate for each year. 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). Because the 2002 figure increased so dramatically over 1999, we reexamined the counting process to look for possible sources of error and found the following:

- It is unlikely that we counted a substantial number of CAH or WAH caribou in the TCH photocensus. The CAH was photocensused the same day and was found to the east of the Colville River and well out of the area where the TCH was photographed. All 24 of the WAH satellite radio collars were located along the crest of the Brooks Range, approximately 200 miles away from where the TCH was photographed. (Figure 1) On radiotracking surveys we found no WAH or CAH VHF radiocollared caribou in the area of the TCH photocensus.

- The photograph layout was reexamined and it was determined that no groups of caribou were counted twice.

- Photograph counters counted consistently. We had all 5 counters count calibration photos and no individual counter seemed to be over-counting The 2 counters that counted 92% of the photos varied by less than 1% on 22 photographs they both counted in a blind test. One counted 8407 and the other 8330 caribou in the test.

- A higher percentage of calves were probably counted in the 2002 photocensus than previous counts. The photographs were very good quality and calves showed up more clearly than in past years. We recounted a sample of 40 photographs and found that 14% of the caribou counted were calves. By comparison, in the 2002 CAH caribou photocensus count, 7% of the animals were listed as calves (Lenart, Pers. Com., 2003)

From the above information, it appears that the minimum population estimate of 45,166 is legitimate. The reason for the relatively large number of caribou counted is a combination of excellent counting conditions, the behavior and distribution of the caribou, good coverage by the photocensus crew, good photograph quality, a substantial increase in the herd, and the fact that the count was conducted on a year when there was very good recruitment (74 calves per 100 cows) (Table 2). The count may be slightly elevated by a larger than normal percentage of calves being counted but, since this is a minimum population estimate of the post-calving population, this estimate is closer to the real population than in some past estimates.

However, 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%), and it seems quite possible for the herd to have achieved the growth rate that would have been required.

Population Composition

Calving. Teshekpuk caribou show great fidelity for the traditional calving area surrounding Teshekpuk Lake and caribou that are found within the area during calving season have much higher calving success than caribou that are found outside the area (Figure 2). In recognition of its importance as wildlife habitat, BLM gave much of the area surrounding Teshekpuk Lake special protection in its 1998 Integrated Activity Plan for the northeast section of the National

Petroleum Reserve–Alaska (BLM 1998). The protected area encompasses the traditional calving area of the TCH. In surveys we have conducted since 1990, 147 out of 163 (90%) of caribou that calved successfully have calved within these protected areas. Of the 178 caribou that were found within the protected areas, 83% calved successfully. Of the 59 cows that were found outside the protected areas during calving season, 25% calved successfully.

In 2001 heavy snow and a late snow melt-off prevented many cows from getting back to the traditional calving area in time to calve, and this resulted in very poor calf survival. We flew surveys to determine calving location and success on 5, 9, 12, 16, and 18 June. Only 16 of 36 collared cows were seen with live calves, for 44% calving success, which is the lowest we have recorded for any year (Table 2). The second lowest year of calf survival was 1997 (53%) when natural conditions also prevented many cows from making it back to the traditional calving area by early June (Carroll 1999). In 2001 the calving success for collared cows that were found in the traditional calving area was much better (76%) than ones that were found outside the area (10%) (Figure 3). It appears to be very important for caribou from the TCH to be able to get to and use their traditional calving area.

In 2002, calving surveys were flown on 2, 5, 7, 10, 11, and 12, June. We located 31 collared cows and 23 of these had calves at heel, for 74% calving success (Table 2). Snowmelt was very early and approximately 50% of the calves were born by 2 June, which was earlier than normal. In conjunction with the early snow-melt, most of the caribou calved north of the lake (Figure 4).

Fall composition counts. Fall composition surveys were flown on October 27, 2001. We located 17 collared caribou including 3 bulls, 10 cows without calves, and 3 cows with calves. We classified 1458 caribou in the vicinity of the collared animals and counted 163 calves, which computed to 11% calves, or 13 calves:100 adults.

Short yearling counts. Short Yearling counts were flown 17 and 25 April 2001. We located 15 collared cows, 6 of which had short yearlings at heel. We also classified 1369 caribou in the areas surrounding the collared animals and counted 1168 adults and 201 short yearlings. This computes to 15% short yearlings or 17 short yearlings:100 adults. This survey was cut short because the plane crashed.

Short yearling counts were also flown on 4 April 2002. We located 22 collared caribou – 2 were males, 2 were cows with calves, and 20 were cows without calves (9 short yearlings:100 collared cows). We also classified 2270 caribou in the areas surrounding the collared animals and counted 2070 adults and 200 short yearlings. This computes to 9% short yearlings or 10 short yearlings:100 adults. (Table 3). The spring 2002 count is the worst recruitment we have recorded for the TCH and coincides with the poor calving success in 2001.

Summer composition counts. We flew summer composition surveys 10 July 2000 and classified 3921 caribou - 1858 as cows, 886 bulls, and 1177 calves. We calculated 47% cows, 23% bulls, 30% calves, 48 bulls per 100 cows, and 63 calves: 100 cows.

Distribution and Movements

Most TCH caribou move toward Teshekpuk Lake during May, and most of the pregnant females move into the area northeast, east, and southeast of Teshekpuk 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 on most years, but the wintering location is quite variable and ranges from near Teshekpuk Lake to south of the Brooks Range. The most common area for wintering is the area around Atqasuk.

Satellite collar information indicates that TCH caribou winter in varied locations from near Teshekpuk Lake to the Chukchi Sea coast to south of the Brooks Mountain Range (Philo et al. 1993). 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 plane 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 moved north of Teshekpuk Lake during the July insect season and gradually moved south during late summer and fall. During July 75% of the radiocollared caribou were found north of Teshekpuk Lake. 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 we were able to track the movements of 7 bull caribou. Four of the bulls moved away from the TCH cows in early October and wintered in the CAH wintering area SE of Anaktuvuk Pass. Two of these bulls returned to the TCH area in the spring, one stayed with the CAH and one was shot on the Colville River, half way between the 2 herds. Most of the cows wintered in the Atqasuk/Wainwright area, with some wintering near Teshekpuk Lake. Snow melt-off was very early during the spring of 2002 and 15 out of 23 of the cows that calved successfully calved north of Teshekpuk Lake (Figure 4)

MORTALITY

Harvest

Season and Bag Limit. The hunting seasons and bag limits were the same for both regulatory years of the reporting period.

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 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, there have been several harvest monitoring projects, which provided information on the number of caribou harvested and the human population of the villages (Table 4). We used this harvest information to calculate an average number of caribou harvested per person per year for each of the villages. This per capita caribou harvest was multiplied by the most recent human population number to estimate the number of caribou harvested by each village. Distribution of the various caribou herds is variable from year to year, so we examined telemetry data for 2000–2001 to determine the availability of TCH caribou, compared to caribou from other herds, in the hunting area of each village and estimated the percentage of the harvest that was most likely TCH caribou. The total harvest of each village was calculated from the estimate of caribou harvested and the estimated percentage that were TCH caribou. We totaled the village harvests to produce an estimate of 2766 TCH caribou harvested in 2000–2001 (Table 5). This represents a 6.1% harvest of the herd. We will gain more confidence in this estimate as we increase VHF radiotracking flights during the periods when differing herds are present in the hunting areas around each village and as we examine satellite collar 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 ATV's 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 and determined how many collared caribou died each year and used these figures to estimate the annual TCH mortality rate for collared cows. During most years the mortality rate ranged from 11% to 17% with the average rate for all years being 14%. The highest mortality rate (24%) was 1996–1997, when much of the herd migrated south of the Brooks Range. Reasons for increased mortality may have included higher stress from the long migration, increased hunter harvest, and the increased risk of predation and other factors associated with unfamiliar territory (Carroll 1999). The lowest mortality rate was in 1998–1999 when 8% of the collared cows died (Table 8). The year 2001–2001 was the first year we had collared bulls and there were no bull mortalities and there was 17% collared cow 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. Radiocollars 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 areas to the south, east, and north of Teshekpuk Lake are 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 (NPRA), 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 NPRA, 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 to 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).

Enhancement

There were no habitat enhancement activities during the reporting period.

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

There were no nonregulatory problems or needs identified for caribou in Unit 26A during the reporting period.

CONCLUSIONS AND RECOMMENDATIONS

We counted 45,166 caribou in a 2002 photocensus, which represents a substantial increase over the 1999 count of 28,627. It seems unlikely that the herd could have grown that quickly, particularly when there was poor recruitment (9%) in 2001–2002 and mediocre recruitment (15%) in 2000–2001. It is more probable that the census in 1999, and possibly the census in 1995 undercounted the population and that the herd has steadily increased since the early 1990s. Previous censuses indicate an increase in the count of 14% per year from 1989 (16,649 caribou) to 1993 (27,686 caribou).

A fairly high recruitment rate and relatively low mortality rate for most years since 1995 appears to have contributed to the recent population growth. Our recruitment results indicated the percentage of short yearlings ranged from 9% to 26% of the population and averaged about 19%. The lowest recruitment rate occurred in 2001–2002 (9%) and was a result of very poor early calf survival when late snow melt-off prevented many of the parturient cows from getting back to the traditional calving area by calving time. The mortality rate was 11% in 2000–2001 and 14% in 2001–2002. It has ranged from 8% in 1998–1999 to 24% in 1996–1997 with an average of about 14%.

TCH caribou have shown great fidelity for the traditional calving area surrounding Teshekpuk Lake and have much higher calving success within the calving area than caribou that are found outside the area. In surveys we have conducted since 1990, 147 out of 163 (90%) of caribou that calved successfully have calved within BLM protected areas that encompass the calving area. Of the 178 caribou that were found within the protected areas, 83% calved successfully. Of the 59 cows that were found outside the protected areas during calving season, 25% calved successfully.

It appears to be very important for the TCH to be able to get to and use their traditional calving area. In 2001 a late snow melt-off prevented many cows from getting back to the traditional calving area in time to calve. This late arrival to the calving area resulted in only 44% of the collared cows being seen with calves, which is the lowest early calf survival for any year we

have recorded. The second lowest year of calf survival was 1997 (53%) when natural conditions also prevented many cows from making it back to the traditional calving area by early June (Carroll 1999). In 2001 the calving success for collared cows that were found in the traditional calving area was much better (76%) than ones that were found outside the area (10%).

The results of several harvest monitoring projects, human population numbers, and caribou distribution data were used to estimate that approximately 2766 TCH caribou were harvested in 2000–2001. This represents a 6.1% 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. It is important that development activities do not reduce the productivity of this important subsistence resource.

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. After the caribou were netted, we used blindfolds, hobbles, and ropes to control the caribou. Caribou were measured and weighed and samples were collected while the animals were restrained. In 2001 and 2002 we 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 33 TCH caribou we captured in 2001 and 2002.

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 radiocollars 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, or near Cape Lisburne, or as far south as the Seward Peninsula. 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 the spring of 2002, 2 of these bulls returned to the TCH area, one stayed with the CAH and one was harvested midway between the 2 herds. VHF collars have also been very useful, primarily in conducting censuses, composition surveys, and productivity studies.

Using satellite and VHF collars, we have learned that the areas to the south, east, and northeast of Teshekpuk Lake are important for calving in the spring; and the area north and northwest of the lake is important for insect relief and grazing each summer; and that there are narrow migration corridors to the east and northwest of the lake that need to be protected. The BLM began the process of opening a planning area in the northeast corner of NPRA to petroleum leasing and development, which includes these crucial habitat areas. After a public review process, it was decided that 87% of the planning area would be open for leasing but that the most critical habitat areas for the TCH would not be available for leasing or surface development activity. However, the critical TCH habitat area also has high potential for petroleum reserves, so the issue may be revisited. It is important to continue surveys in this area so resource managers 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]	N/A
1985	13,406[a]	N/A
1989	16,649[b]	7.1%
1993	27,686[b]	13.5%
1995	25,076[b]	-4.8%
1999	28,627[b]	3.4%
2002	45,166[b]	16.2%[c]

[a]Derived from visual estimate.
[b]Derived using aerial photocensus.
[c]It is unlikely that the herd increased at this rate. The 1999 count was probably an underestimation and the herd has increased since 1995

Table 2 Teshekpuk caribou herd calving and postcalving composition counts, June–July, 1991–2002

	Calving survey[a]	Summer composition counts[b]				
Date	Calves:100 cows	Percent 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	89					
1997	53	18	46	26	56	3771
1998	63	31	67	28	41	3302
1999	67					
2000	79	23	63	30	47	3921
2001	44					
2002	74					

[a] Surveys conducted early to mid June
[b] Surveys conducted in July

Table 3 Spring and fall composition data for the Teshekpuk caribou herd, 1990–2002

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

Table 4 Summary of community-based harvest assessments for communities within the range of the Teshekpuk Caribou Herd, 1985–2002.

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
Atqasuk	1994–1995	237	262	Hepa et al. 1997
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. Com.)
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 2000–2001 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	273	1.11	302	60	181	Atqasuk 1994–1995
Barrow	4541	0.50	2270	70	1589	Barrow 1988, 1989, 1992
Nuiqsut			600	60	360	2000–2001 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					2766	

[a]The Estimated Total Community Harvest was derived from an ADFG Subsistence Division harvest survey that was conducted in Nuiqsut in 2000–2001 (Pedersen, Pers. Com., 2003)

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, 1990–2002

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%
Totals	374	50	14%

[a] Collar year defined as July 1–June 30.
[b] Sample Size - the total number of active radiocollars 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 PTT's 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

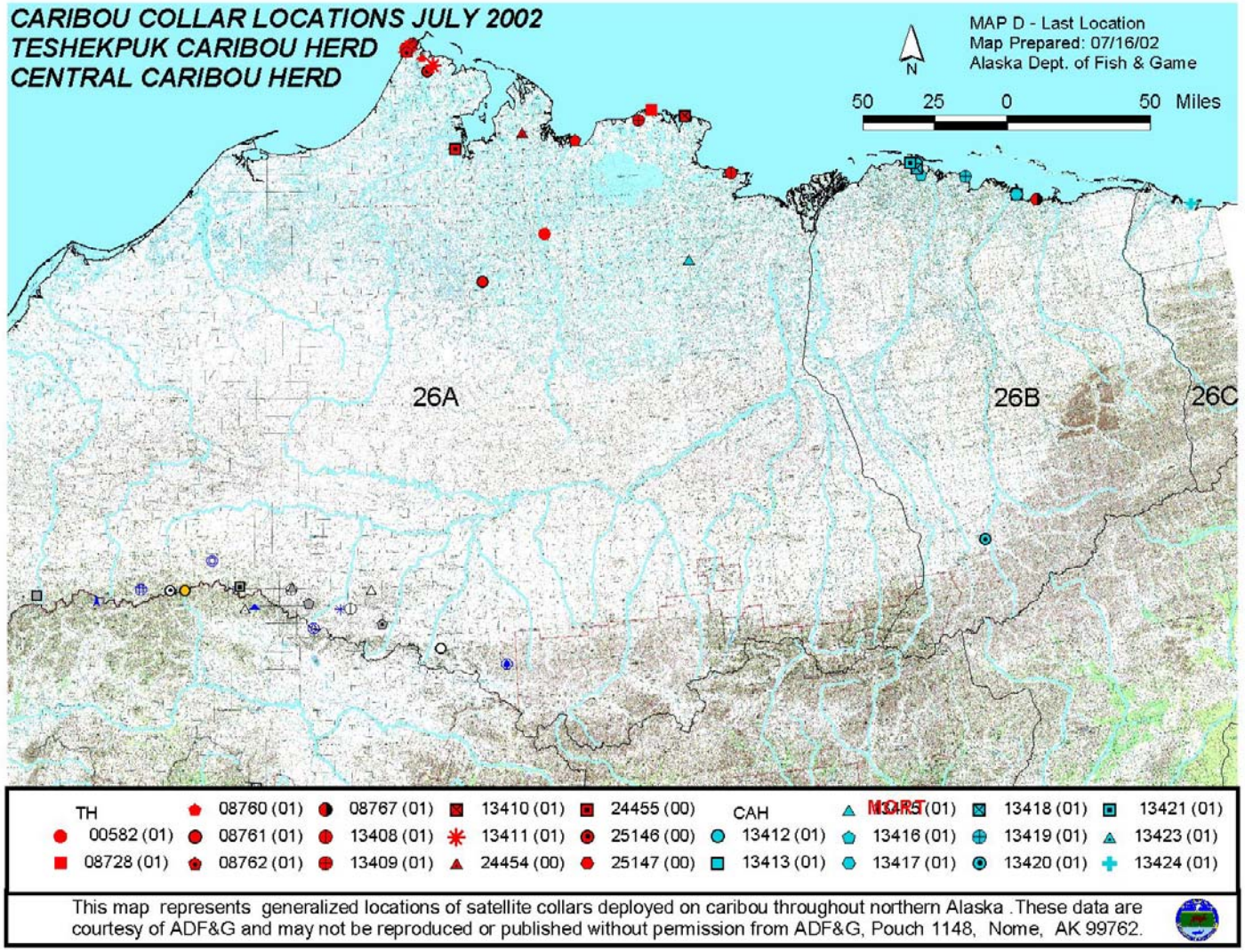

Figure 1 Locations of satellite collared caribou from the TCH (red), the CAH (light blue), and the WAH(purple, yellow, white) on 7/16/2002, the day of the TCH and CAH photocensus. Note: all of the WAH satellite collars were located along the Brooks Range. The CAH caribou shown in the TCH range was a mortality.

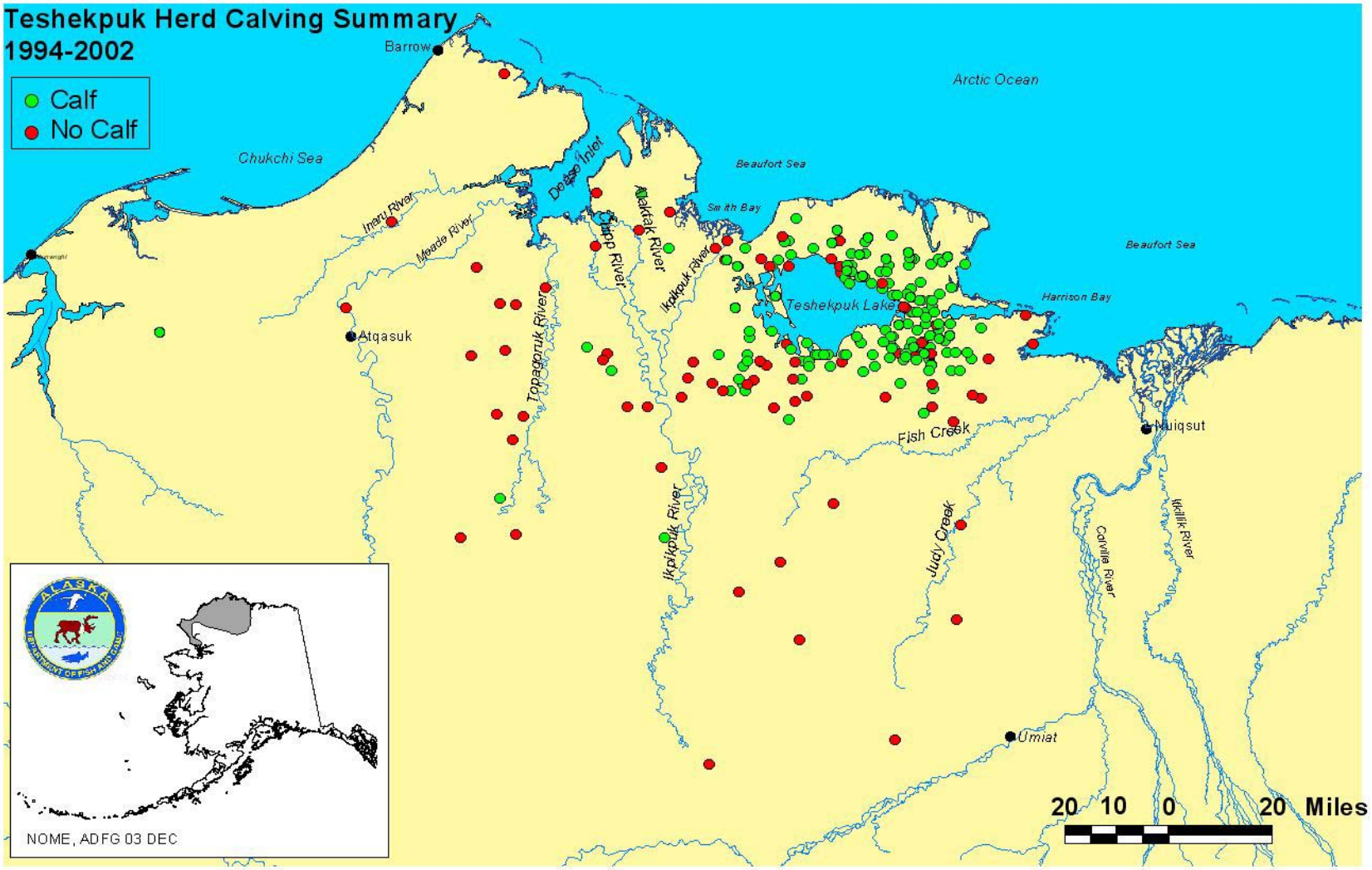

Figure 2 Calving locations of collared TCH cows that calved successfully (produced calves that survived through the end of calving survey observations) and locations of collared cows that did not have calves or had calves that died prior to the end of the calving survey observations from 1994–2002.

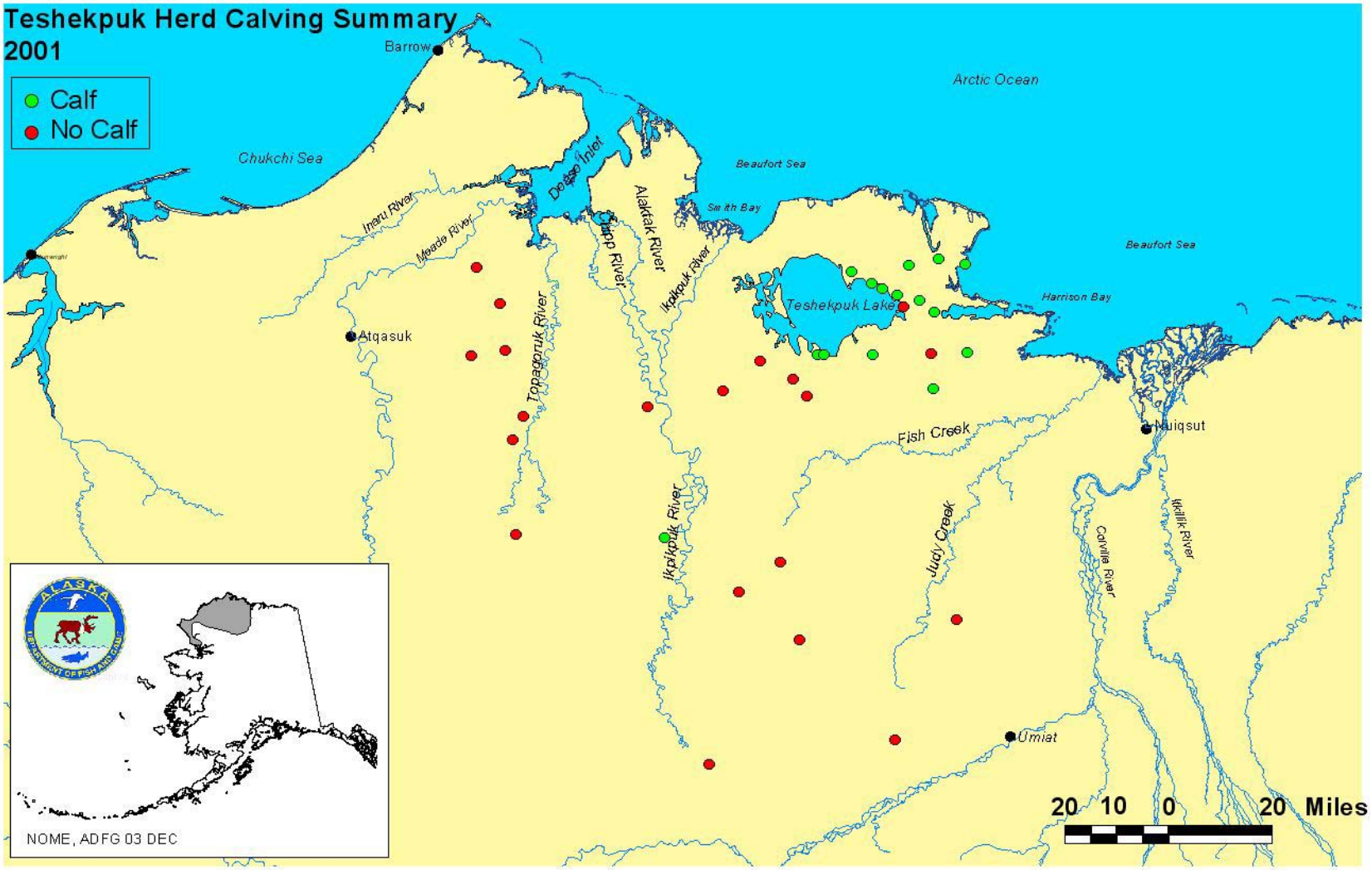

Figure 3 Calving locations of collared TCH cows that calved successfully (produced calves that survived through the end of calving survey observations) and locations of collared cows that did not have calves or had calves that died prior to the end of the calving survey observations in 2001.

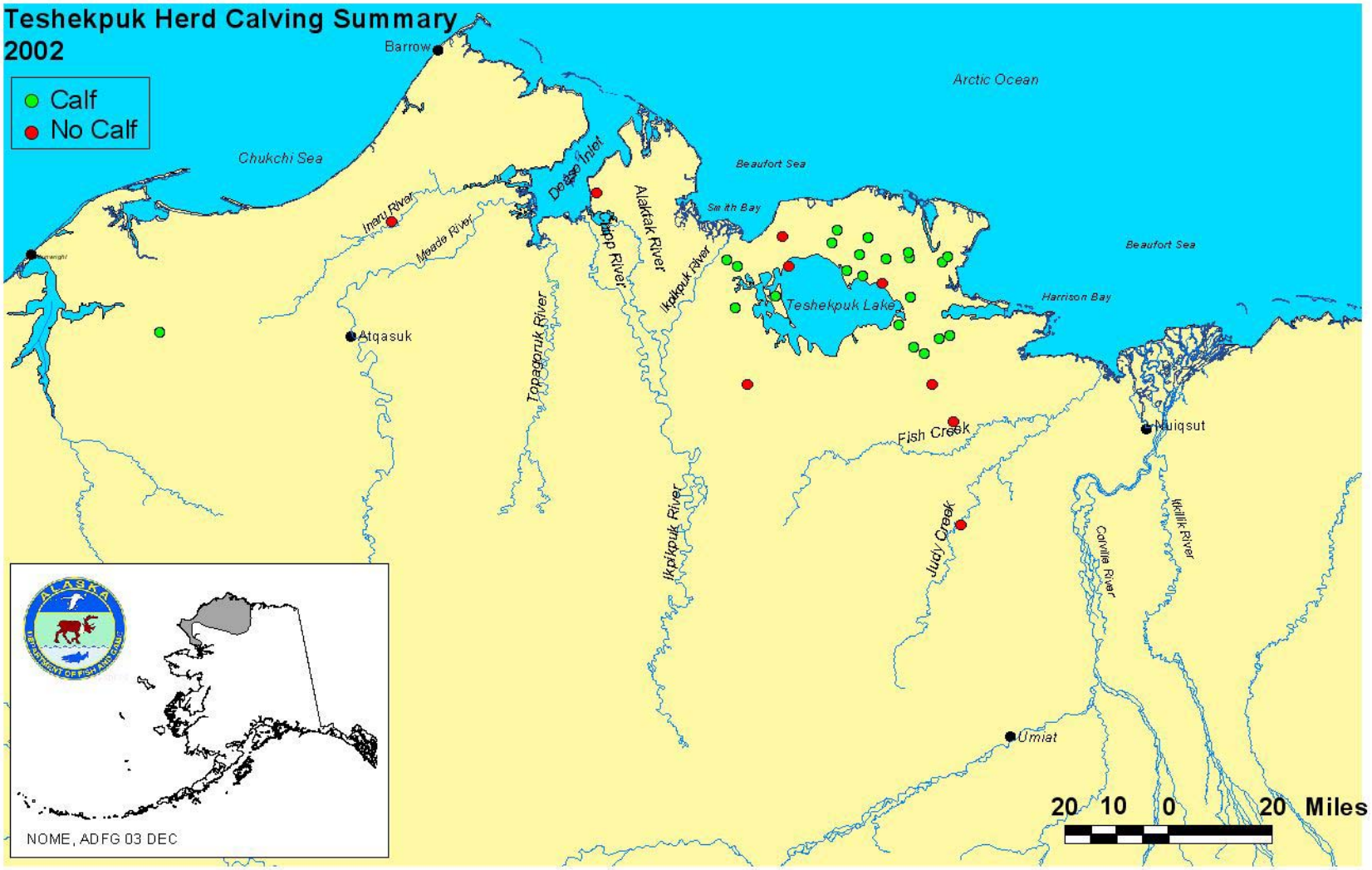

Figure 4 Calving locations of collared TCH cows that calved successfully (produced calves that survived through the end of calving survey observations) and locations of collared cows that did not have calves or had calves that died prior to the end of the calving survey observations in 2002.

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CARIBOU MANAGEMENT REPORT

From: 1 July 2000
To: 30 June 2002

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 over 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 over 27,000 animals. The recent increase was due to low adult mortality (<10%), high parturition rates (≥90%), and high calf survival to October (≥50: calves:100 cows) during 1998–2000.

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 traffic in 1991. Reported harvest increased moderately in RY00. Some of this increase was by bowhunters using the Dalton Highway.

The CAH's summer range extends from Fish Creek, just west of the Colville River, eastward along the coast (and inland approximately 30 miles) to the Katakturuk River. The CAH winters in the northern and southern foothills and mountains of the Brooks Range. The herd's range often overlaps with the Porcupine caribou herd (PCH) on summer and winter range to the east and with the Western Arctic and Teshekpuk herds on summer and winter range to the west. However, there is no record of permanent exchange of caribou among these herds.

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 oilfield 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 et al. 1992; Cameron and Smith 1992). By the mid 1980s, major movements of CAH caribou through the Prudhoe Bay oilfield in summer had ceased and caribou distribution and movements within the Kuparuk oilfield 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 oilfield development on calf production and survival (Arthur 2002).

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 oilfield and the Dalton Highway and also restricted the cow harvest. The current management objectives reflect these concerns. In addition, during the March 2000 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 Sagavanirktok River) because Cameron (ADF&G [retired], 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–15 June. Beginning in 1995, caribou were located once and the target date was pre-peak calving between 3–9 June. Since 1994, parturient caribou may have been missed because the cow did not have hard antlers and the udder was not distended and (1) calves were born early and died or (2) calves were born late and not observed. 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.

The proportion of calves:100 cows were 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 and since 1994, calves:100 cows were 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.

Parturition rates and the proportion of calves:100 cows were calculated for 3 categories: known–age females, females ≥4 years old, and “sexually mature” females. “Sexually mature” females were those known to have been parturient prior to being included in the sample. By only looking at females known to be sexually mature, variability at first age of reproduction is eliminated (R Cameron, ADF&G [retired], personal communication). Data for “sexually mature” females were stratified based on the location of caribou east and west of the Sagavanirktok River and included only those animals located on the same side during the previous and current summer. Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River during the current summer.

We used logistic regression to compare parturition rates and the proportion of calves:100 cows for females ≥4 years old for Unit 26B across years and in Unit 26B West and Unit 26B East. We tested for differences due to year, area, and the year/area interaction at $\propto = 0.05$. We allowed the Akaike Information Criterion to choose the best model (Akaike 1973).

Population Composition

Prior to 1994, calving surveys were conducted every year in conjunction with ongoing research. Beginning in 1994 they were conducted every 3 years through 2000 using methods described in Lenart 2001.

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. Fall composition surveys were not conducted during 1997–1999 because of poor weather.

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 living south of the Yukon River, and for nonresidents, were monitored using harvest reports submitted by hunters. Total harvest, residency and success, chronology, and transportation were summarized by regulatory year.

Alaska residents living 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. The Alaska Department of Fish and Game's 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 in 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

In July 2002 we estimated 31,857 caribou based on a photocensus conducted during the postcalving aggregation. This represented a 17% increase (8.5% annually) from the July 2000 estimate of 27,128 (Table 1). The CAH has been increasing substantially since 1997 when the herd was estimated at 19,730 caribou. Population modeling indicates 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 increased significantly during 1994 through 2002 (P = <0.0025). Parturition rates were low in 1995 and 1997 (<65%) when the herd was declining or stable, but by 1998 they exceeded 85%. These high parturition rates contributed to the increase in population size observed in the 2000 and 2002 censuses (Tables 1 and 2). Parturition rates of “sexually mature” females were similar to females ≥4 years old (Table 2). Parturition rates for 3-year-olds also were high during 1998–2002 (≥75%), although sample sizes were small (n = 4–13; Table 4). 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 was also low (56%, Tables 1 and 2). No data are available for 1996, but parturition rates for females ≥4 years old increased slightly in 1997 (61%; Table 2); only two 3-year-olds were relocated and neither was parturient.

In Unit 26B West, the parturition rate was considerably higher than in Unit 26B East in 1995 and 1997 (Table 2). However, over time (1994–2002) using the Common-Slope-Intercept Model, these parturition rates did not differ between west and east (P = 0.73), and there was no significant area/year interaction (P = 0.10). Yet, for years 1988–1994 Cameron (1995) and Cameron et al. (2002) detected a significantly lower mean parturition rate in Unit 26B West than in Unit 26B East (P = 0.003; Table 2). This occurred during part of the period when the herd was declining (1992–1995).

Late June calf:cow ratios of radiocollared females ≥4 years old in all of Unit 26B also increased during 1994–2002; although the change was not statistically significant (P = 0.17). Similar to parturition rates, late June calf:cow ratios were lower (<65%) during years when the herd was declining or stable than in years when the herd was increasing (1998–2002, ≥75%). This indicated a consistently high early calf survival during the past 6 years, which also contributed to the increase in population size observed in 2000 and 2002 (Table 3). Late June calf:cow ratios were somewhat lower in 2000 and 2001 (75 and 79%) than in 1998 and 1999 (81 and 86%); probably because of an extremely late spring in both 2000 and 2001, which may have reduced early summer calf survival. Late June calf:cow ratios for "sexually mature" females were similar to those observed for females ≥4 years old (Table 3). During 1998–2002, 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).

Late June calf:cow ratios for radiocollared females ≥4 years old were considerably higher in Unit 26B West than in Unit 26B East in 1995 and 1997, similar to differences observed with parturition rates. However, logistic regression using a Null Model indicated that there were no significant differences due to area (east or west) or area/year interaction for females ≥4 years old during 1994–2002 (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 further 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

We estimated 72 calves:100 cows during calving ground transect surveys in both 1997 and 2000 in all of Unit 26B (Table 1). Estimated calf:cow ratios in Unit 26B West were 69:100 during 1997 and 72:100 during 2000. In Unit 26B East they were 81:100 in 1997 and 70:100 in 2000.

Because these surveys were limited to calving areas, nonparturient cows are underrepresented and the data do not accurately reflect overall herd composition.

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 have been high since 2000 (>50:100), indicating that summer calf survival rates were relatively high in 2000, 2001, and 2002. The calf:cow ratio was extremely high in 2000 (72:100), but this number may be inaccurate, because the sample size was considerably smaller than sample sizes in 2000 and 2001 (Table 6). Nonetheless, calf survival during summer 2002 was very good. During the fall 2002 survey the calves appeared healthy and fat. Summer 2002 was cool and cloudy and had less abundant insects than other years. Cloudy summers can increase quality of forage for caribou (e.g., nitrogen content; Lenart et al. 2002) and cool summers can decrease insect harassment, which allows more time for foraging (Mörschel and Klein 1997). The composition surveys occurred in the Brooks Range in the Chandalar Shelf, Atigun Pass, Galbraith Lake, and upper Sagavanirktok River areas.

Distribution and Movements

The proportion of the CAH that calved southwest of the Kuparuk oilfield appeared higher during the early 1990s than in the 1980s, when calving was relatively common in the Kuparuk oilfied (ADF&G files). Preliminary analysis of calving survey data for 1994, 1997 and 2000, and telemetry data for 1994–2001, indicate a similar pattern. No directional shift in distribution of caribou calving east of the Sagavanirktok River was noted. However, calving survey and telemetry data for 1994, 1997, and 2000 will be analyzed further.

In 2000 and 2001, exceptionally late springs and deep snow delayed migration and many caribou calved before they reached the traditional calving grounds. In addition, calving distribution in 2001 deviated somewhat from previous years. Three radiocollared females were found west of the Colville River in the Fish Creek drainage in Unit 26A.

Movements during summer (postcalving) are influenced by insect abundance, which is largely dependent 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. CAH caribou were not radiotracked during July and August from 1995 through 2000 except in connection with a photocensus. Observations indicate that postcalving distribution and movements during July did not vary significantly during 1994–2002, with caribou distribution depending on weather conditions. Radiotracking data in conjunction with an ongoing research project corroborate these observations for 2001 and 2002 (ADF&G files). Caribou were concentrated along the coast during warm weather but moved inland on cool and windy days. During the 1997 and 2000 July censuses, some groups were located as far east as the Tamayariak and Katakturuk Rivers, respectively, and a dead radiocollared caribou was found on Marsh Creek, east of the Katakturuk River. In 1997, one small group (<250) ranged as far west as Fish Creek, west of the Colville River.

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. However, summer distribution during 2001 was different than in previous years. In late July an estimated 5000 Central Arctic caribou were found inland in the Fish Creek drainage in Unit 26A. Unusually warm temperatures persisted during most of September, and most of the CAH remained on the North Slope 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.

During the October rutting season in 2000 and 2001, large concentrations of caribou were on the 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 were located around Galbraith Lake, Accomplishment Creek, and in the upper Sagavanirktok River. These areas represent a portion of the rutting area, as we do not radiotrack the entire herd during rut.

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 during the mid 1990s (ADF&G files). In RY00, RY01, and RY02, most of the herd wintered east of the Dalton Highway with 1/3–1/2 on the north side of the Brooks Range in the upper Sagavanirktok, Accomplishnent, and Lupine Rivers with some caribou distributed throughout as far east as the Canning River. Caribou were also found near Galbraith Lake and Slope Mountain and sparsely distributed west along the foothills to Anaktuvuk Pass. On the south side of the Brooks Range, 1/2–2/3 wintered from the North Fork Chandalar to Wind River with some groups as far south as Ackerman Lake. Large concentrations (≈5,000+) were found in Your and Thru Creeks and some CAH animals also wintered in the Tinyaguk River and Glacier and Hammond Creeks, west of the Dalton Highway. In RY02, many caribou were distributed across the coastal plain, west of the Dalton Highway; approximately 2500–3500 caribou wintered along the Kuparuk River. We suspect 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. However, for all 3 years ≥90% of the CAH radio collars were heard or located east of the Dalton Highway. March 2003 experienced heavy snows on the south side of the Brooks Range and it appeared that the spring migration north was delayed.

During some years, caribou from the Western Arctic Herd mixed with the CAH during fall and winter. Central Arctic caribou probably also mix with the Teshekpuk Herd during late summer, fall and winter, and their range sometimes also overlaps with the PCH during winter and summer (ADF&G files). During 1995–2000 there was little or no mixing with the PCH during summer, largely because the PCH remained on the calving ground for only a short time and returned to Canada soon after calving. Some mixing may have occurred during summer 2001 when about 10,000 Porcupine caribou inhabited the Sadlerochit Mountains and Central Arctic caribou were located near the Canning River, 10–20 miles away. During winter 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. 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, and 26A. However, harvest in units other than Unit 26B (e.g., Unit 25A) 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–RY02).

Unit/Location	Resident Open Season/Bag Limit	Nonresident Open Season/Bag Limit
Unit 24, except for the Kanuti drainage upstream from and including Kanuti Chalatna Creek, and the Fish Creek and Bonanza Creek drainages of South Fork Koyukuk River.	1 Jul–30 Jun; 5 caribou per day; however, cow caribou may not be taken 16 May–30 Jun.	1 Jul–30 Jun; 5 caribou total; however, cow caribou may not be taken 16 May–30 Jun.
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 from 1 Jul–30 Sep and cow caribou may be taken only from 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 from 1 Jul–30 Sep and cow caribou may be taken only from	1 Jul–30 Apr; 2 bulls

Unit/Location	Resident Open Season/Bag Limit	Nonresident Open Season/Bag Limit
	1 Oct–30 Apr.	
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 oilfield. The area 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. During the March 2002 Board of Game meeting, additional restrictions were established (see below).

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 2002 meeting the Board of Game considered a number of proposals related to bow hunting and the use of motorized vehicles in the DHCMA, some of which will affect CAH caribou harvest. The board established the North Slope Closed Area, which is closed to big game hunting. The area includes the portion of Unit 26B within ¼ mile of the Dalton Highway from Atigun Pass north to the Prudhoe Bay Closed Area. The board also established a requirement that hunters using the DHCMA mark arrows with their bowhunter education certification number, extended the restrictions on the use of motorized vehicles in the DHCMA to apply to the Prudhoe Bay Closed Area, and limited the use of licensed highway vehicles in the DHCMA to publicly maintained roads. Caribou seasons and bag limits have remained the same since 1996.

Hunter Harvest and Success and Residency. During RY01, 918 hunters reported hunting caribou in the CAH range and 507 hunters reported harvesting 515 caribou. Reported harvest was considerably higher in RY00 and RY01 than in the previous 7 years (Table 7). Since 1984, harvest in the CAH has fluctuated. The change in harvest over time probably resulted from a combination of regulatory modifications and changes in hunting pressure. Beginning in RY86, more restrictive regulations were adopted and harvest decreased substantially through RY90. In RY90 hunting restrictions were implemented on several Interior Alaska caribou herds (e.g., Delta, Macomb, Fortymile), and hunters were displaced. Many of these hunters began hunting the CAH because they are accessible by road. Harvest was low in RY96, likely due to a

combination of poor weather in August and September and the closure of the moose season in Unit 26B. Harvest and number of hunters increased in RY97 and continued to increase thereafter.

Hunter success has always been good for the Central Arctic Herd (≥40% and frequently ≥50%; Table 7). Lower success rates (<49%) began in RY98 when 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 (12–19%) during RY92–RY01, and they took 16–24% of the harvest (except in RY95 when they took 37%). Nonresident hunters were highly successful (57–88% success). Nonlocal resident hunters during the same period also had good success (37–54%). 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 RY92–RY01 (16–32 cow caribou). 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 data (1985, 1992, 1993, 1994, 1999) from the Nuiqsut Subsistence Caribou Harvest Surveys which is a cooperative effort of the City of Nuiqsut, Kuukpik Corporation, Native Village of Nuiqsut, North Slope Borough, and Division of Subsistence, Alaska Department of Fish and Game (ADF&G files).

Bowhunters accounted for 37% of the harvest in RY01. The number of caribou harvested by archers was higher during RY97–RY01 ($\bar{x}$ = 36%) than during the previous 5 years (RY92–RY96; $\bar{x}$ = 27%; Table 7). This may reflect changes in the distribution of caribou, particularly in RY99 and RY00. The most important factor was probably the steady increase in the number of bowhunters using the DHCMA.

Harvest Chronology. During RY92–RY01, most reported harvest occurred in August (41–61%; Table 8). The remaining harvest occurred primarily in September and October. During RY97–RY00 the proportion of harvest in August was higher ($\bar{x}$ = 55%) than in the 4 previous years ($\bar{x}$ = 45%; RY92–RY96), probably because of the increase in hunters in August and the closure of the moose season on the North Slope in RY96, which reduced the number of hunters in the field during September. The proportion of the harvest in September was slightly higher prior to RY96 ($\bar{x}$ = 23%, RY92–RY96) than in subsequent years ($\bar{x}$ = 19%, RY97–RY00). The proportion of harvest in October was generally about 17% during RY92–RY98 but declined to 5% and 6% in RY99 and RY00, perhaps due to weather and/or caribou distribution. In RY01, a substantial increase in the proportion of harvest occurred in October (25%). This was probably related to warmer weather persisting into October during 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, 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 RY92–RY01, the proportion of hunters using highway vehicles was stable, ranging from 57 to 70%. Airplanes were the second most common transport method and were used by 18–28% of successful hunters; boats, horses, and dogs were each used by ≤15% of hunters (Table 9). Transport methods were similar to methods used in previous years, although use of boats (including airboats) on the Ivishak and Sagavanirktok Rivers has increased somewhat over the past 2 years. 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 (ADF&G files; S. Pedersen, personal communication).

Natural Mortality

Radiocollared caribou were relocated infrequently during fall and winter, making it difficult to estimate adult mortality or determine causes of adult mortality. Wolves (*Canis lupis*), grizzly bears (*Ursus arctos*), and golden eagles (*Aquila chrysaetos*) 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 they are on the north side of the range and snowfall is heavier. However, there have been no studies of predation rates on the CAH. During the 5 years from RY97–RY01 we confirmed 3 (3%), 1 (2%), 8 (9%), 15 (14%) and 4 (5%) mortalities among cow caribou with functioning radio collars.

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). Harvest increased in RY00 and RY01, but was still well below sustained yield (<2% of the herd). Most hunters living outside of Unit 26 used primarily highway vehicles as a means of access with most harvest occurring in August. Harvest by bowhunters also increased in recent years. Hunters residing in Unit 26 used boats, with approximately half of the harvest occurring in July, August, and September and the other half of the harvest occurring in March and April by use of snowmachine. Although herd size has increased and harvest has remained somewhat stable with a slight increase in RY00 and RY01, 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 for a new road that was built on the western edge of the calving grounds in Unit 26B West. 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 of 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 for RY01, reported and estimated harvest combined was 765 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). We met our second objective to maintain accessibility of seasonal ranges for CAH caribou because based on radiotelemetry and anecdotal observations, CAH animals were able to access their calving, postcalving, summer, fall, and winter ranges. We met our sixth objective to reduce conflicts between consumptive and nonconsumptive uses of caribou along the Dalton Highway because in 2002 the board established the North Slope Closed Area, which is closed to big game hunting for ¼ mile on either side of the highway in Unit 26B.

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TABLE 1 Central Arctic Herd caribou calving composition on the calving grounds[a] and estimated population size, 1978–2002

	Calving composition survey						Population survey	
Year	Day/ Month	Yearlings: 100 Cows	Bulls:100 Cows	Calves:100 Cows	Percent calves	Composition sample size	Date and method[b]	Estimated size
1978	Jun		19	68	36	950	Jul; STS	5000
1979	Jun	24	6	80	38	1865		
1980	Jun	48	4	69	31	787		
1981	Jun	22	9	87	40	3337	Jul; AC	8537
1982	Jun		20	62	34	1101		
1983	Jun		16	86	42	1879	Jul; APDCE	12,905
1984	12 Jun	25	9	89	40	2692		
1985	13–14 Jun	35	16	88	37	2357		
1986	12–13 Jun	33	7	56	29	891		
1987	13 Jun	19	4	74	37	4839		
1988	10–15 Jun	32	7	66	32	4892		
1989	11–15 Jun	16	6	48	28	2520		
1990	11–15 Jun	11	31	75	35	6543		
1991							18–20 Jun; GM	19,046[c]
1992	11–14 Jun	12	6	73	38	5556	8–9 Jul; APDC	23,444
1994	12–14 Jun	8	17	65	29	3638		
1995							13 Jul; APDC	18,100
1997	11–12 Jun	37	9	72	33	1995	19–20 Jul; APDC	19,730
2000	15–17 Jun	32	5	72	34	3097	21 Jul; APDC	27,128
2002							16 Jul; APDC	31,857

[a] Many bulls and yearlings are not on the calving grounds during this time.

[b] STS = Systematic transect surveys; AC = Aerial count; APDCE = Aerial Photo Direct Count Extrapolation; GM = Gasaway Method; APDC = Aerial Photo Direct Count.

[c] Ninety-percent confidence interval was 14,677–23,414.

TABLE 2 Central Arctic Herd caribou percent parturition of radiocollared females ≥4 years, 1988–2002

		Percent parturition by subunit											
		≥4 years old[a]						Sexually mature[b, c]					
Year	Date	26B West (*n*)		26B East (*n*)		All 26B (*n*)		26B West (*n*)		26B East (*n*)		All 26B (*n*)	
1988	2–14 Jun							73	(11)	100	(8)	85	(34)
1989	30 May–10 Jun							54	(13)	78	(9)	65	(23)
1990	31 May–14 Jun							83	(12)	100	(7)	87	(23)
1991	2–8 Jun							46	(11)	75	(12)	67	(30)
1992	6–12 Jun							73	(11)	75	(12)	77	(26)
1993	7–12 Jun							56	(9)	63	(8)	59	(17)
1994	10–14 Jun	67	(6)	78	(9)	73	(15)	67	(6)	88	(8)	79	(14)
1995	7–8 Jun	75	(4)	40	(5)	56	(9)	67	(3)	40	(5)	56	(9)
1996[d]													
1997	6–7 Jun	77	(13)	46	(13)	61	(26)	83	(12)	43	(7)	70	(20)
1998	3–4 Jun	93	(14)	90	(10)	92	(24)	92	(13)	100	(7)	95	(21)
1999	5, 9 Jun	100	(14)	100	(10)	100	(24)	100	(14)	89	(9)	100	(23)
2000[e]	6–7 Jun	89	(9)	100	(16)	96	(25)	83	(12)	100	(11)	92	(24)
2001[e]	3–9 Jun	89	(19)	94	(16)	91	(35)	92	(13)	93	(15)	91	(32)
2002	4–7 Jun	83	(29)	92	(25)	87	(54)	87	(16)	100	(17)	92	(39)

[a] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River using locations from the current summer.

[b] The criteria for a sexually mature female is that she was determined to have been parturient before including her in the sample. Data for females that were sexually mature were stratified based on the location of caribou east and west of the Sagavanirktok River. However, they were only included in the sample if they were located on the same side during the previous and current summer. Thus, the total (all Unit 26B) may exceed the combination of Unit 26B West and Unit 26B East.

[c] 1988–1994 data are from Cameron 1995 and Cameron et al. 2002.

[d] Survey not completed.

[e] Late spring on North Slope; some caribou still migrating.

TABLE 3 Central Arctic Herd caribou late June and summer calf cow ratios (calves:100 cows)[a] of radiocollared females ≥4 years old, 1988–2002

		Late June calf cow ratios (calves:100 cows) by subunit											
		≥4-years old[b]						Sexually mature[c]					
Year	Date	26B West	(*n*)	26B East	(*n*)	All 26B	(*n*)	26B West	(*n*)	26B East	(*n*)	All 26B	(*n*)
1988	Jun, Jul, Aug							47	(15)	100	(7)	71	(31)
1989	Jun, Jul, Aug							55	(11)	60	(5)	55	(20)
1990	Jun, Jul, Aug							67	(9)	75	(4)	63	(16)
1991	Jun, Jul, Aug							45	(11)	75	(4)	56	(22)
1992	Jun, Jul, Aug							64	(11)	82	(11)	71	(24)
1993	Jun, Jul, Aug							56	(9)	56	(9)	56	(18)
1994	27–29 Jun	50	(6)	75	(8)	64	(14)	50	(6)	67	(9)	60	(15)
1995	27, 30 Jun	75	(4)	50	(4)	63	(8)	67	(3)	50	(4)	63	(8)
1996	15–16 Jun	50	(4)	75	(4)	63	(8)	86	(7)	100	(4)	83	(12)
1997	29–30 Jun	85	(13)	64	(11)	75	(24)	83	(12)	50	(6)	74	(19)
1998	29–30 Jun	79	(14)	85	(13)	81	(27)	85	(13)	100	(9)	88	(24)
1999	22–24 Jun	92	(12)	80	(10)	86	(22)	91	(11)	78	(9)	85	(20)
2000	17–19 Jun	79	(14)	72	(18)	75	(32)	73	(15)	79	(14)	77	(30)
2001	23–25 Jun	78	(18)	81	(16)	79	(34)	73	(15)	77	(13)	77	(30)
2002	23–25 Jun	75	(28)	83	(24)	79	(52)	82	(17)	88	(17)	82	(40)

[a] Late Jun calves:100 cows was estimated during 15 Jun–30 Jun for years 1994–2002. Summer calves:100 cows was estimated during 15 Jun–15 Aug for years 1988–1993.

[b] Data for females ≥4 years old were stratified based on the location of caribou east and west of the Sagavanirktok River using locations from the current summer.

[c] The criteria for a sexually mature female is that she was determined to have been parturient before including her in the sample. Data for females that were sexually mature were stratified based on the location of caribou east and west of the Sagavanirktok River. However, they were only included in the sample if they were located on the same side during the previous and current summer. Thus, the total (all Unit 26B) may exceed the combination of Unit 26B West and Unit 26B East.

TABLE 4 Central Arctic Herd caribou known-age percent parturition of radiocollared females, 1994–2002

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	0 (0)	83 (12)	75 (12)	100 (9)	100 (20)

TABLE 5 Central Arctic Herd caribou known-age late June calf cow ratios (calves:100 cows) of radiocollared females, 1994–2002

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	0 (0)	57 (14)	75 (12)	100 (11)	81 (21)

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 1984–1985 through 2001–2002

Regulatory year	Reported harvest					Total hunters	Percent successful hunters	Estimated unreported harvest[b]	Total harvest
	Male	Female	Unk	Total (harvest by bow)[a]					
1984–1985	313	55	0	368				100–200	468–568
1985–1986	482	177	3	662				100–200	762–862
1986–1987	311	34	0	345		287	76	100–200	445–545
1987–1988	176	2	3	181		225	77	100–200	281–381
1988–1989	179	7	0	186		255	73	100–200	286–386
1989–1990	132	8	0	140		221	63	100–200	240–340
1990–1991	96	16	0	112		173	55	100–200	212–312
1991–1992	383	24	1	408		618	57	100–200	508–608
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

[a] Harvest by bow is included in total harvest.

[b] Estimate by area biologist and Division of Subsistence.

TABLE 8 Central Arctic caribou herd harvest chronology, regulatory years 1992–1993 through 2001–2002[a]

Regulatory year	Month (%)													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Unk	Total
1992–1993	7 (2)	197 (46)	122 (29)	73 (17)	10 (2)	1 (<1)	1 (<1)	0 (0)	6 (1)	6 (1)	1 (<1)	0 (0)	3	427
1993–1994	34 (9)	152 (41)	73 (20)	78 (21)	14 (3)	1 (<1)	2 (<2)	4 (<1)	3 (1)	8 (2)	0 (0)	0 (0)	3	372
1994–1995	28 (8)	154 (45)	109 (32)	27 (8)	1	0 (0)	0 (0)	0 (0)	12 (3)	6 (2)	0 (0)	0 (0)	3	340
1995–1996	9 (3)	150 (45)	64 (19)	65 (19)	21 (6)	1 (<1)	4 (<1)	1 (<1)	9 (3)	8 (2)	0 (0)	0 (0)	4	336
1996–1997	13 (6)	108 (49)	49 (22)	35 (16)	1	0 (0)	2 (<1)	0 (0)	2 (1)	5 (2)	0 (0)	0 (0)	5	220
1997–1998	7 (2)	189 (61)	40 (13)	44 (14)	1	3 (<1)	0 (0)	0 (0)	7 (2)	14 (4)	0 (0)	0 (0)	4	309
1998–1999	18 (6)	163 (52)	59 (19)	47 (15)	5 (2)	2 (<1)	3 (<1)	2 (<1)	3 (1)	9 (3)	0 (0)	0 (0)	4	315
1999–2000	18 (5)	201 (55)	86 (24)	16 (5)	8 (2)	1 (<1)	1 (<1)	0 (0)	8 (2)	17 (5)	0 (0)	2 (<1)	4	362
2000–2001	42 (8)	262 (53)	109 (22)	32 (6)	11 (2)	0 (0)	2 (<1)	3 (<1)	4 (1)	24 (5)	0 (0)	0 (0)	4	493
2001–2002	28 (5)	217 (42)	117 (23)	127 (5)	7 (1)	0 (0)	0 (0)	2 (<1)	5 (1)	7 (1)	0 (0)	0 (0)	5	515

[a] Includes only harvest from harvest report cards.

TABLE 9 Central Arctic caribou herd successful hunter transport methods, regulatory years 1992–1993 through 2001–2002

Regulatory year	Transport methods (%)								
	Airplane	Horse/Dog	Boat[a]	3- or 4-Wheeler	Snowmachine	Other ORV	Highway vehicle	Unk	Total
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)	4 (1)	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

[a] Includes airboats.