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CHAPTER 3: CARIBOU MANAGEMENT REPORT

From: 1 July 2012
To: 30 June 2014

LOCATION

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

HERD: Mulchatna

GEOGRAPHIC DESCRIPTION: Drainages into northern Bristol Bay and Kuskokwim River

BACKGROUND

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

Reports indicate that caribou numbers in the Mulchatna River area began to increase again in the early 1930s (Alaska Game Commission 1925–1939), then began declining in the late 1930s (Skoog 1968); however, no substantive information was collected between 1940 and 1950 to support this theory.

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

Aerial surveys of MCH's range were first conducted in 1949, when the population was estimated at 1,000 caribou. The population increased to approximately 5,000 by 1965 (Skoog 1968). In 1966 and 1972 relatively small migrations across the Kvichak River were recorded; however, no major movements of this herd were observed until the mid-1990s. An estimated 6,030 caribou were observed during a survey in June 1973. In June 1974 a major effort was made to accurately census this herd. That census yielded 13,079 caribou, providing a basis for an October estimate in 1974 of 14,231 caribou.

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

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a population of 30,000–80,000 with a minimum bull:cow ratio of 35:100.
- Maintain a harvest of 2,400–8,000.

Additional objective includes

- Manage MCH for maximum opportunity to hunt caribou.

METHODS

ABUNDANCE ESTIMATES

We conducted a photocensus of MCH during the postcalving aggregation period in late June or early July in most years from 1980 to 1992. From 1993 through 2003 the censuses were scheduled on alternate years. Since then, censuses have been planned for each year, with the realization a successful census would likely occur about 2 out of 3 years. The last successful photocensus conducted during this reporting period was in July 2013. Alaska Department of Fish and Game (ADF&G) coordinates censuses out of the Dillingham area office in cooperation with staff from the Bethel, McGrath, Palmer, and Fairbanks ADF&G offices; and personnel from Togiak National Wildlife Refuge, Yukon Delta National Wildlife Refuge and Lake Clark National Park and Preserve; with additional funding provided by the Bureau of Land Management. Biologists, using fixed-wing aircraft, radiotrack caribou and survey the herd's range, estimate the number of caribou observed, and photograph discrete groups. Since 1994 we have photographed large aggregations with an aerial mapping camera mounted in a de Havilland Beaver (DH-2) or Cessna C-206 aircraft flown by ADF&G staff. We estimate herd size using Rivest et al. (1998), by employing this technique of using radiocollared animals to estimate caribou abundance. This method takes into account collared animals that are located as well as those missed to derive the estimate.

COMPOSITION SURVEYS

We conducted aerial surveys to estimate the sex and age composition of the herd each October using fixed-wing aircraft and helicopters. Groups of caribou are located by radiotracking with the fixed-wing aircraft and a helicopter is used to isolate small groups from the main herd allowing for caribou in each of the following classifications to be tallied: calves, cows, small bulls, medium bulls, and large bulls. Classification of bulls is subjective and based on antler and body size.

CAPTURE OPERATIONS

MCH caribou were captured and radiocollared from 1980 to the present. These capture operations generally occur during late March–early April. Caribou are captured via aerial darting from a helicopter. These are usually cooperative efforts between ADF&G, Togiak National Wildlife Refuge, and Yukon Delta National Wildlife Refuge. During recent years, we have been collaring 20 short-yearling females each spring. This provides us with samples of animals in each age cohort, which in turn allows us to investigate age-specific parameters such as pregnancy and survival. The short-yearlings are weighed and provide an important metric to compare between years as an indirect measure of habitat quality and condition of caribou on the habitat.

PARTURITION SURVEYS

Beginning in May 2000, intensive aerial radiotracking surveys during calving have been conducted to determine the proportion of adult females calving, and more recently, age-specific parturition. A fixed-winged aircraft was used to find calving concentrations and locate individual radiocollared adult females. We attempt to get visuals on as many of the collared females as possible, and record whether they were pregnant (i.e., presence of a calf at heel or retaining hard antlers). Presence of hard antlers prior to calving is generally considered evidence the adult cow is pregnant (Whitten 1995).

RADIOTRACKING

We conducted periodic radiotracking flights throughout the year, mostly associated with parturition surveys, photocensuses, fall composition surveys, and spring captures. Data recorded during general telemetry flights were limited to location and status (live or dead) of each animal, while other more intensive surveys might include presence of a calf or hard antlers (parturition surveys), group size, and aggregation status (photocensus and fall composition).

HARVEST

We monitored the harvest from data collected from statewide harvest reports. During regulatory year (RY) 2012 (regulatory year begins 1 July and ends 30 June, e.g., RY12 = 1 July 2012–30 June 2013) we assessed harvest and effort using at statewide caribou harvest ticket, but in RY13 a registration permit (RC503) was required to hunt Mulchatna caribou. Reminder letters and news releases have been used to increase reporting compliance. We also assisted Alaska State Wildlife Troopers in enforcement during the fall and winter hunting seasons.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Between 1981 and 1996, MCH increased at an annual rate averaging 17%. However, from 1992 to 1994, the annual rate of increase appeared to be 28%, though this may have been an artifact of more precise survey techniques being used at this time. The dramatic growth of the herd is attributed to a succession of mild winters, movements onto previously unused range, relatively low predation rates, and an estimated annual harvest rate of less than 5% of the population since the late 1970s. This herd peaked in size during the mid-1990s and by 1999 the summer photocensus indicated the herd had declined from the peak, which probably occurred in 1996 or 1997. Over the next 15 years, this herd experienced a steady decline, and recent photocensuses through summer 2013 indicate this trend has continued.

Population Size

We were able to conduct 2 photocensuses during this reporting period, in both RY12 and RY13. In RY12 the point estimate was 22,809, which continued the trend of a declining herd since the peak in the mid-1990s. The RY13 photocensus estimate was lower still, with a point estimate of 18,308 caribou (Table 1).

Population Composition

In RY12, sex and age composition surveys of the eastern segments of MCH were conducted in all areas east of the Wood-Tikchik Lakes system on 14 October (portions of Units 17C, 17B, and 19B), and of the western population segments in all areas west of the Wood-Tikchik Lakes system (portions of Units 17A and 18) on 15 October. We classified 4,853 caribou overall, with the composition being 23.2 bulls:100 cows and 29.8 calves:100 cows (Table 2). The eastern portion of the herd had 17.4 bulls:100 cows and 22.2 calves:100 cows as compared to the western portion that was substantially higher in both categories, with 29.1 bulls:100 cows and 37.5 calves:100 cows.

In RY13 composition surveys conducted in the eastern segments of the population on 18 October were located almost entirely in Unit 17B with only a few groups found in eastern Unit 17C. The western segment of MCH, in all areas west of the Wood-Tikchik Lakes system, was surveyed on 19 October (portions of Units 17A and 18). We classified 3,222 caribou overall, with the composition being 27.2 bulls:100 cows and 18.6 calves:100 cows. The eastern portion of the herd had 27.4 bulls:100 cows and 13.6 calves:100 cows as compared to the western portion that had 27.0 bulls:100 cows and 23.1 cows:100 cows.

Parturition Surveys

Productivity surveys were flown in May of each year. In RY12, 68 radiocollared female caribou of calf-bearing age (2 years of age and older) were located and visual observations made on the following age classes: 11 2-year-olds, 14 3-year-olds, 15 4-year-olds, and 28 5-years old or older (Table 3). Of the 68 caribou sampled, 48 (71%) were accompanied by calves or had hard antlers. These included 3 of the 2-year-olds, 12 of the 3-year-olds, 10 of the 4-year-olds and 23 of the 5-years old or older cows. The pregnancy rates for the 2- and 3-year-olds suggest these animals are in good condition, and that the population as a whole is at a high level of productivity.

In RY13 we visually observed 55 radiocollared female caribou of calf bearing age including 5 2-year-olds, 8 3-year-olds, 11 4-year-olds, and 31 5-years old or older. Of the 55 caribou sampled, 48 (87%) of these were accompanied by calves or had hard antlers. These included 3 of the 2-year-olds, 8 of the 3-year-olds, 11 of the 4-year-olds, and 26 of the 5-years old or older. Although the sample size for 2-year-olds was only 5 animals, the fact that 3 of these or 60% were pregnant is a positive sign for continued good productivity in this herd.

Caribou Capture

In April 2013 we captured and radiocollared 10 short-yearling female caribou, 5 adult females, and 9 adult bulls. The captures were evenly divided between the western (Unit 18) and eastern (Units 9B and 17B) ranges of MCH. In April 2014 we captured and radiocollared 21 short-yearling female caribou, 1 adult female, and 10 adult bull caribou. As in 2013, these captures were evenly divided between the east and west ranges of MCH. All short-yearling females were weighed for comparison of body condition over time (Table 4).

Short-Yearling Weights

Body weights are recorded for all 10.5-month-old (i.e., short-yearling), female caribou captured and radiocollared. Short-yearling female weights from spring 2013 and 2014 continued to be much heavier than during both the peak of the population and the rapid decline of the herd (Table 4). In 2013, female short-yearlings averaged 127 lb (range 103–149 lb); in 2014, short-yearling females averaged 128 lb (range 107–142 lb).

Distribution and Movements

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

As has been the case in recent years, during RY12, and again in RY13, approximately half of the Mulchatna caribou traveled westerly through western Unit 17B into the Kuskokwim Mountains, and eventually into Unit 18 south of the Kuskokwim River to overwinter. The remainder of the caribou stayed on the eastern side of the Tikchik Mountains and were scattered in the Nushagak and Mulchatna drainages over the course of the winter.

Calving Areas. There has been considerable variation in calving areas over the past 30 years for MCH. Taylor (1988) noted the main calving area for MCH included the upper reaches of the Mulchatna River and the Bonanza Hills. Small groups also were observed in the Jack Rabbit and Koktuli Hills, along the Mosquito River, and in the Kilbuck Mountains in Unit 18. Since that time and up to this reporting period, calving areas on the east side of MCH's range have ranged as far north at the Holitna and Hoholitna rivers in Units 19A and 19B (2004), to as far south as the Kokwok River in Unit 17C (2014). In recent years however the main calving areas have been divided into a northern and southern group, east of the Tikchik Mountains. The northern group

has been in the area of Tundra Lake, just south of Lime Village in Unit 19A, while the southern group has been south and west of Koliganek in Units 17B and 17C.

During the first year of this reporting period (RY12), the calving sites mimicked those of the previous few years with the northern site being centered on Tundra Lake and the southern site being south and west of Koliganek. This changed somewhat dramatically in RY13, when the northern calving group that had been centered on Tundra Lake the last dozen years, moved south and east to the Bonanza Hills to calve (approximately 60 miles distance). The southern calving group was in their more traditional location being south and west of Koliganek. The large movement by the northern calving group is a mystery, but one that returned them to an area where they had traditionally calved in the early 2000s. During this reporting period, a few of the radiocollared females remained west of the mountains in western Unit 17B and Unit 18 during calving, but we did not have the resources to investigate calving in those areas.

Seasonal Movements. MCH generally does not move en masse as a distinct herd, nor do individuals move to predictable places at predictable times. The herd basically splits, with part of the herd moving to the eastern side of its range during the summer and the rest of the herd traveling to the western side; caribou then aggregate for the fall rut and winter in these respective areas. In late winter-early spring most of the caribou travel back to the middle and northern part of the herd's range for calving. Over the last several years, some caribou that wintered in the western side remained in Unit 18 to calve, while most of the caribou that winter in Unit 18 migrated east and through the mountains to calve east of the Tikchik Mountains almost entirely in the southern calving group.

After calving in mid- to late May, caribou from the southern calving area move west through the Tikchik Lakes (from south of Nuyakuk Lake to north of Nishlik Lake) into the headwaters of the Kanektok, Eek, Kwethluk, and Kisaralik river drainages and become widely scattered. Caribou in the northern calving area start moving southeast, towards the headwaters of the Mulchatna River before calving is completed. These caribou then disperse and become widely scattered throughout the area between the Nushagak Hills and Lake Iliamna. If dry, warm weather conditions occur, they tend to form tight postcalving aggregations to minimize insect harassment. In the fall, the caribou again begin forming large groups in the eastern and western parts of the herd's range where they will spend the winter.

Based on observation of movements by radiocollared caribou from 2000 through 2008, it did not appear that individual caribou had any particular affinity to either of the 2 calving or wintering areas. One individual radiocollared caribou might winter on the western side of the herd's range one year and on the east side the next. It might use the northern calving area one year and the southern calving area the next. Nor did it appear that all animals using one wintering area had any affinity to a particular calving area, or vice versa. Of the caribou wintering on the western side of the range, some would travel to the Kemuk Mountain area to calve and some would travel to the Tundra Lake area. The caribou wintering on the east side of the range would do the same, with some traveling north to calve and some remaining in the Nushagak drainage and calving near Kemuk Mountain.

This type of mixing has not been evident during the past 8 years, when nearly all the radiocollared cows that wintered on the east side of the range traveled north to calve in the

Tundra Lake area or the Bonanza Hills; and nearly all the radiocollared cows that wintered in the west traveled east to the Kemuk Mountain-southwest Koliganek area, with the exception of a handful of radiocollared cows that apparently calved in eastern Unit 18.

Similarly, nearly all the radiocollared caribou that calved in the Kemuk Mountain or Koliganek area traveled west to winter in Unit 18, and nearly all the caribou that calved near Tundra Lake or the Bonanza Hills wintered on the east side of the herd's range. Although there is some crossover by individual animals, this pattern of separation generally holds true.

In the past, several large peripheral groups appeared to be independent from the main MCH. A group of about 1,300 caribou resided between Portage Creek and Etolin Point until about 1999. Caribou in the Kilbuck Mountains (Seavoy 2001) and the upper Stuyahok and Koktuli river drainages (Van Daele and Boudreau 1992; Van Daele 1994) seemed distinct from MCH until the mid-1990s. These subsidiary herds periodically intermingled with the main herd but remained within their traditional ranges. As MCH grew in size and seasonally moved through the areas used by these groups, they eventually ceased to exist as discrete groups of caribou (Hinkes et al. 2005).

During the past several years it appears that small groups are again being found in various parts of MCH's range, some remaining distinct from the larger groups with others intermingling during calving. Most notably there seems to be a group of caribou that are seen routinely on the south side of Iliamna Lake, though our best estimate based on anecdotal observations would be in the hundreds rather than thousands.

MORTALITY

Harvest

Season and bag limit	Resident open season	Nonresident open season
Unit 9A, 9B, and that portion of 9C within the Alagnak River drainage:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Unit 9C, that portion north of the Naknek River and south of the Alagnak River drainage:		
RESIDENT HUNTERS: 3 caribou by permit.	Season may be announced	
NONRESIDENT HUNTERS:		No open season
Unit 17A, all drainages east of Right Hand Point:		
RESIDENT HUNTERS: 1 caribou.	Season may be announced	
NONRESIDENT HUNTERS:		No open season

Season and bag limit	Resident open season	Nonresident open season
Remainder of Unit 17A:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Unit 17B, that portion within the Unit 17B Nonresident Closed Area:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Remainder Unit 17B and a portion of Unit 17C east of the Wood River and Wood River Lakes:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Remainder of Unit 17C		
RESIDENT HUNTERS: 1 caribou.	Season may be announced	
NONRESIDENT HUNTERS:		No open season
Unit 18:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Unit 19A and 19B, within the Nonresident Closed Area:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season
Remainder of Unit 19A and Unit 19B:		
RESIDENT HUNTERS: 2 caribou, no more than 1 bull, no more than 1 caribou taken 1 Aug–31 Jan.	1 Aug–15 Mar	
NONRESIDENT HUNTERS:		No open season

Alaska Board of Game Actions and Emergency Orders. During the spring 2013 meeting, the Alaska Board of Game passed a proposal to replace the caribou harvest ticket with a registration permit for hunting Mulchatna caribou, this included Units 17, 18, 19A&B, 9A&B, and a portion of 9C. This regulation went into effect 1 July 2013.

Harvest by Hunters. The reported harvest from returned harvest report cards for MCH was 339 caribou during the RY12 hunting season and 114 during RY13 (Table 5). The most important factor in the low harvest in RY13 was lack of access to the caribou due to low snowfall and an almost nonexistent spring hunt which is when most caribou are taken. These totals and the number of hunters reporting hunting Mulchatna caribou continued to decline from previous years. Sex ratio of the animals reported taken varies considerably from year to year though bulls continue to make up the majority of the harvest. Since most caribou in recent years have been harvested during the late winter when bulls no longer carry antlers, the selection for bulls almost certainly is related to their larger body size and potential to provide more meat when compared to smaller-bodied cows.

The reported harvest of caribou in MCH is only a portion of what is taken, but what that missing proportion of unreported harvest is remains unknown. In the 1990s when as many as 5,000 caribou were reported to have been taken in a given year, the unreported harvest was estimated at 1,500–2,500 caribou. Today, with the population and harvest at a much lower level one would expect the unreported harvest to be lower as well. Changes in caribou distribution from year to year and variable snow cover necessary for winter travel can greatly affect the number of caribou killed. Caribou distribution during some winters has resulted in increased hunting effort by village residents of Unit 18. The recent regulatory change that required a registration permit to hunt Mulchatna caribou beginning in July 2013 may help with hunt and harvest reporting and provide us with better information on the true level of harvest.

Hunter Residency and Success. Local Alaska residents (living within the range of MCH) made up 76% of those hunters who reported hunting during both RY12 and RY13 (Table 6). Nonlocal Alaska residents accounted for 20% of the reporting hunters during RY12 and 22% during RY13. MCH is not open to nonresident hunters. Of the reporting hunters 57% successfully harvested at least 1 caribou in RY12; in RY13, 21% were successful. The low success in RY13 was related to lack of access during the late winter months due to lack of snow.

Harvest Chronology. Prior to RY06 when MCH was much larger than present, and transporters and guides hauled in hunters who were most often searching for large antlered bulls, much of the reported annual harvest occurred during August and September. It is at this time when the antlers are fully developed (with or without velvet) that bulls are at peak trophy value. However, the percentage of the reported annual harvest during fall months has been declining steadily over time. In RY12 only 10% of the harvest was recorded in August and September, while February and March accounted for 68% of the harvest. This change in the pattern of harvest chronology is due to the transition to a more local hunt where hunters from this area pursue caribou during the late winter months via snowmachines. Good snow cover allows hunters to access terrain in any direction, and with the advent of faster and more reliable snowmachines in recent years, hunters can be highly successful under the right conditions.

During RY13 the harvest chronology was nearly opposite of RY12. The fall harvest increased to 44% while the harvest in February and March was only 16% of the total take. This diversion from the recent trend is easily explained. During winter RY13 very little snow fell and access by snowmachine was almost nonexistent – and the spring harvest reflected this lack of access. The reason for the high fall harvest for RY13 is not because of a change in hunting patterns, but rather a complete lack of a spring harvest that by default inflated the magnitude of the fall harvest (Table 7).

Transport Methods. Aircraft were traditionally the most common means of transportation for MCH hunters, but have been replaced in recent years by snowmachines. During the RY12 hunting season only 9% of the hunters reported using aircraft, while 87% reported using snowmachines. This was a more typical Bristol Bay winter with adequate snow cover for winter travel. In the RY13 season however, 36% of the hunters reported using aircraft while 36% also reported using snowmachines (Table 8). This increasing use of snowmachines is reasonable considering the change in reported harvest chronology to the late winter months. What is most telling in this table for RY13 is the increase in boats and all-terrain vehicles as means of access for successful hunters. Both of these methods of access replaced snowmachines during the winter and spring of RY13.

Other Mortality

MCH declined 85% between 1996 and 2008. Annual survival of adult cows (2 years of age or older), averaged 90% during the period but was less than 80% in 6 of 13 years. Annual population sex-age composition surveys indicate markedly reduced calf survival beginning with the 1999 cohort.

A calf mortality study was conducted during spring 2011–spring 2014 in 2 calving areas, the Kemuk Mountain-Koliganek area in Units 17B and 17C; and the Tundra Lake-Bonanza Hills area in Units 19A, 19B and 17B. Survival rate of calves from birth to 4 months of age was 61% in the Kemuk Mountain-Koliganek area and 34% in the Tundra Lake-Bonanza Hills area. Over the 4 years of the study, approximately 82% of the mortality in the northern calving ground was predation related, with bears and wolves making up the majority of predation. However, in spring 2014 when the northern group moved to the Bonanza Hills to calve, golden eagles were the most significant predator. In the southern calving area, 68% of mortalities were linked to predation, with bears and wolves again being the most significant predators. In both groups, drowning was a leading cause of nonpredation mortality. The calving areas have small creeks with steep banks hidden in long grass that is deadly for the calves because they have little chance of climbing out once they fall in.

The specific causes for lower survival rates and the subsequent population decline from the late 1990s to present are poorly understood, but they likely result from a combination of intrinsic (e.g., nutrition, disease, pregnancy rates, survival rates, etc.) and extrinsic (e.g., weather, predation, etc.) factors. Because other caribou herds in Southwest Alaska experienced similar population declines (Northern Alaska Peninsula herd and Southern Alaska Peninsula herd) and reduced survival rates during the same period, it is possible that density independent factors (i.e., weather/climate) may have been a contributing factor. Also, the range of MCH expanded significantly during the mid-1990s. At that time the herd was at peak population levels, and the range expansion may be indicative of habitat limitations in traditional seasonal ranges. During

this period density dependent factors are likely to have resulted in deteriorated forage conditions on traditional ranges resulting in decreased nutritional condition of animals. This scenario would make them more susceptible to disease (foot rot, pneumonia, parasites) and predation, and thus contribute to lower survival rates.

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

HABITAT

Assessment

We have not objectively assessed the condition of the MCH winter range. Taylor (1989) reported the carrying capacity of traditional wintering areas had been surpassed by the winter of 1986–1987, and it was necessary for MCH to use other winter range to continue its growth. The herd has been using different areas at an increasing rate since that time.

Portions of the range used by MCH when the herd was at its peak population size show signs of heavy use. Extensive trailing is evident along travel routes. Some of the summer and fall range in the Nushagak Hills and elsewhere is trampled and heavily grazed. A range survey conducted in September 2010 by the Natural Resources Conservation Service (unpublished report by Karin Sonnen, Range Specialist, obtained from Michael J. Mungoven, NRCS, Homer, Alaska) in the southern calving area (and former wintering area) showed lichens had been heavily grazed and trampled in the past. Some areas showed signs of regrowth, other areas showed little recovery. Villagers from Nushagak River villages have also commented that lichens in some areas heavily used by caribou during the years of peak numbers seem to be showing recovery.

Traditional winter range on the north and west sides of Iliamna Lake also show signs of heavy use from the period of high density, although few caribou are now present in that area through the winter. Many of the areas that MCH started using in the mid-1990s had not been used by appreciable numbers of caribou for more than 100 years, or reindeer for 50 years.

CONCLUSIONS AND RECOMMENDATIONS

The minimum postcalving population estimates during this reporting period were 22,809 and 18,308 during RY12 and RY13 respectively. This continues the trend of declining abundance since peak numbers of ~200,000 caribou in 1996.

Distribution of this herd continued to be widespread throughout this reporting period. Fall composition count ratios have varied in recent years, but generally have been substantially lower than during the period of rapid herd growth during the late 1980s and early to mid-1990s.

The habitat being used by MCH caribou seems to be in excellent condition given that our indices of parturition rates, age of first reproduction, and weights of short yearlings all are indicative of a healthy herd.

The total reported harvest and the number of hunters afield continued to decline from long-term trends during this reporting period. The change from a general season harvest ticket to a registration permit (RC503) in RY13 will hopefully help with reporting compliance and better information on harvest and effort as we go forward.

MCH continues to present new management challenges as its size and range change. With the decline in population size, the productivity and condition of this herd as measured by pregnancy rates and weights of short yearling females, suggest this herd is in good condition physically with good reproductive potential. These indices provide optimism that this herd is capable of growing in size, barring mortality factors that could offset the reproductive potential we are seeing.

Recommended management actions for the next few years include

1. Conduct an annual photocensus during postcalving aggregations.

2. Conduct annual October composition surveys in both the east and west ranges.

3. Conduct calving-parturition surveys in May of each year.

4. Continue to collar a sample of short-yearling females each spring.

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

6. Continue to deploy SAT collars to provide herd movement and location data.

7. Work toward improved harvest reporting.

8. Continue to work with other land and resource management agencies and landowners toward management of this herd.

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Table 1. Mulchatna caribou herd estimated population size, Southwest Alaska, calendar years 1991–2013.

Calendar year	Date	Preliminary estimate[a]	Minimum count[b]	Extrapolated estimate[c]
1991	2 July	60,851		90,000
1992	7–8 July	90,550	110,073	115,000
1994	28–29 June	150,000	168,351	180,000
1996	28 June–3 July	200,000	192,818	200,000
1999	8 July	160,000–180,000	147,012	175,000
2001	30 June 2002		121,680	147,000
2004	7 July		77,303	85,000
2006	11 July		40,766	45,000
2008	7 July		20,545	30,000
2012	6 July		15,443	22,809
2013	12 July		12,660	18,308

[a] Based on estimated herd sizes observed during the aerial census.
[b] Data derived from photo-counts and observations during the aerial census.
[c] Estimate based on observations during census and subjective estimates of the number of caribou in areas not surveyed.

Table 2. Mulchatna caribou fall composition counts and estimated population size, Southwest Alaska, calendar years 1978–2013.

Calendar year	Bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Small bulls (% of bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Composition sample size	Estimate of herd size[a]
1978	50.3	64.5	27.6						758	7,500
1980	31.3	57.1	30.0						2,250	
1981	52.5	45.1	22.8						1,235	20,600
1986	55.9	36.9	19.2						2,172	
1987	68.2	60.1	26.3						1,858	52,500
1988	66.0	53.7	24.4						536	
1993	42.1	44.1	23.7	53.7				22.6	5,907	
1996	42.4	34.4	19.5	56.6	49.8	28.5	21.7	24.0	1,727	200,000
1998	40.6	33.6	19.3	57.4	27.8	43.7	28.5	23.3	3,086	
1999	30.3	14.1	9.8	69.3	59.9	26.3	13.8	21.0	4,731	175,000
2000	37.6	24.3	15.0	61.8	46.6	32.9	20.4	23.2	3,894	
2001	25.2	19.9	13.7	68.9	31.7	50.1	18.3	17.7	5,728	
2002	25.7	28.1	18.3	65.0	57.8	29.7	12.5	16.7	5,734	147,000
2003	17.4	25.6	17.9	69.9	36.2	45.3	18.5	12.2	7,821	
2004	21.0	20.0	14.2	71.0	64.2	28.9	6.9	14.9	4,608	85,000
2005	13.9	18.1	13.7	75.8	55.3	33.3	11.5	10.6	5,211	
2006	14.9	25.5	18.1	71.3	57.5	33.7	8.9	10.6	2,971	45,000
2007	23.0	15.8	11.4	72.1	52.7	36.0	11.3	16.6	3,943	
2008	19.3	23.4	16.4	70.1	46.8	36.1	17.1	13.5	3,728	30,000
2009	18.5	31.0	20.7	66.9	39.7	43.9	16.3	12.4	4,595	
2010	16.8	19.5	14.3	73.3	30.0	43.7	26.3	12.4	4,592	
2011	21.7	19.0	13.5	71.1	32.2	41.3	26.5	15.4	5,282	
2012	23.2	29.8	19.5	65.3	38.3	38.1	23.6	15.2	4,853	22,809
2013	27.2	18.6	15.4	66.6	37.3	43.0	19.7	18.0	3,222	18,308

[a] Estimate derived from observations during census, photo-counts, corrected estimates, and subjective estimate of the number of caribou in areas not surveyed.

Table 3. Mulchatna caribou calving surveys conducted in May, Southwest Alaska, calendar years 2000–2014.

Calendar year	2-yr-old		3-yr-old		4-yr-old		5+ yr-old		Total caribou located
	No. radios[a]	No. pregnant	No. radios[a]	No. pregnant	No. radios[a]	No. pregnant	No. radios[a]	No. pregnant	
2000	5	0	0	0	0	0	22	21	27
2001	6	0	4	3	0	0	11	8	21
2002[b]	4	0	7	4	1	0	5	2	17
2003	4	0	8	2	6	5	9	9	27
2004	9	0	2	0	3	3	13	12	27
2005	4	0	5	2	8	6	13	11	30
2006	7	0	0	0	3	2	14	12	24
2007	10	0	5	0	1	1	15	12	31
2008	10	1	10	4	9	7	14	11	43
2009	10	0	6	5	10	9	10	10	36
2010	5	1	13	9	9	5	19	16	46
2011	13	0	3	2	11	10	29	22	56
2012	12	0	15	10	2	1	32	27	61
2013	11	3	14	12	15	10	28	23	68
2014	5	3	8	8	11	11	31	26	55

[a] Number of radiocollared female caribou of that age located and observed during survey.

[b] Survey incomplete because of weather.

Table 4. Mulchatna caribou female calf weights, Southwest Alaska, calendar years 1994–2014.

Calendar year	Season[a]	Avg. weight (lb)	No. of calves
1994	Spring	130.5	2
1995	Spring	110.6	10
1996	Spring	98.0	1
1997			
1998	Fall	106.6	10
1999			
2000	Spring	103.5	11
2001	Spring	109.4	13
2002	Spring	109.2	22
2003	Spring	106.7	19
2004			
2005	Spring	115.9	19
2006	Spring	118.9	21
2007	Spring	121.8	15
2008	Spring	119.7	15
2009	Spring	95.5	6
2010	Spring	128.3	15
2011	Spring	124.1	18
2012	Spring	119.1	13
2013	Spring	127.0	14
2014	Spring	128.0	14

[a] Late March, early April, or October.

Table 5. Mulchatna caribou reported harvest from harvest report cards, Southwest Alaska, regulatory years[a] 1991–2013.

Regulatory year	Reported harvest by hunters			
	Male	Female	Unk	Total[b]
1991	1,353	203	17	1,573
1992	1,184	149	269	1,602
1993	2,268	523	13	2,804
1994	2,631	651	19	3,301
1995	3,345	1,076	28	4,449
1996	1,845	497	24	2,366
1997	2,277	411	16	2,704
1998[c]	3,936	809	25	4,770
1999	3,411	1,019	37	4,467
2000	3,272	789	35	4,096
2001	2,771	1,042	17	3,830
2002	1,875	646	16	2,537
2003	2,047	1,103	32	3,182
2004	1,223	997	16	2,236
2005	1,044	1,118	13	2,175
2006	508	406	7	921
2007	404	353	10	767
2008	256	253	1	510
2009	213	102	6	321
2010	250	220	4	474
2011	233	240	9	482
2012	174	162	3	339
2013	78	34	1	113

[a] Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 1991 = 1 July 1991–30 June 1992.
[b] Includes only reported harvest from harvest cards.
[c] First year that reminder letters were sent to caribou hunters.

Table 6. Mulchatna caribou annual hunter residency and success, Southwest Alaska, regulatory years[a] 1991–2013.

Regulatory year	Successful				Unsuccessful				Total hunters[c]
	Local resident[b]	Nonlocal resident	Nonresident	Total (%)	Local resident[b]	Nonlocal resident	Nonresident	Total (%)	
1991	89	562	599	85	9	136	69	15	1,464
1992	82	542	651	91	12	82	26	9	1,391
1993	47	718	725	85	5	171	77	15	2,394
1994	61	812	896	83	11	227	124	17	2,954
1995	52	1,035	928	87	15	188	86	13	3,127
1996	56	647	824	85	25	139	101	15	1,822
1997	85	564	1,277	84	33	178	152	16	2,301
1998	178	1,130	1,877	78	142	320	414	22	4,131
1999	174	1,024	1,697	72	120	453	553	28	4,039
2000	188	817	1,713	68	148	427	691	32	3,989
2001	270	843	1,377	74	159	351	368	26	3,406
2002	169	556	1,028	63	210	383	450	37	2,831
2003	312	762	1,111	71	181	352	378	29	3,129
2004	256	573	764	62	133	357	501	38	2,634
2005	418	427	485	56	229	322	497	44	2,405
2006	207	208	273	53	182	207	226	47	1,312
2007	334	148	125	58	184	163	105	42	1,084
2008	269	130	61	54	165	140	85	46	850
2009	180	63	0	49	197	82	0	53	540
2010	270	58	0	58	174	66	0	42	589
2011	305	87	0	70	115	53	0	30	575
2012	279[d]	48	3	59	155	67	7	41	572
2013	88[d]	24	1	20	328	96	3	80	545

[a] Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 1991 = 1 July 1991–30 June 1992.
[b] Includes residents of communities within the range of the Mulchatna caribou herd.
[c] From harvest report cards. Includes hunters of unknown residency who would not be tallied under the column headings, as well as hunters who reported killing more than 1 caribou.
[d] Data from ADF&G's Wildlife Information Network (WinfoNet) harvest information. Local resident includes residents of communities within Game Management Units 9B, 17AB&C, 18, and 19A&B.

Table 7. Mulchatna caribou annual harvest chronology percent by month[a], Southwest Alaska, regulatory years[b] 1991–2013.

Regulatory year	Harvest chronology percent by month										
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total[c]
1991		29.0	43.0	6.0	0.4	2.0	1.0	4.0	12.0	0.0	1,573
1992		30.0	54.0	5.0	1.0	0.3	0.2	1.0	8.0	0.0	1,602
1993		36.0	50.0	5.0	0.4	1.0	1.0	1.0	5.0	2.0	2,804
1994		35.0	50.0	5.0	0.4	1.0	1.0	1.0	5.0	2.0	3,301
1995		33.0	50.0	6.0	1.0	2.0	1.0	1.0	5.0	2.0	4,449
1996		25.0	52.0	5.0	1.0	1.0	1.0	2.0	11.0	2.0	2,366
1997		33.0	53.0	4.0	0.3	0.4	1.0	3.0	4.0	0.3	2,704
1998		25.0	55.0	6.0	0.6	0.6	2.0	2.0	7.0	1.0	4,770
1999	0.1	24.0	52.0	5.0	0.5	1.0	3.0	5.0	8.0	2.0	4,467
2000	0.2	27.0	55.0	6.0	0.3	0.3	2.0	3.0	4.0	1.0	4,096
2001	0.2	23.0	49.0	3.0	1.0	2.0	2.0	4.0	9.0	5.0	3,830
2002	0.2	23.0	55.0	4.0	0.6	1.0	3.0	2.0	6.0	2.0	2,537
2003	0.2	19.0	45.0	4.0	0.5	4.0	5.0	5.0	12.0	2.0	3,182
2004	0.2	20.0	46.0	2.0	1.0	2.0	2.0	2.0	10.0	9.0	2,236
2005	0.2	15.0	32.0	2.0	4.0	2.0	3.0	6.0	25.0	7.0	2,175
2006		13.0	38.0	1.0	3.0	5.0	4.0	10.0	21.0	1.0	921
2007		3.0	26.0	2.0	2.0	6.0	7.0	28.0	26.0	1.0	767
2008		3.0	23.0	3.0	5.0	4.0	6.0	25.0	30.0		510
2009		7.0	12.0	7.0	17.0	5.0	9.0	10.0	30.0		328
2010		3.0	7.0	1.0	3.0	14.0	7.0	19.0	44.0		474
2011		2.0	9.0	2.0	4.0	2.0	18.0	18.0	43.0		482
2012		3.0	7.0	1.0	2.0	12.0	6.0	16.0	52.0		336
2013		16.0	28.0	8.0	18.0	12.0	2.0	8.0	8.0		106

[a] July opening date for Unit 9B established starting 1 July 1999. Starting 2006, opening date 1 August. Starting 2008, all closing dates 15 March.
[b] Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 1991 = 1 July 1991–30 June 1992.
[c] From harvest report cards. Includes unknown harvest date.

Table 8. Mulchatna caribou harvest percent by transport method, Southwest Alaska, regulatory years[a] 1991–2013.

Regulatory year	Harvest percent by transport method								Total caribou[c]
	Airplane	Horse	Boat	3- or 4-Wheeler	Snowmachine	ORV[b]	Highway vehicle	Unknown	
1991	81.0	0.2	9.0	1.0	9.0	0.1	0.2	2.0	1,573
1992	88.0	0.2	8.0	3.0	3.0	0.1	0.1	0.0	1,602
1993	86.0	1.0	10.0	1.0	2.0	0.3	1.0	0.0	2,804
1994	85.0	0.2	12.0	1.0	2.0	0.0	0.2	0.2	3,301
1995	88.0	0.2	9.0	1.0	2.0	0.1	0.1	0.0	4,449
1996	82.0	0.4	10.0	2.0	3.0	0.3	0.7	1.0	2,366
1997	86.0	0.4	8.0	1.0	2.0	0.1	0.2	2.0	2,704
1998	82.0	0.1	10.0	2.0	3.0	0.1	1.0	1.0	4,770
1999	85.0	0.3	6.0	2.0	5.0	0.2	0.7	1.0	4,467
2000	87.0	0.2	6.0	1.0	5.0	0.1	0.1	0.6	4,096
2001	79.0	0.1	7.0	2.0	11.0	0.2	0.2	0.8	3,830
2002	82.0	0.2	8.0	3.0	5.0	0.0	0.0	0.2	2,537
2003	73.0	0.0	6.0	2.0	19.0	0.1	0.0	0.7	3,182
2004	74.0	0.0	7.0	1.0	17.0	0.0	0.0	0.9	2,336
2005	55.0	0.4	6.0	3.0	34.0	0.2	0.3	1.0	2,175
2006	61.0	0.4	7.0	4.0	27.0	0.2	0.3	0.5	921
2007	27.0	0.1	4.0	9.0	58.0	0.5	1.0	0.6	767
2008	23.0	0.0	3.0	10.0	63.0	0.0	0.0	1.0	510
2009	16.0	0.0	7.0	1.0	71.0	1.0	0.0	2.0	328
2010	9.0	0.0	4.0	2.0	85.0	0.4	0.0	0.4	474
2011	10.0	0.4	4.0	4.0	79.0	0.1	0.0	0.4	482
2012	9.0	0.0	1.0	2.0	87.0	1.0	0.0	0.0	339
2013	36.0	0.0	14.0	13.0	36.0	1.0	0.0	0.0	110

[a] Regulatory year begins 1 July and ends 30 June, e.g., regulatory year 1991 = 1 July 1991–30 June 1992.
[b] ORV = off-road vehicles.
[c] From harvest report cards. Includes harvest by unknown transport method.