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CHAPTER 9: CARIBOU MANAGEMENT REPORT

From: 1 July 2012
To: 30 June 2014

LOCATION

GAME MANAGEMENT UNIT: 13 and 14B (25,525 mi^2)

HERD: Nelchina caribou herd

GEOGRAPHIC DESCRIPTION: Nelchina Basin

BACKGROUND

The Nelchina caribou herd (NCH) has fluctuated in size over time. It has been managed for a population objective of 35,000–40,000 since the late 1990s. Maintaining a moderate objective has helped keep productivity high and the herd healthy. Harvest quotas have been developed annually with the intent of achieving maximum sustained yield.

The NCH is important to large numbers of hunters because of its accessibility and proximity to Anchorage and Fairbanks as well as residents of the Copper River Basin. Caribou hunting permits have been issued for state and federal subsistence hunts in Unit 13 since regulatory year (RY) 1990 (RY90 = 1 July 1990 through 30 June 1991), and hunters in a limited drawing hunt for caribou in Unit 14 have likely harvested a few Nelchina caribou that were moving through the hunt area. More recently, the Board of Game established new drawing hunts for Nelchina caribou in Unit 13, and a Tier I subsistence hunt, which have been offered since RY11. Both the number of permits issued and the allowable harvest fluctuate annually, depending on existing hunt structures and herd status. Herd management has allowed for tremendous hunting opportunity for resident hunters over the past few decades. Since 1990, more than 66,000 caribou have been harvested from the NCH, with an average of nearly 2,800 per year.

MANAGEMENT DIRECTION

MANAGEMENT OBJECTIVES

- Maintain a fall population of 35,000–40,000 caribou, with a minimum of 40 bulls:100 cows and 40 calves:100 cows.

- Provide for an annual harvest of 3,000–6,000 caribou.

METHODS

Censuses and sex and age composition surveys are conducted annually. The censuses involve aerial counts of caribou observed during late June or early July in postcalving aggregations. Aerial count techniques include fixed-wing photo censuses, direct counts from fixed-wing aircraft, or a combination thereof. Aggregation of caribou and weather conditions determine the

census technique. Large concentrated groups can be photographed effectively, whereas loosely aggregated caribou must be counted from the air. Composition data are collected via helicopter immediately after the census, and again in early October during the rut to determine the bull:cow ratio and to refine the estimate of calf survival and recruitment. Fall post-hunt population estimates are then calculated from the summer counts and fall composition data. Population data are modeled to determine future population trends and allowable annual harvest rates.

Radiocollared caribou are located seasonally to delineate herd distribution, determine seasonal range use, and estimate mortality rates. To accomplish this, we attempt to maintain a minimum of 40 to 60 radiocollared cow caribou in the herd. Collars are placed on 4- or 11-month-old female calves to obtain calf weights, as well as survival and parturition data for known-age females in following years. Radiocollared cows are located during the calving period to determine parturition rates and mean calving date.

Additional collaring began in the spring of 2011 as part of a new Watana Hydroelectric study. Additional cow caribou have been captured and fitted with Argos satellite collars, and a sample of bulls have been fitted with radio collars and Argos satellite collars.

To monitor hunt conditions and harvest, biologists use permit reports, radiotelemetry flights, and hunter field checks.

RESULTS AND DISCUSSION

POPULATION STATUS AND TREND

Population Size

Since the late 1990s, the department has attempted to manage the NCH near maximum sustained yield. This management strategy proves difficult when annual composition or count data are inaccurate or unattainable. In these years, the annual harvest quota may be set too high or too low, and corrections must be made in subsequent years.

In 1996 and 1997, the size of the NCH was intentionally reduced from 50,280 (in 1995) due to concerns about nutritional stress. In addition to high harvest quotas those years, wounding loss was likely very high given the exceptionally high hunter numbers. The herd declined rapidly. Population estimates averaged just fewer than 33,000 caribou from 1998 to 2003. The herd slowly increased, and by 2004 and 2005 population estimates were within the objective range (average = 36,550). Due to weather conditions no count was attained in 2006. Harvest quotas were set based on available estimates of calf production and survival, along with the bull-to-cow ratio. In 2007, the herd estimate again fell below 33,000. Due to weather conditions no count was attained in 2008.

Despite conservative harvest quotas during RY07 and RY08, the 2009 herd estimate of 33,837 (Table 1) remained below objectives. Although the 2009 count was conducted over a broad geographic area, encompassing a large portion of the eastern Talkeetna Mountains, there were indications caribou were missed. Of the radiocollared cows expected to be in this area, only 60% were located during pre-count flights. In addition to a low herd estimate, parturition was low and calf mortality increased in 2009. The annual harvest quota was further reduced to encourage herd growth.

Survival during the winter of 2009–2010 was very good and an exceptionally high number of calves were produced in 2010. A photo census was completed. The final fall population estimate of 48,653 in 2010 was much higher than anticipated and was the highest estimate since the last peak in 1995. Summer survival also was high as evidenced by a high fall calf-to-cow ratio. The harvest quota was increased. Survival of radiocollared caribou again was high during the winter of 2010–2011 as was calf production and early calf survival the following summer. Despite the good concentration of radiocollared caribou in the traditional count area, fewer total animals were observed during the 2011 summer census than expected. The large number of yearling caribou in the herd could have been partially responsible as these young caribou often fail to concentrate on the calving grounds where the traditional summer censuses are conducted. The final fall population estimate in 2011 was 41,394. Harvest opportunity remained relatively high.

The winter of 2011–2012 was relatively severe in Unit 13 with persistent deep snow, although the majority of the herd wintered near or north of the Alaska Range where winter conditions were mild. Productivity declined somewhat in 2012 despite high numbers of yearling and 2-year-old caribou. During the summer census, caribou were loosely aggregated and a photo count could not be completed. Conditions, however, were very good for a traditional summer census as caribou were congregated above tree line and groups were relatively sedentary during the count. The fall estimate indicated an increase in the population to 50,646 caribou.

Conditions did not allow for a photo census in the summer of 2013 but aerial surveys were conducted to estimate herd size. The fall estimate for 2013 was 37,257 animals. The drastic decline observed between the 2012 and 2013 estimates is suspected to be a result of poor survey conditions and poor aggregations for the 2013 summer census.

Population Composition

The most important annual variable for management of the NCH is calf recruitment; a combination of productivity and calf survival. Variations in calf production generally relate to changes in body condition. Poor condition in young caribou can result in a delay in age of first reproduction. Reproductive age cows can also skip a breeding season to regain body condition if they are nutritionally stressed (Whitten 1995). While nutritional stress can occur due to annual weather fluctuations, it can also result due to overgrazing, or a combination of these factors.

The number of calves born and subsequent calf survival are the largest components in estimating the annual increment available for harvest for this herd. Parturition, the birthrate, of radiocollared cows provides initial spring data on the status of the herd. These data have been collected from known-age NCH cows since 1997. The typical age range of first reproduction in the NCH is 3 to 4 years old. Parturition of these young cows appears to be the most sensitive to nutritional fluctuations, and may provide a useful index of herd performance. Since 1997, annual 3-year-old parturition has averaged 41%; overall parturition for cows 3 years of age and older has averaged 72%.

With no parturition data prior to 1997, there is no way to know what immediate effects the increased herd size during the mid-1990s had on birthrates. Although the size of the herd was intentionally reduced by 1997, nearly half of the 3-year-old radiocollared cows had calves in 1997 and 1998 (50%, n = 6 and 45%, n=11, respectively). Parturition declined from that point with 25% observed in 1999 (n = 12) and 0% in 2000 (n = 8). While deep snow in Unit 13 likely

played a role in low parturition in 2000 and 2001, rates remained relatively low from 2002 to 2005 (average = 46%; *n* = 40).

Although the annual sample of radiocollared 3-year-old cows has been small in recent years, 3-year-old parturition in 2007, 2008, and 2010 combined was relatively high, averaging 67% (*n* = 18). No 3-year-old parturition data were available for 2009. For comparison, parturition for cows 3 years of age and older for 2007, 2008, and 2010 combined was 85% (*n* = 95), well above the long-term average. The 2009 rate, while biased towards older cows (no 3-year-olds), was very low at 65% (*n* = 23). Overall parturition was also lower than average in 2011 and 2012, with an average 3-year-old rate of 23% (*n* = 23) and an average for cows 3 years of age and older of 79% (*n* = 78). Parturition rates for 3-year-olds in 2013 neared the long-time average, with 39% of 3-year-old cows parturient (*n* = 23). Overall parturition (3 years and older) was above average, at 73% (*n* = 115).

In addition to parturition, calf survival plays an integral role in annual herd management. While a significant number of calves are lost in the first several weeks of life, summer herd composition data (collected immediately following the census) have proven useful in estimating annual recruitment, population trajectory, and initial harvest quotas.

Nelchina calf ratios have traditionally been high compared to other Alaska caribou herds (Harper 2011). Summer ratios have averaged 49 calves:100 cows (range = 31–65:100; 1972–2012), with fall ratios averaging 39:100 (range = 20–55:100) during the same period. The lowest ratios for this herd were observed in 1999 and 2000 (average = 32:100 in the summer and 22:100 in the fall; Tobey 2001). The combination of variable weather, low parturition (average birthrate of 47% for cows 3 years of age and older), and high wolf numbers on the summer range (average fall density = 11 wolves/1,000 km^2 for Subunits 13A and 13B) were all likely responsible for the low calf recruitment.

Calf ratios were below average for 2012 and 2013. Summer ratios were 34 and 27 calves per 100 cows, respectively. The fall ratios were 31 and 19 per 100 cows, respectively. Early calf survival may be the largest contributor to higher ratios. The low calf:cow ratio in 2013 is likely due to the combination of several late winter snow events that resulted in a late spring, late migration, and late green-up. Cows began calving during their migration and were crossing rivers that were near flood stage in early June. The timing of calving during migration and the difficult travel conditions likely contributed to higher than normal calf mortality. During the summer composition survey many cows were observed with full udders but no calves.

While calf loss between parturition and the summer composition survey is not monitored regularly, loss between the summer and fall surveys is calculated in number of calves per 100 cows or a percentage of calves lost. Since 1972 this summer-to-fall calf loss has been variable, averaging 11 calves:100 cows (range = 2–23) or 23%. The highest consecutive years of loss were 1996–2000 when an average of 13 calves:100 cows were lost (32%), coinciding with a high unitwide fall wolf density (average = 11 wolves/1,000 km^2; subunit estimates were unavailable prior to 1998). The highest years of wolf harvest followed in 1999–2001, though harvest rates averaged only 47% and wolf numbers were still relatively high (Tobey 2003). Notably, the summer-to-fall calf loss declined markedly to only 4 calves:100 cows each year 2001–2003. While this was a dramatic change, the pattern did not hold. Fall wolf numbers on the caribou

summer range have further declined (Schwanke 2012) to a stable 4 wolves/1,000 km^2 since 2006, and summer-to-fall calf loss has increased to an average of 12 calves:100 cows (23%).

The variation in calf ratios and recruitment year-to-year can be significant in determining population trajectory and subsequent harvestable surplus. In 2010, the exceptionally high 55 calves:100 cows that were observed in October meant over 11,000 calves made it to fall. This is in contrast to the 31 calves:100 cows observed in the fall of 2012 which represented just over 8,000 calves. The 19 calves:100 cows observed in the fall of 2013 equates to over 4,000 animals. These calves must go through one full winter before they are considered recruited into the population. Winter mortality for calves varies greatly, from around 15% to 30%.

In addition to annual calf recruitment and general herd composition, calf weights and measurements also provide indices by which overall herd health can be monitored. Four-month female NCH calves have been weighed in the fall since 1995 (average = 119 lb). Annual sample sizes have ranged from 8 to 40. For 2012 and 2013, the average weight of fall calves dropped to 114 lb (2012 range = 96–131 lb; n = 20, 2013 range = 94–129 lb; n = 19). While annual weather conditions such as snow depth, timing of green-up, and quality of the growing season can impact calf weights and measurements year to year, trends may indicate changing range conditions.

Herd health indices, population status, and composition data are all used to set harvest quotas annually. While initial harvest quotas must be set prior to the fall hunting season, fall calf and bull ratios are used to refine the harvestable surplus estimate in those years when hunts extend past October. The fall bull ratio increased steadily after 2004, reaching 64 bulls:100 cows in 2010. Following higher bull harvest quotas in 2010 and 2011, the ratio declined to 57:100 in 2012 and 30:100 in 2013 (Table 1).

Bulls are also classified by antler size (small, medium, and large) during the fall. Considering many caribou hunters select for large-antlered bulls, hunting can impact this segment of the population in a short period of time (Milner et al. 2007). Between 1998 and 2001, only 13% of all bulls were estimated as large antlered. The harvest quota for bulls decreased from 1,500 in 1999 to 1,000 in 2000 and remained at 1,000 until 2005. The number of bulls estimated as large antlered increased to 22% between 2002 and 2005, likely as a result of the quota reduction. The percentage of large-antlered bulls has trended higher since (averaging 26% of all bulls; 2007–2013).

Distribution and Movements

Calving typically takes place in the southwest portion of the herd's range in the eastern Talkeetna Mountains from the Little Nelchina River north to Fog Lakes. The core calving area extends from the Little Nelchina River to Kosina Creek. This area is also used during the post-calving and early summer periods. During summer through early fall, caribou disperse north and east. Their fall distribution can extend across the Denali Highway, the Alphabet Hills, and the Lake Louise flats as far east as the Gulkana River.

The Nelchina herd ruts from late September through mid-October, and has occurred in different areas depending on the year. In 2009 and 2010 rutting was concentrated in the center of the unit, covering portions of Units 13A, 13B, and 13E. In 2011, caribou started to migrate to the northeast early. The rut occurred from Tangle Lakes east through the Chistochina River drainage

in Units 13B and 13C, and into Drop Creek in northern Unit 11. In 2012, caribou were scattered across Unit 13 during the rut. A large group of caribou rutted in the Paxson area, with additional animals to the west between the Upper Susitna and MacLaren rivers. Another substantial group of caribou rutted in the Upper Talkeetna River drainage. In 2013, the rut occurred from the northwest Alphabet Hills spreading south to Hungry Hollow and East to the upper Chistochina.

Winter habitat for the NCH extends from Cantwell Unit 13E, east across Units 13A and 13B, and northeast into Units 11, 12, and 20E. Through the 1980s and 1990s, as the size of the herd increased its range expanded. Use of Unit 13 winter range declined in the mid-1990s as caribou began to find higher quality winter range in Unit 20E, presumably due to an abundance of lichen in older burns in the vicinity of the Taylor Highway. This shift in winter range use may be another indicator that the herd has begun to overutilize certain portions of its range; if that is the case, Unit 13 winter range may have the opportunity to recover over time as the herd winters elsewhere.

In 2004 much of the preferred NCH winter range in Unit 20E burned, such as the Upper West Fork of the Fortymile River and the Upper Dennison. While caribou have been avoiding the recently burned areas, they continue to use adjacent unburned areas. Nelchina caribou that continue to winter in Unit 20E are now concentrated in unburned areas. There has also been documentation of increased movements to previously unused areas, such as the Mosquito Fork and Kechumstuk Mountain, northwest of a large burned area, as well as east into the Yukon. Approximately 60–95% of the NCH continues to winter in Unit 20E.

In addition to winter habitat loss in Unit 20E, continued growth of the Fortymile caribou herd could also impact the NCH. A portion of the Fortymile herd uses this same area year-round (Boertje and Gardner 2000) and winter competition has been increasing between these herds in recent years. The Fortymile herd has increased nearly 40% since 2001, is now greater than 50,000 animals, and continues to grow. With the Fortymile Caribou Herd Harvest Management Coalition membership continuing to support further herd growth (Jeff Gross, Area Biologist, Alaska Department of Fish and Game [ADF&G], Tok, personal communication), competition will continue to increase and this winter range could become overgrazed. With limited lichen availability and increasing winter pressure on the unburned range, movements and nutritional indicators for both herds will continue to be monitored to assess the impacts.

While the calving distribution of the NCH remains relatively constant each year, caribou do not typically show fidelity to other seasonal ranges. Annual movements and range use likely depend on resource availability as well as the persistence of snow. As in years past, as the NCH grows, larger groups of caribou start to utilize range outside the core areas. Caribou often remain in these areas year-round, though intermixing is still evident based on radiocollar data. These groups are common throughout the Talkeetna Mountains and portions of the Alaska Range between the Upper Nenana River and the Upper MacLaren River. Additional groups can also be found in the Tolsona area, and to the southeast into the Tonsina River drainage. Considering the current objective is to reduce the size of the herd, it is expected that these groups will shrink as well.

MORTALITY

Harvest

Season and Bag Limit. The season dates for state subsistence caribou hunts in Unit 13 have historically been 10 August–20 September (fall) and 21 October–31 March (winter). In RY12 and RY13, a Tier I subsistence community hunt (CC001) and a Tier I subsistence registration hunt (RC566) were held. The bag limit was one caribou per household and hunters were restricted to participating in only one of the hunt options. In RY12 the caribou season remained open until the end of the winter season, March 31. In RY13 the caribou quota was reached during the fall season, and no winter hunt was held.

Also during RY12 and RY13, 4 Unit 13 drawing hunts (DC480–483) were offered to Alaska resident hunters with a bag limit of 1 bull caribou. The season dates were 20 August–20 September and 21 October–31 March.

Since 1993 there has also been a drawing hunt (DC590) held in the Talkeetna Mountains in Unit 14B for 1 caribou with season dates of 10 August–20 September.

The Unit 13 federal subsistence hunt for rural residents (FC1302, previously FC513 and FC514) is held 1 August–30 September and 21 October–31 March (opening on 10 August prior to 2012). The federal bag limit is 2 caribou, and each hunter is issued 2 permits. The Unit 13 federal subsistence hunt is by registration, administered by the Bureau of Land Management (BLM); only residents of Units 11, 13, and 12 along the Nabesna Road, and Unit 20 residents from Delta Junction are eligible. A Unit 12 federal subsistence hunt (FC1202, previously FC412) for rural residents of Unit 12, Dot Lake, Healy Lake, and Mentasta is opened for 1 caribou by emergency order when the NCH migrate through the Tetlin National Wildlife Refuge during winter months.

Board of Game Actions. During the 2013 Southcentral Board of Game meeting, the board changed the bag limit for drawing caribou from bull to caribou and also provided ADF&G the ability to restrict the bag limit if biologically necessary. In addition, the board increased the number of drawing permits available from 3,000 to 5,000.

Hunter Harvest and Emergency Orders. The total reported harvest from all NCH state and federal hunts varies annually depending on hunter participation, caribou availability, and annual quotas. In order to return the Nelchina caribou population to within objectives, a liberal harvest quota of 4,000 bulls and 1,500 cows was established in RY12. The quota was not met under the available hunt structure; a total of 4,356 caribou were taken.

Given decreased winter survival and a decrease in overall caribou numbers in 2013, the RY13 harvest quota was decreased to 2,500 caribou. A total of 8,026 hunters (both state and federal) reported hunting and harvested a total of 2,645 caribou, exceeding the quota by 145 (Table 2). On October 15, all state hunts were closed by Emergency Order for RY13, and no winter season was held.

Illegal and unreported harvests of Nelchina caribou are an additional unknown source of mortality. The most common type of illegal harvest occurs when a permittee fails to validate the permit after taking a caribou.

Wounding loss can be high because caribou are often shot while in groups, and more than one animal can be hit with a single shot. Additionally, identifying a specific animal from a group is difficult, particularly cows and small bulls. While some cows are mistakenly taken when a hunter is required to take only bulls, more care is exercised to be sure of the target. Wounding loss increases when high numbers of permits are issued and when large numbers of caribou migrate across the Richardson Highway during open hunt periods.

Permit Hunts. Nelchina caribou may be harvested only under permit (Table 2). Through RY08, the Tier II subsistence hunt TC566 was the primary caribou hunt in Unit 13. No Tier II hunt was offered in RY09, though a winter season hunt was offered in RY10. Tier II hunts are no longer offered for the NCH.

To provide the maximum opportunity to participate in Unit 13 caribou hunts, two Tier I subsistence hunts are now offered (RC566 and CC001). Alaska resident hunters must apply for these hunts in November or December prior to the hunting season. The RC566 hunters and their household members are limited to hunting caribou and moose in Unit 13 for the entire regulatory year. Community hunters (CC001) and their household members are also limited to hunting caribou in Unit 13, though they may hunt moose anywhere within the community hunt area (Units 11, 13, and a small portion of 12) for the regulatory year. Community hunters apply in groups and have the added benefit that they are allowed to use designated hunters within their group to harvest caribou. They are also required to salvage all edible meat, as well as the heart, liver, and kidneys. There were no antler specific regulations during this reporting period.

The drawing hunt in Unit 14B (DC590) has been held each year. Beginning in RY11, 4 drawing hunts were offered in Unit 13 (DC480–483). The hunt boundaries were based on historical hunting areas within the unit. The DC480 hunt area covers Unit 13D and the majority of Unit 13A south of the Black River. The DC481 hunt area covers Unit 13E south of the Susitna River, and 13A north of the Black River. The DC482 hunt area covers Unit 13E north of the Susitna River, and Unit 13B west of the MacLaren River. The DC483 hunt area covers Unit 13B east of the MacLaren River, and Unit 13C.

There are 2 federal permit hunts for rural residents, one in Unit 12 (FC1202; previously FC412) and one in Unit 13 (FC1302; previously FC513 and FC514).

Hunter Residency and Success. Only Alaska residents may hunt Nelchina caribou in Units 12 and 13, while nonresident hunters may hunt in Unit 14B (a nonsubsistence area). Of these Unit 14B hunters, 93% have been Alaska residents (RY09–RY13). In RY12, 83% of nonresidents and 76% of residents were successful in harvesting a caribou in the DC590 hunt. During RY13, 78% of DC590 were successful (nonresidents 100%, residents 73%).

In RY12, of 5,045 permits issued in the RC566 hunt, 3,781 nonlocal residents and 99 local residents (residents of Units 11, 13, or 12 along the Nabesna Road) reported hunting (Table 3). The nonlocal resident success rate was 66%, while the local resident success rate was 50%. The number of RC566 permits issued increased to 6,878 permits in 2013; of 4,146 permit holders who reported hunting, 38% were successful. The nonlocal success rate was 40% and the local success was 11%.

In the RY12 CC001 hunt, of 402 permits, 143 nonlocal residents and 95 local residents reported hunting. The nonlocal resident success rate was 75%, while the local resident success rate was only 45%. During RY13, 689 CC001 permits were issued. Of 307 hunters who reported hunting, 37% were successful. The nonlocal resident success rate was 45% and the local resident success rate was 11%.

For the Unit 13 drawing hunts (DC480–483) in RY12, 3,001 permits were issued. Of those who reported hunting, 2,056 were nonlocal resident hunters, while only 12 were local residents. Nonlocal residents averaged 49% success, while local residents averaged 58%. In 2013, 5,000 draw permits were issued. Of 2,179 hunters that reported hunting, 28% were successful. Nonlocal resident success was 28% and local resident success was 6%.

The lower success rates for all hunters during RY13 can be attributed to the harvest quota being reached during the fall season, and the winter season being closed by Emergency Order that year.

While nonlocal hunters experienced higher success rates on state hunts, federal hunts were exclusive to local hunters. In RY12 and RY13, 608 and 309 additional caribou, respectively, were taken by local hunters in federal hunts.

Harvest Chronology. The fall caribou season in August and September is the most popular time to hunt Nelchina caribou (Table 4). Hunting pressure typically increases during moose season (1–20 September) by hunters on combination hunts. Bulls also become more vulnerable in September because of the onset of the rut and movement patterns that bring caribou closer to the roadways. Winter harvest patterns are typically dependent on caribou availability, as well as emergency closures.

Transport Methods. The most common methods of transportation for Nelchina caribou hunters are all-terrain and highway vehicles (Table 5). For hunters using highway vehicles as their primary method of transportation, success is highest during the months of October and November when caribou are migrating across the Richardson Highway. While most Nelchina hunts are road or trail accessible, 2 hunts are primarily accessed by aircraft, the drawing hunt in Unit 14B (DC590) and the drawing hunt in southern Unit 13E (DC481). For DC590 and DC481, 98% and 54% of successful hunters, respectively, reported using aircraft during this reporting period. Of the successful DC481 hunters, 38% reported using 3- or 4-wheelers, and 8% reported using a boat.

Other Mortality

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

Brown bears are considered numerous throughout the NCH summer range and are known to be important predators of caribou (Boertje and Gardner 1998). Between 2006 and 2011 ADF&G staff observed radiocollared brown bears feeding on caribou, in addition to moose, on the Nelchina caribou calving grounds.

Wolves are present throughout the NCH range, and Ballard et al. (1987) reported that Unit 13 wolves preyed on caribou whenever they were available. The importance of wolf predation on caribou depends on wolf numbers, the relative availability of moose, and the size and distribution of the NCH.

The NCH is likely benefiting from an intensive wolf management program to improve moose abundance that has been ongoing in Unit 13 since 2001. Overwinter survival in relation to the intensive management program is difficult to monitor considering large numbers of caribou move out of Unit 13 during winter months. The highest overwinter mortality documented in recent years was in the winter of 2008–2009, when 10 of 58 (17%) radiocollared cows died. Caribou were widely scattered and the snow was relatively deep; both factors tend to increase losses to predation.

Perhaps more important than Unit 13 wolf numbers has been the recent reduction in wolves in Unit 20E (Gross 2009). During the winter of 2010–2011, 10 of 79 (13%) radiocollared cows died. Yearling mortality was 28% (5 of 18) and adult mortality was 8% (5 of 61). Mortality during the winter of 2011–2012 was even lower despite relatively deep and persistent snow; 5 of 74 (7%) radiocollared cows died. Yearling mortality was 29% (4 of 14), while adult mortality was only 2% (1 of 60).

HABITAT

Assessment

Between 1955 and 1962, ADF&G established 39 range stations, including exclosures, throughout much of the Nelchina caribou range in Unit 13. Biologists examined these stations at approximately 5- to 6-year intervals from 1957 through 1989. A complete description of the Nelchina caribou range, range station locations, and results of long-term monitoring was presented by Lieb (1994). Lieb concluded that lichen use was high during the 1960s, when caribou were abundant, and the result was an overall decline in lichens on the Nelchina range. Following a decline in caribou numbers, lichen increased over much of the fall and traditional winter range from the early 1970s until 1983. However, as the herd doubled in size between 1974 and 1983, increases in lichen biomass ceased in areas of substantial caribou use. Between 1983 and 1989, continued increases in caribou numbers resulted in a decline in lichen biomass. Lieb concluded that in 1989, 77% of the Nelchina range exhibited poor lichen production, 2% was considered to have fair production, and only 21% good production; this compared to 33% of the range in each category in 1983. On the important calving and summer range in the Eastern Talkeetna Mountains, Lieb (1994) reported the lowest lichen biomass ever recorded, with all the preferred lichen species virtually eliminated.

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

cool, cloudy summer conditions minimize insect activity as well as increase forage quality in terms of higher nitrogen levels in vascular plants (Lenart 1997).

Enhancement

Short-term caribou habitat enhancement depends more on weather conditions than any other factor. The Nelchina summer range has a short growing season due to the high average elevation of 1,256 m (4,122 ft). An early spring can provide caribou with abundant early, nutritious forage that can have a substantial impact on lactation and summer body growth. If precipitation is adequate through the rest of the summer, range conditions usually improve. Drought summers can be devastating to both vascular and nonvascular forage plants.

Long-term caribou habitat enhancement is largely dependent on limiting herd growth to historic sustainable levels, in the range of 35,000 to 40,000 caribou versus the 45,000 to 50,000 level observed during the 1990s. Between 1999 and 2009, the herd was maintained at or below the objective range, likely allowing for range recovery. With the recent influx of calves, the herd was above the objective 2010–2012, with fall estimates averaging 46,897. The quotas were reduced in 2013 due to the low census count, although the count was likely biased low, and not representative of the actual population size.

Habitat diversity, which can be achieved through the return of wildfire or controlled burns, is also important for long-term habitat advancement. The Alaska Interagency Wildland Fire Management Plan (Alaska Wildland Fire Coordinating Group 2010) provides for a natural fire regime that allows fire to function in its ecological role in remote portions of Unit 13, although large wildfires are rare in this area. While wildfire likely enhances summer range conditions by increasing forbs, sedges, and deciduous shrub growth, recent research has focused on the role of fire on winter range. Joly et al. (2003) found that Nelchina caribou routinely select winter habitat that is more than 50 years post burn, likely due to the slow growth of lichens. Collins et al. (2011) suggested that there are tradeoffs for habitat enhancement to consider, between early and mid-to-late successional vegetation, with the introduction of fire in caribou habitat. Considering wildfire may play a role in the enhancement of depleted or decadent stands of plant species important to caribou during the spring and summer months, but limit the biomass of lichens important for overwintering caribou, an understanding of which seasonal forage may be limiting is important prior to the application of prescribed fire..

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

NONREGULATORY MANAGEMENT PROBLEMS/NEEDS

During recent years that has been renewed discussion of constructing a Susitna-Watana Hydroelectric Project, which would be within the core of the Nelchina caribou range. During Susitna Hydroelectric Project big game studies conducted in the 1980s, caribou were documented using the proposed site (Pitcher 1987), although not as consistently as they do now. Large numbers of caribou have spent a considerable amount of time in the Watana Creek area in recent years, perhaps associated with herd growth. A variety of new field studies commenced in this area in 2011, and will continue for 5 years or more before a decision will be made as to future development. Nelchina caribou monitoring efforts have been increased recently in association with this project.

CONCLUSIONS AND RECOMMENDATIONS

The long-term management objective for the Nelchina caribou herd is to hold population numbers stable at 35,000-40,000, somewhat below the range's carrying capacity, to ensure maximum herd productivity and harvest opportunity. This is a management experiment, which to this point has been successful.

To achieve the desired balance between calf recruitment, overall survival, and harvest, the Nelchina caribou herd must be closely monitored and actively managed. When the herd trajectory does not follow model predictions, harvest quotas must be corrected either in-season or in subsequent years. Quotas can be quite different year-to-year, adding to the already complex Nelchina caribou regulatory environment. While dynamic, the current management strategy allows for the opportunity to harvest a significant number of caribou annually. Conceptually, this scenario is far preferable to the possibility of uncontrolled herd growth precipitating a crash, followed by a period of herd recovery lasting 10 to 20 years or more.

Between 2000 and 2009 the Nelchina herd exhibited slow growth despite low harvest quotas and reduced wolf numbers across its core summer range. In 2010, a very large calf cohort boosted herd numbers significantly. With the herd above objectives since 2010, the management goal has shifted to herd reduction.

Although the population objective set for the herd has been in place for more than 20 years, annual monitoring of body condition and productivity are critical to understanding long-term herd performance. This nutritional monitoring is also used as an indirect measure of range condition.

While trends in these parameters are important in addressing overall herd and range condition, these values are highly variable. Factors likely include sensitivity to annual weather conditions, as well as the ability of caribou to search out high quality habitat.

Maintaining the NCH at or below the current population objective will continue to be the most important management tool to maintain range quality and long-term herd stability. If the herd remains above 40,000, and productivity remains moderate to high, it may be difficult to control the growth of the population as it begins to exhibit exponential tendencies. Likewise, if the Fortymile caribou herd continues to increase, there could be further negative impacts to the winter range in Unit 20E, and both herds could suffer. Overstocking and subsequent decline

could result in a prolonged period of low herd productivity (Messier et al. 1988, Cameron and Ver Hoef 1994).

Harvest quotas will continue to be adjusted annually to ensure the population objective is maintained over the long term. Annual harvest quotas for cows and bulls should be based on annual recruitment, herd composition, and the population trend.

As the Board of Game continues to search for an acceptable long-term solution to allocation concerns, it will be important that the number of hunters in the field remains at a moderate level. If the number of Tier I registration hunt participants continues to rise, the board may have to readdress hunt management in coming years. Too many hunters in the field can lead to hunter conflict, as well as a large number of caribou taken in a very short period of time. Likewise, if hunting opportunity is restricted, too few hunters could lead to undesirable herd growth.

If the herd can be held at current objective levels, given current rates of natural mortality, the projected annual harvests are expected to be about 1,000–3,000 caribou each year, with some years being as high as 6,000 or more given exceptional productivity and survival. In addition to stable harvestable surpluses for hunters, herd stability should provide a consistent prey supply for wolves, and may help reduce predation pressure on moose.

The NCH may be the only moderately sized caribou herd in Alaska that can have its upper population limit controlled solely by human harvests. This is possible because the NCH is accessible by the road system from major population centers. Given hunter interest and accessibility of this herd, there is a decreased chance that the population will increase to unsustainable levels. Other caribou herds with less hunter access may not be manageable under the same conditions. Because of this, the NCH management strategy is considered a long-term experiment. Up to this point, this management strategy has been successful; however, it is critical that management adapt to changing annual conditions and observations. Caribou population dynamics are very difficult to predict, and often change course with little warning.

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While this unit report was actually published in 2018, it is part of the set of 2015 unit species management reports, so we suggest citing the report as a 2015 report to maintain its relationship to the other 2015 unit reports.

Table 1. Nelchina caribou fall composition counts and estimated herd size, calendar years 2008 through 2013.

Year	Total bulls: 100 cows	Calves: 100 cows	Calves (%)	Cows (%)	Total bulls (%)	Composition Sample Size	Total adults	Fall estimate of herd size
2008	39	40	22	56	22	3,378	26,150[a]	33,288[a]
2009	42	29	17	58	25	3,076	28,198	33,837
2010	64	55	25	46	29	5,474	36,790	48,653
2011	58	45	22	49	29	3,907	32,404	41,394
2012	57	31	16	54	30	5,249	43,386	50,646
2013	30	19	13	67	20	4,256	32,524	37,257

[a] Modeled estimate.

Table 2. Alaska Nelchina caribou harvest data by permit hunt, regulatory years[a] 2009 through 2013.

Hunt No.	RY	Permits Issued	Percent did not hunt	Percent Successful Permits	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
RC566	2009	500	15	55	274	99	3	1	0	277
	2010	1,151	17	53	462	75	153	25	0	615
	2011	3,148	22	52	1092	67	529	33	2	1,623
	2012	5,045	20	50	1,602	63	939	37	1	2,542
	2013	6,878	37	23	1,374	87	199	13	0	1,573
CC001	2009	477	35	27	127	100	0	0	0	127
(no hunt 2010)	2011	323	44	27	71	82	16	18	0	87
	2012	402	39	37	99	66	51	34	0	150
	2013	689	50	17	101	89	13	11	0	114
FC1302[b]	2009	2,576	44	14	342	98	7	2	0	349
	2010	2,853	46	16	316	70	129	29	6	451
	2011	2,980	52	13	281	71	113	29	0	394
	2012	2,953	49	18	326	61	203	38	8	537
	2013	2,783	53	10	210	76	68	24	0	278
FC1202	2009	111	43	18	18	100	0	0	2	20
	2010	120	38	45	31	57	23	43	0	54
	2011	103	41	48	37	80	9	20	3	49
	2012	152	34	46	35	49	35	49	1	71
	2013	113	39	35	15	42	21	58	0	36
DC590	2009	100	62	24	20	83	4	17	0	24
	2010	100	54	29	21	72	8	28	0	29
	2011	100	45	40	35	88	5	12	0	40
	2012	100	55	34	27	79	7	21	0	34
	2013	100	53	35	29	83	6	17	0	35
DC 480-483	2011	1,127	40	28	313	98	6	2	0	319
	2012	3,001	30	34	1,015	99	7	1	2	1,024
	2013	5,008	56	12	603	99	6	1	0	609
Totals for	2009	3,763	39	21	781	98	14	2	2	797
all permit	2010	7,828	36	31	1,708	70	721	30	9	2,438

Hunt No.	RY	Permits Issued	Percent did not hunt	Percent Successful Permits	Bulls	(%)	Cows	(%)	Unk.	Total Harvest
hunts	2011	7,781	37	36	1829	73	678	27	5	2,512
	2012	11,653	38	37	3,104	71	1,242	29	10	4,356
	2013	15,458	48	17	2,332	88	313	12	0	2,645

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2010=1 July 2010–30 June 2011.
[b] This federal hunt has a bag limit of 2 caribou.

Table 3. Alaska Nelchina caribou state hunt annual hunter residency and success, regulatory years 2009 through 2013.

		Successful				Unsuccessful				
Hunt	RY	Local[b] resident	Nonlocal resident	Total[c]	%	Local[b] resident	Nonlocal resident	Total[b]	%	Total[c] hunters
RC566	2009	13	264	277	67	10	124	134	33	411
	2010	82	533	615	66	113	206	319	34	934
	2011	25	1,598	1,623	68	46	724	770	32	2,393
	2012	50	2,492	2,542	66	49	1,289	1,338	34	3,880
	2013	10	1,563	1,573	38	84	2,489	2,573	62	4,146
CC001	2009	99	28	127	44	132	29	161	56	288
(no hunt 2010)	2011	52	35	87	50	65	23	88	50	175
	2012	43	107	150	63	52	36	88	37	238
	2013	8	106	114	37	65	128	193	63	307
DC 480-483	2011	1	318	319	47	5	350	355	53	674
	2012	7	1,014	1,023	49	5	1,042	1,048	51	2,071
	2013	1	608	609	28	17	1,546	1,570	72	2,179

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2010=1 July 2010–30 June 2011.
[b] Local resident is a resident of Units 11, 13, or 12 along the Nabesna Road.
[c] Total hunters include only those with known community of principal residence.

Table 4. Nelchina caribou Alaska state hunt annual harvest chronology percent by harvest period, regulatory years[a] 2009 through 2013.

		Harvest Periods													
		Weeks[b] (fall)							Months (winter)						
Hunt	RY	1	2	3	4	5	6	7	Oct	Nov	Dec	Jan	Feb	Mar	*n*
RC566	2009	11	10	6	11	20	16	13	6	5	3	2	4	4	253
	2010	10	14	13	8	20	17	19	No winter hunt						613
	2011	13	17	10	8	16	16	11	8	1					1612
	2012	19	14	7	9	18	19	14	59	4	1	6	6	26	2,540
	2013	34	13	6	8	13	14	12	No winter hunt						1,573
CC001	2009	0	3	14	13	13	4	13	8	16	3	2	4	6	120
(no hunt 2010)	2011	18	17	7	7	9	13	12	9	7	1				87
	2012	15	31	8	10	7	11	17	50	27	4	6	0	13	148
	2013	33	22	8	8	4	11	13	No winter hunt						111
DC480-483	2011	-	-	25	9	16	14	17	18						310
	2012	-	-	11	10	14	15	11	20	6	2	1	2	8	1016
	2013	-	-	28	20	20	18	14	No winter hunt						605

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2010=1 July 2010–30 June 2011.

b Week 1 is 8/5 to 8/11, week 2 is 8/12 to 8/18, week 3 is 8/19 to 8/25, week 4 is 8/26 to 9/1, week 5 is 9/2 to 9/8, week 6 is 9/9 to 9/15, and week 7 is 9/16 to 9/22.

Table 5. Alaska Nelchina caribou state hunt harvest percent by transport method, regulatory years[a] 2009 through 2013.

		Percent of harvest								
Hunt	RY	Airplane[b]	Horse	Boat	ATV	Snowmachine	ORV	Highway vehicle[b]	Airboat	*n*
RC566	2009	5	0	9	38	7	9	31	1	272
	2010	3	0	8	44	0	11	31	1	611
	2011	3	0	10	46	0	8	32	1	1,594
	2012	3	0	6	48	5	8	29	1	2,503
	2013	6	0	7	61	0	11	14	1	1,547
CC001	2009	0	2	2	25	9	4	59	0	126
(no hunt 2010)	2011	0	0	7	40	2	9	41	-	87
	2012	1	0	2	43	6	7	42	0	149
	2013	2	0	8	54	0	31	5	0	114
DC480-483	2011	5	1	11	49	0	7	28	-	310
	2012	5	0	5	36	11	6	36	0	1,005
	2013	9	0	9	53	0	9	19	1	601

[a] A regulatory year begins 1 July and ends 30 June, e.g., regulatory year 2010=1 July 2010–30 June 2011.
[b] Aircraft and vehicles weighing over 1,500 lb were illegal in RY07.