MANAGEMENT PLAN FOR THE CHISANA CARIBOU HERD

Renewed November 2024

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Cover photo: Lone Chisana bull caribou (Alaska Department of Fish and Game)

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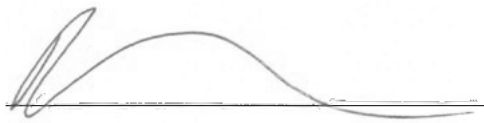
Approved By:



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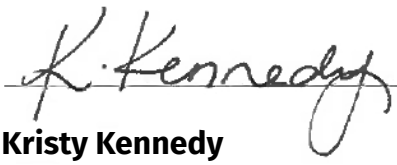

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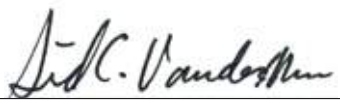

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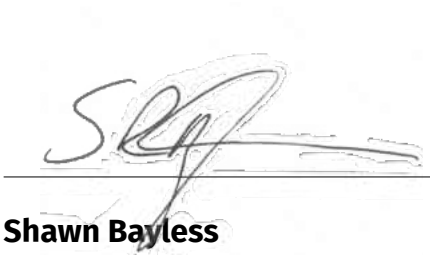

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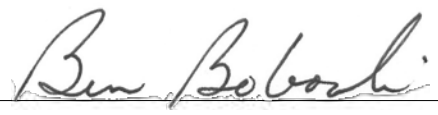

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Chisana caribou in Asi Keyi Natural Environment Park. (Government of Yukon)

EXECUTIVE SUMMARY

The Chisana caribou herd is a small international herd that ranges across the Yukon and Alaska border. The Management Plan for the Chisana Caribou Herd presents a collaboratively developed approach to management of the Chisana caribou herd for the next ten years. It is agreed to by the Government of Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service. This plan provides a common goal, objectives, and strategies to guide Chisana caribou herd management and conservation in both Alaska and the Yukon. The plan provides direction for monitoring, harvest management, increasing knowledge, and communication about the herd.

Coordinated management for the Chisana caribou herd has a long history, including a recovery program in the early 2000s and an initial management plan signed in 2012. The major changes found in this plan from the previous 2012 version include:

- A strengthened commitment to monitoring.
- A new decision-making framework for harvest within the same overarching allocation.
- A new strategy to avoid incidental harvest of Chisana caribou when targeting other herds.
- A new strategy regarding considerations for Chisana caribou in planning and decision-making processes.
- Consolidated content regarding commitments to increasing knowledge about habitat, climate and predator influences.

ACKNOWLEDGEMENTS

This collaboratively developed management plan was possible through the cooperation and mutual respect of the Government of Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service.

The Yukon Fish and Wildlife Management Board and the Ahtna Intertribal Resource Commission participated in the planning process alongside the management authorities and contributed greatly to the management plan. Environment and Climate Change Canada participated in reviews of this management plan as it complements the Canadian national species at risk management for Woodland caribou. Environment and Climate Change Canada continues to support all of the management partners in the Yukon to lead the stewardship of the Chisana caribou through implementing this plan.

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During the recovery program of 2003-2006, pregnant cows were transferred to a holding pen in their natural range to protect them and their calves from predators.

INTRODUCTION

The Chisana caribou herd is a small international herd located in Alaska and the Yukon on the Klutlan Plateau, near the headwaters of the White River. The herd ranges in Kluane and White River First Nation territories as well as the Upper Tanana and Upper Ahtna peoples' territories. The Alaska Native Tribes with ties to caribou in this area include Cheesh'na Tribe, Healy Lake Village, Mentasta Traditional Council, Native Village of Tanacross, Native Village of Tetlin, Northway Village, and Village of Dot Lake. The Chisana caribou herd ranges across international boundaries and multiple jurisdictions.

During the 1990s through 2003, the herd was believed to have experienced a long and steady decline in population size, largely attributed to extremely low calf numbers relative to the number of cows. Predation, climate and habitat changes, and harvest pressure likely contributed to the decline. Given the importance of the herd internationally, to local Indigenous Peoples[1] and to residents of the Yukon and Alaska, Alaskan and Yukon partners collaborated towards a significant recovery effort. From 2003 to 2006, the partners conducted a recovery program designed to increase recruitment and calf survival (see Appendix A for more details). During this work, the partners recognized a need for a management plan to support a stable or increasing caribou population. Management planning provides a coordinated approach by all parties and better potential for herd sustainability. Coordination across all parties will help ensure interests and concerns continue to be addressed and will help facilitate management of the herd in an inclusive and collaborative manner.

The Management Plan for the Chisana Caribou Herd (this plan) provides a goal, objectives, and strategies to guide Chisana caribou herd management and conservation in both Alaska and the Yukon. The management authorities who have agreed to this management plan—that is, the Government of Yukon (Department of Environment), Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service (Tetlin National Wildlife Refuge), and the United States National Park Service (Wrangell-St. Elias National Park and Preserve)—are referred to as 'the parties' throughout this document.

1 Throughout this management plan, 'Indigenous Peoples' is terminology used when referring to the Upper Ahtna and Upper Tanana people in Alaska as well as the Kluane and White River First Nation people in the Yukon. 'First Nations' is terminology used only in a Yukon context.

The parties originally agreed to a management plan in 2012 (2012 ***Management Plan for the Chisana Caribou Herd***) and approved an updated and renewed plan 2024 (see Appendix B for a summary of the planning process).

The management recommendations in this plan are based on current circumstances, status and trends of the herd. If conditions change or more information becomes available about factors that influence the range and population dynamics of the Chisana caribou herd, direction may need to shift. Management decisions that stray from this plan's framework should reflect agreement of all parties when possible; however, the parties' individual mandates and authorities for management decisions will be respected (as per the management plan principles on page 29).

Sidebar 1: Meaning of the name Chisana

The name given to the herd by western biologists likely comes from that of the Chisana River, an Anglicized version of the Ahtna place name ***Tsetsaan' Na'*** for the river that runs through the herd range in Alaska (see Orth 1971:213). James Kari's 1990 ***Ahtna Athabascan Dictionary*** (p. 369) translates this name as copper river, from the root word ***tsaan'***, meaning excrement (literally rock excrement). According to the Web Atlas of Alaska Dene Traditional Place Names developed by Gerad Smith and James Kari (ArcGIS Storymap, published online November 15, 2023), the Upper Tanana name for the river is ***Ttheetsaan' Niign***, also meaning copper river. A different meaning was documented during a public meeting on this plan in Burwash Landing, where a Kluane community member stated that ***'Chu sa na'*** means 'the place where the sun shines on the water.'

Indigenous people didn't necessarily use the same names for the herd as western biologists or even think about them in the same way. In the elder interviews described in Sidebar 2, Chisana caribou were referred to by Northway Elders Danny Thomas and Louie Frank in terms of characteristics such as large size or light color. Cheesh'na Elder Wilson Justin, meanwhile, has talked about the herd in terms of their relationship to people. He describes a close relationship between the Mentasta/Chisana caribou (which he doesn't clearly distinguish as separate herds) and the ***'Ałts'e'tnaey*** clan. Summarizing a conversation with Justin on this topic, Anthropologist William E. Simeone (2006:10) wrote, "he compared those caribou to horses, not in terms of property, but as animals that you have a relationship with and are concerned about." Elsewhere, Justin notes that Chisana caribou are "province of the medicine people" (cited in Simeone 2014: 77). At a public meeting on this plan in Destruction Bay, a community member stated that it is always the caribou in Elders' stories that help people to live and survive, such as when two winters came back-to-back. They emphasized the importance of the caribou to Indigenous people.

Donald J. Orth. 1971. Dictionary of Alaska Place Names. US Geological Survey Professional Paper 567. US Government Printing Office: Washington, DC, p. 213. https://doi.org/10.3133/pp567.

James Kari. 1990. Ahtna Athabaskan Dictionary. Alaska Native Language Center, University of Alaska Fairbanks, Fairbanks, AK.

William E. Simeone. 2006. Some Ethnographic and Historical Information on the Use of Large Land Mammals in the Copper River Basin. Resource Report, NPS/AR/CRR-2006-56. Wrangell-St. Elias National Park and Preserve, Copper Center, Alaska.

William E Simeone, 2014. Along the Ałts'e' tnaey-Nal'cine Trail: Historical Narratives, Historical Places. Mount Sanford Tribal Consortium.

CONTEXT

Herd range and interactions with neighbouring caribou

Due to the topography of the region, the annual range of the Chisana caribou herd is generally aligned along a northwest-southeast direction in east-central Alaska and southwest Yukon (Figure 1). The summer range is predominately within the Wrangell-St. Elias National Park and Preserve in Alaska, while the winter range has a larger proportion of the herd occurring in the Yukon's Asi Keyi Natural Environment Park.

In the past, some Chisana caribou were seen west of the Nabesna River. This meant that the Chisana caribou herd may have interacted to a greater extent with the neighbouring Nelchina and Mentasta herds, which range primarily to the northwest in Alaska. They also have been seen as far north as Beaver Creek and east of the Alaska Highway, so may have interacted with the Kluane herd (Figure 2). However, since 2005, Chisana caribou have seldom been observed north of the Nutzotin Mountains. Newer collar data (2020 to 2022) shows the animals concentrated in the central area of the range, primarily within the Wrangell-St. Elias National Park and Preserve in Alaska and the Yukon's Asi Keyi Natural Environment Park.

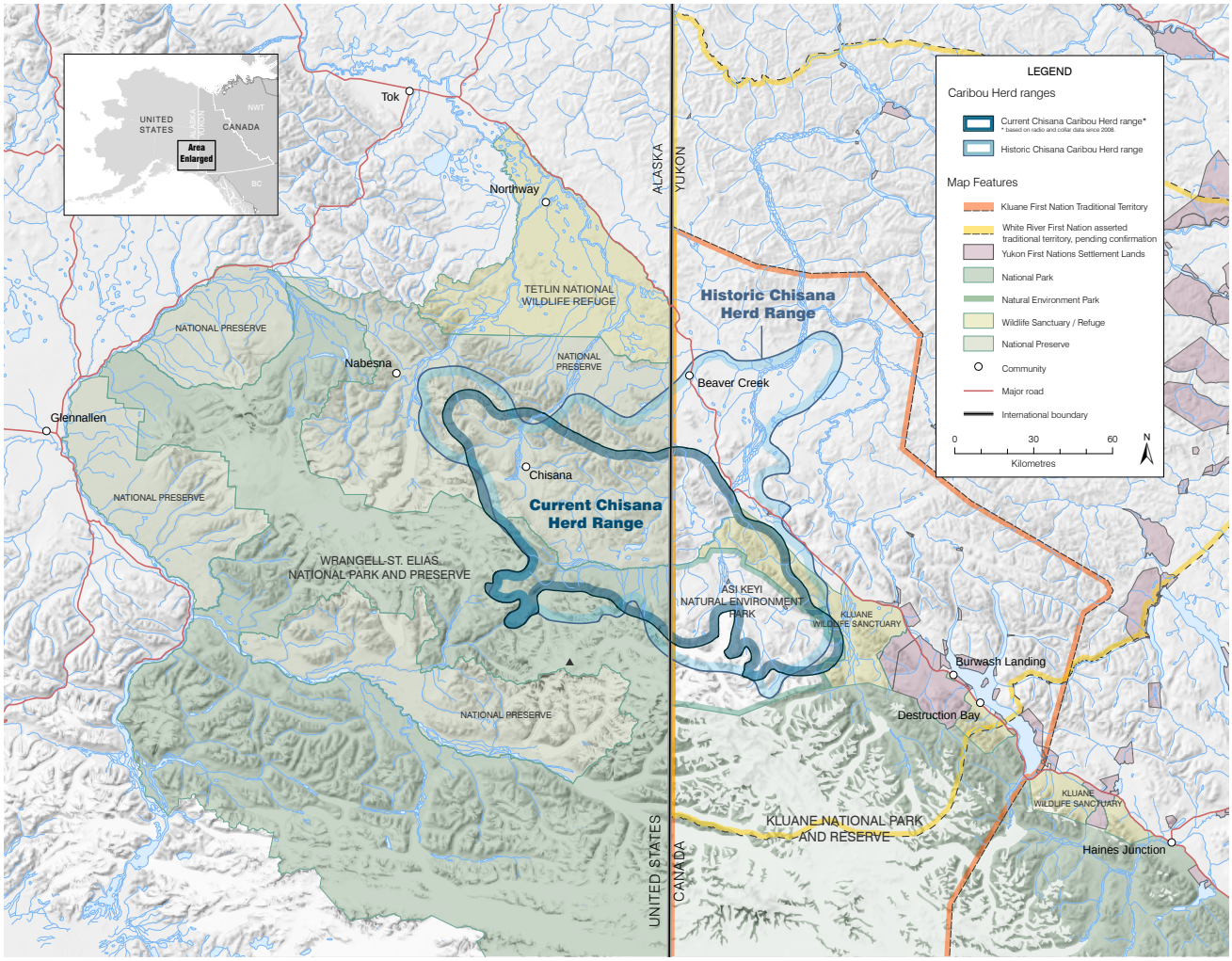


Figure 1. *Map of Chisana caribou herd range and jurisdictional context. The map shows the current annual range based on satellite and radio collar data since 2008 and the extent of historic mapped range.*

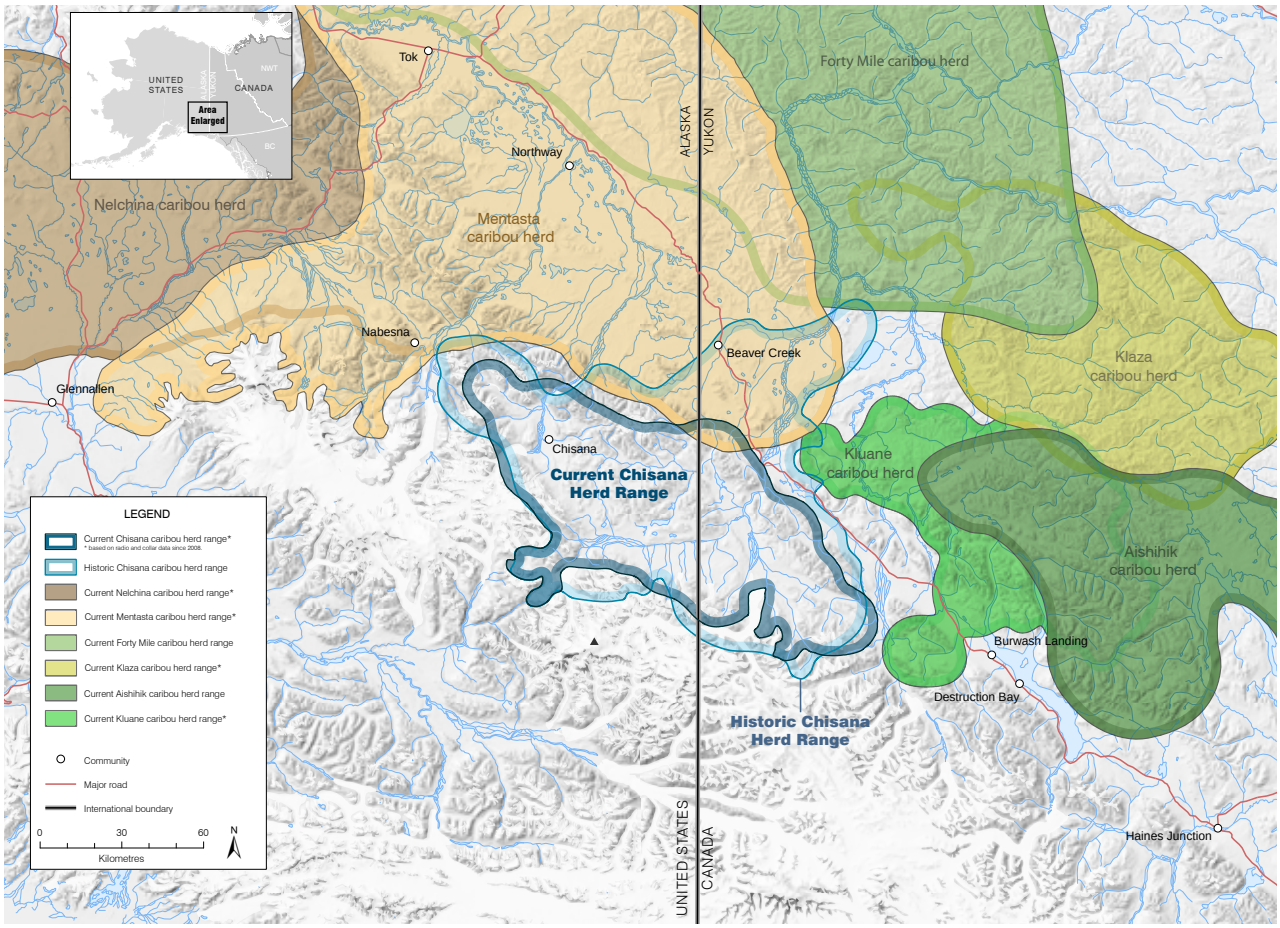


Figure 2. *Map of Chisana and neighbouring caribou herd ranges.*

Herd composition and size

Since 1987, biologists have maintained very-high-frequency radio collars on a subset of Chisana caribou adult females and calves to facilitate monitoring of the herd. In 2019, biologists deployed satellite collars (also equipped with radio transmitters) in the herd to obtain more detailed data necessary to improve our understanding of herd distribution and movement patterns. As of April 2024, there were 33 active collars in the Chisana caribou herd – 15 satellite collars and 18 radio collars. These collars are replaced, as necessary, when they reach the end of their life cycle or when they are lost due to caribou mortalities. Generally, satellite collars must be replaced more frequently due to battery limitations and are more costly than radio collars.

Composition surveys are the primary source of monitoring information for caribou population assessment and management. These surveys are typically conducted during the fall breeding season (rut) when animals are congregated, which allows biologists to count and classify individual animals. The Alaska Department of Fish and Game and the Government of Yukon's Department of Environment conduct annual composition surveys via helicopter flights in Alaska and the Yukon, respectively, and aggregate the data they collect. The United States National Park Service typically contributes to these surveys by paying for a fixed-wing aircraft to track collared animals and direct helicopters to group locations. Based on discussions in February 2023, the United States Fish and Wildlife Service may assist with surveys the future.

Sidebar 2: Northway Elder interviews about Chisana and Nelchina caribou

In 2011, staff from the Tetlin National Wildlife Refuge interviewed seven Northway Village Elders about Chisana caribou.

All of the Elders stated that the Chisana caribou and Nelchina caribou looked quite different from each other and were in the area at different times of the year. Avis Sam spoke about hunting Chisana caribou with her father, Stephen Northway, and other family members in the 1940s and 1950s. She remembered her father stating that the Chisana had bigger bodies, more like the size of a moose. Danny Thomas, a hunter and trapper in the area from 1948 to the mid-1970s, said that they called the bigger bodied, larger antlered Chisana caribou ***Toma ganak***. Louie Frank, who trapped in the area from 1965 to 1975, said that Chisana caribou have bigger bodies, longer legs and larger feet and are referred to as ***Uzii choo***, meaning 'big caribou' or ***Uzii ma***, meaning 'lighter colour'.

Another notable difference was that the Chisana caribou did not move around as much, whereas the Nelchina caribou migrated through the region a few times a year. Even so, there were some memories of the two herds mixing. Howard Fix, who trapped in the area from the 1960s to the 1980s, said that although the two herds usually were in the areas at different times, "Sometimes, you could tell the two herds mixed because the Chisana were much larger. Some were as big as moose!"

Howard Fix also noticed that the Chisana caribou have bigger, differently shaped antlers compared to Nelchina or Fortymile caribou. He noticed that the Chisana antlers have a pronounced angle in the main beam, and comparatively, the barren ground caribou antlers have a more gradual curve in their main beam. Another physical difference was noticed by Louie Frank, who stated that Chisana caribou hooves were more curved and cupped than those of Nelchina caribou.

Risdahl, G. editor. 2011. Historic Use of the Chisana Caribou Herd by Residents of Northway Village: Elder Interviews. Unpublished report from the Tetlin National Wildlife Refuge, United States Fish and Wildlife Service, Tok, Alaska, United States.

The composition surveys provide two pieces of information – the number of calves for every 100 cows (calf-to-cow ratio) and the number of bulls for every 100 cows (bull-to-cow ratio). Most calf mortality occurs within the first months of life, so the fall calf-to-cow ratios are an early indicator of the number of calves entering ("recruited" into) the herd as adults. However, they are an overestimate of "true" recruitment, as some calf mortality occurs over the winter. Estimates of fall bull-to-cow ratios provide a measure to evaluate if there are adequate numbers of bulls for breeding opportunities, maintaining genetic diversity, and harvest management purposes. Figure 3 shows both the calf-to-cow ratios and adult bull-to-cow ratios based on data collected during the annual composition surveys from 2003 to 2022. In addition to sampling variation, ratios can vary substantially from year to year due, in part, to factors that influence survival rates of the different age and sex classes in the population and seasonal timing of the survey.

To account for this variability, the parties have agreed to use the three-year averages of calf-to-cow and bull-to-cow ratios as the basis for decision making. This reduces the likelihood of incorrect management decisions being made based on variance associated with a single year's survey results. The averages are shown in Figure 3 as dashed lines.

Ryan Drummond holds up a device to scan for radio collars.
(Government of Yukon)

For calf-to-cow ratio, there has been a range of values across all the surveys, from a high of 28 calves per 100 cows in 2016 to a low of 12 calves per 100 cows in 2021. As of 2022, the three-year moving average of the calf-to-cow ratio is 17 calves per 100 cows. Bull-to-cow ratios have ranged from a high of 65 bulls per 100 cows in 2012 to a low of 32 bulls per 100 cows in 2017. As of 2022, the three-year moving bull-to-cow ratio average is 42 bulls per 100 cows. The partners were unable to conduct a survey in 2020, so the three-year moving average for 2021 used data from 2018, 2019, and 2021 and the three-year moving average for 2022 used data from 2019, 2021 and 2022.

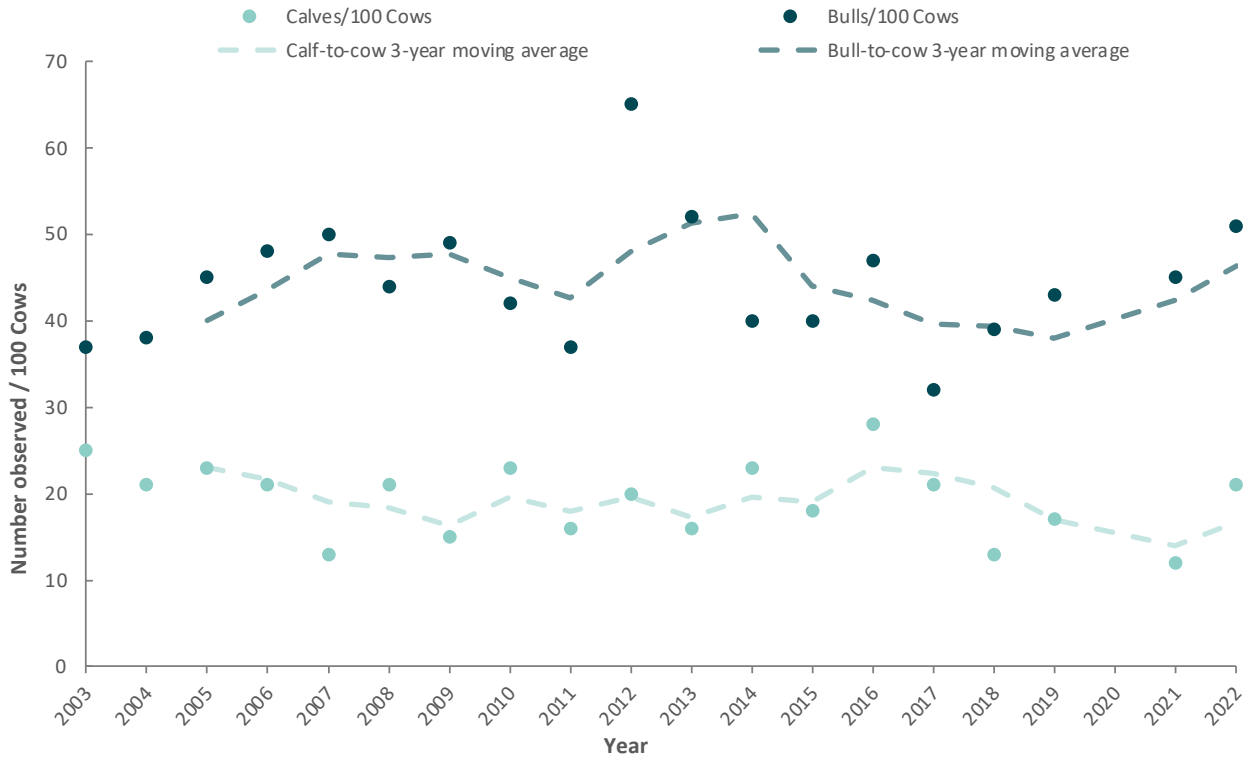


Figure 3. *Numbers of calves and bulls observed per 100 cows during Chisana caribou herd composition surveys from 2003 to 2022. The three-year averages, represented by the dashed lines, are based on the data points. No survey was conducted in 2020.*

In addition to composition surveys, Yukon's Department of Environment, the Alaska Department of Fish and Game, and the United States National Park Service jointly conducted population surveys in 2003, 2005, 2007, 2010, 2013, and 2022 to derive population estimates for the herd (Figure 4). Between 2003 and 2022, population estimates of the herd ranged from a low of 582 animals during the 2022 population survey to a high of 766 animals during the 2007 survey.

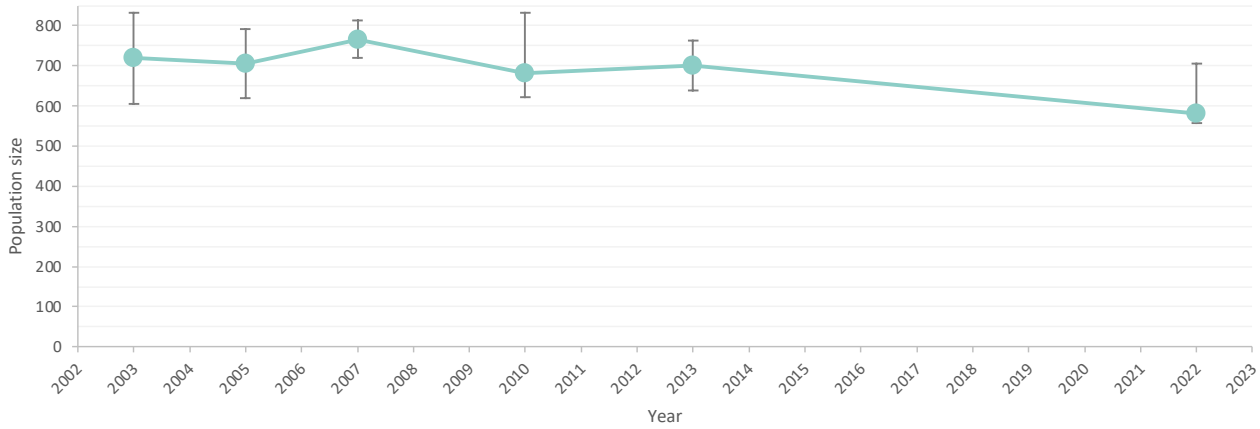


Figure 4. *Population survey estimates of the Chisana caribou herd since 2003. The upper and lower bars represent 90% confidence intervals.*

The population estimates have a confidence interval associated with them, represented by the bars in Figure 4. This is the range of possible numbers that the population could be, based on the computer modeled analysis of the survey results, with 90% confidence (technical reports on the methods and analysis of the population surveys are available by request from the Government of Yukon's Department of Environment).
Population trend is determined not only from the population survey data, but also is informed by composition survey data, best professional judgment, and by local and Traditional knowledge. This results in one of four potential conclusions: population trend is (1) stable, (2) increasing, (3) decreasing, or (4) indeterminate (not possible to determine due to insufficient existing information). Parties to the Plan define 'indeterminate' based on the frequency of monitoring, with an indeterminate trend resulting when it has been more than five years since the last population survey ***and*** more than three years since the last composition survey.

There is always a degree of uncertainty when determining population trend; however, this uncertainty can be reduced by regular monitoring of herd population size ***and*** composition, with the latter providing additional information about factors affecting population dynamics, thereby reducing uncertainty.

For the Chisana herd, overlapping confidence intervals for six population estimates obtained during the period from 2003 to 2022 suggest that the estimates are not significantly different from one another, and that the herd's population size was stable during this period. There was, however, a nine-year time gap between population estimates obtained in 2013 and 2022 (Fig. 4), resulting in a degree of uncertainty about the trend in population size during the most-recent nine-year period. Nevertheless, the relatively stable long-term patterns in calf-to-cow and bull-to-cow ratios (Fig. 3) further suggest that the population size has been stable. A summary of the most recent survey results to 2023 is available in the reports section of the Government of Yukon's website: **yukon.ca/en/woodland-caribou**

Potential factors influencing the Chisana caribou herd size and dynamics

As part of a social-ecological ecosystem, there are many factors that influence the Chisana caribou herd. This management plan identifies potential factors that influence the herd to assist in management decisions. For example, understanding that predation was the main threat during the late 1990s and early 2000s helped the parties to plan a recovery effort for the herd (Appendix A). Although all factors are mentioned here, this plan focuses management objectives (page 30) on realistic strategies to support a stable or increasing population of Chisana caribou.

Climate and habitat

Our understanding of how the changing climate is affecting caribou populations is developing, with scientific research and local and Traditional knowledge continually providing new information and insight into these complex relationships. Climate change may influence caribou via two pathways: directly from changing temperature and precipitation gradients, and indirectly by changes to their habitat.

Local people have noticed a change towards warmer winters with higher precipitation in this region. This is in alignment with data gathered on changing climate trends in the north and specific data gathered in the Wrangell-St. Elias National Park and Preserve (see Sidebar 4). Severe weather can have implications for the physical condition of adults and calves. Winters with excess snow or ice-on-snow or ice-on- frozen ground events make it harder for the caribou to access quality forage and increase the amount of energy expended to move. Years in which snow levels remain high during the calving season may prevent females from moving up in elevation, thus increasing predation on neonate calves. Warmer, drier summers may adversely affect the Chisana caribou herd by increasing insect harassment and decreasing nitrogen content in caribou forage. These conditions are likely to worsen in the future (see Sidebar 4).

The Chisana caribou herd range is within the St. Elias Mountains ecoregion, which is distinguished by rugged, glaciated mountains with high peaks. White and black spruce are the most commonly occurring trees, with the tree line generally occurring at 1,050 –1,200 metres. In lowland portions of the range, paper birch, aspen and balsam poplar are more prominent.

Dall's Sheep
(Government of Yukon)

Sidebar 3: Regional patterns

Wildlife biologists often concurrently monitor multiple species to evaluate long-term trends and changing environmental conditions at a regional scale. Lower-than-average fall calf-to-cow ratios were observed in the Chisana herd during two recent rut counts in 2018 and 2021. This resulted in a low three-year average below 15 calves per 100 cows, triggering a temporary halt of Alaskan harvest in fall 2022.

In 2018, Yukon biologists also observed lower-than-average calves in relation to cows in other nearby wildlife populations, including the neighbouring Kluane caribou herd, Dall's sheep in the Kluane National Park and Reserve (Blakeburn et al. 2020) and Alsek and Kluane/Paint Mountain moose populations. Environmental factors (such as snow depth, snow duration and/or freeze/thaw events) may have influenced the observed low calf-to-cow ratios in wildlife populations, in addition to other sources of mortality (e.g., predation).

Blakeburn, D, S. Pociuk, C. Wong. 2020. Thechàl Dhâl' Surveys (2015, 2017-2020) Mäy - Dall's Sheep. Resource Conservation Technical Report, Kluane National Park and Reserve, Parks Canada. January 2020.

Sidebar 4: Climate trends

The Intergovernmental Panel on Climate Change states that there is high confidence that northern North America, which includes Alaska and the Yukon, will experience large temperature increases compared to the global average, especially in the winter. There is also high confidence in increases in annual precipitation, both in the average level of precipitation and the occurrence of extreme weather events. There is high confidence that observed declines in glaciers, permafrost and snow cover will continue.

Swanson et al. analyzed air and ground temperature information from climate monitoring stations in Alaskan national parks, including stations in Wrangell-St. Elias National Park and Preserve. For the four remote monitoring stations in Wrangell-St. Elias National Park, there was an average increase in the mean air temperature between 2014 and 2019 of 1.8 degrees compared to the previous 30 years. The authors suggest that with continued warmer temperatures, it is likely that there will be a transition to a different type of landscape without permafrost.

IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3–32, doi:10.1017/9781009157896.001.

Swanson, D. K., P. Sousanes, and K. Hill. 2021. Increased mean annual temperatures in 2014-2019 indicate permafrost thaw in Alaskan national parks. Arctic, Antarctic, and Alpine Research 53: 1–19.

The understory includes willow, dwarf birch, soapberry, and ericaceous shrubs. Sedge–tussock fields are common in poorly drained sites and gentle slopes, while the steeper slopes support mosses, alpine forbs, ericaceous shrubs, grasses and lichens.

The Chisana caribou range is somewhat unique because of the deep ground layer of volcanic ash from the Mount Churchill eruption over 1,600 years ago. Heavy surface deposits of volcanic ash throughout much of the Chisana caribou herd range may lead to increased early tooth wear. For example, in 1998 researchers of the Southern Alaska Peninsula herd observed caribou calves with incisors worn to the gum line. If animals are dying younger because of hastened tooth wear, the reproductive potential for cow caribou would be reduced. The degree to which ash affects the Chisana caribou is uncertain and could be an area for further research.

The ways in which caribou habitat may be affected by a changing climate include changes to forest cover and shrubs and increased wildfire occurrence. Warmer temperatures also support advancement of the shrub-line to higher elevations. An increase in woody shrub species could decrease the availability of alpine tundra habitat that caribou depend on. This may also provide additional habitat for moose at higher elevations and draw more wolves into core caribou habitat. While changes in the tree line and increased shrub growth have been observed throughout the Chisana range, the direct impacts to the herd are largely unknown. Fire is a natural disturbance that occurs throughout the Yukon and Alaska. Fire history data provided by the State of Alaska and United States Bureau of Land Management indicate that there have been no extensive fires (greater than 15,000 acres) in the Chisana caribou herd range in Alaska

St. Clare Creek area in the Yukon portion of the Chisana range (Government of Yukon)

during the past 50 years. In the Yukon, the core part of the range has not experienced any large wildfires; however, there was one large fire (~70,000 acres) east of the Alaska Highway (north of Wellesley Lake) in the 2000s. This area is in the historic part of the range, as it has not been used by Chisana caribou in over 15 years. The degree to which this change in distribution related to habitat change due to wildfire is uncertain. Fire occurrences are increasing due to climate change. Given that caribou tend to avoid recently burned areas, that is, areas burned less than 50 years ago[2], there is the potential for wildfire to cause shifts in the Chisana caribou range.

There is recent research (see Sidebar 5) indicating that caribou range distribution will be more sensitive to the effects of climate change on habitat than to the direct effects of changing climate conditions, while caribou demographics (e.g., calf recruitment and adult female survival) will be influenced by annual climatic variation. In northern caribou populations such as the Chisana herd, animals will be more sensitive to more variable winters with a higher frequency of freeze-thaw and adverse precipitation events that affect demography.

2 Russell and Johnson researched the effect of forest fire on lichen in the Klaza caribou range, which is slightly north and east of the Chisana caribou's range. They found that most burns recovered sufficient lichen to be considered winter range for caribou after 50 years.

Russell, K. L. and C. Johnson. 2019. Post-fire dynamics of terrestrial lichens: Implications for the recovery of woodland caribou range. Forest Ecology and Management Volume 434: 1-17.

Sidebar 5: Select summary of recent research related to climate effects on caribou habitat

Neilson et al. evaluate both the influence of human disturbance and climate change on the ranges of caribou and state that both affect the extent of caribou ranges as well as the locations where species can occur, leading to an increased risk of extinction. They used models to estimate the direct effects of climate on caribou ranges in the Canadian boreal forest and climate's indirect effects from habitat changes. The analysis showed that human disturbance had the most effect on caribou ranges. However, climate also has an indirect influence on caribou distribution through its effects on habitat. The authors expect that climatic changes will continue to shrink caribou ranges in the future and refuge habitats will become increasingly important.

DeMars et al. studied whether climate variation would impact low-density populations of caribou by using data from 21 caribou herds in western Canada between 1994 and 2015. They found a correlation between juvenile recruitment and adult female survival with annual variation in climate and habitats. Juvenile recruitment seemed to be most affected by the habitat conditions in the year prior to their birth and adult female survival was more impacted by colder, more variable, winters. The authors suggest that the correlations that they found may be due to the fact that woodland caribou tend to live in areas with limited resources, where minor climate shifts are more likely to be impactful.

Morineau et al. examined the relative influence of climate change and human disturbance on the northwards range contraction of boreal caribou in Quebec. Their results suggest that human disturbance and harvest were the most important drivers of range recession over the last 160 years; however, as climate changes increase in severity in upcoming decades, caribou will be increasingly vulnerable as effects are cumulated over habitat that is already disturbed. Management measures that limit the negative impacts of human disturbance will become increasingly important.

DeMars, C.A., S. Gilbert, R. Serrouya, A.P. Kelly, N.C. Larter, D. Hervieux, and S. Boutin. 2021. Demographic responses of a threatened, low density ungulate to annual variation in meteorological and phenological conditions. PLOS ONE 16: 1-26.

Morineau, C., Y. Boulanger, P. Gachon, S. Plante, and M-H. St-Laurent. 2023. Climate change alone cannot explain boreal caribou range recession in Quebec since 1850. Global Change Biology 00: 1–18.

Neilson, E.W., C. Castillo-Ayala, J.F. Beckers, C.A. Johnson, M.H. St-Laurent, N. Mansuy, D. Price, A. Kelly, and M.A. Parisien. 2022. The direct and habitat-mediated influence of climate on the biogeography of boreal caribou in Canada. Climate Change Ecology Volume 3: 1-10.

Lichen availability

Lichen is a critical food source for caribou, especially in the winter. The winter diet of the Chisana caribou herd is high in moss and low in lichen compared to other herds in the area (Sidebar 6). Mosses have low nutritional value and digestibility compared to lichens. Despite this, the body conditions of the Chisana caribou are similar to other herds, suggesting that they are getting the appropriate nutrients.

In the 2012 ***Management Plan for the Chisana Caribou Herd***, availability of lichen was a concern for the parties. Some relevant information was gathered in 2011 and 2020 (summarized in Sidebar 6). These lichen assessments and models may be useful for evaluating caribou habitat selection and avoidance and provide the relative abundance of lichen.

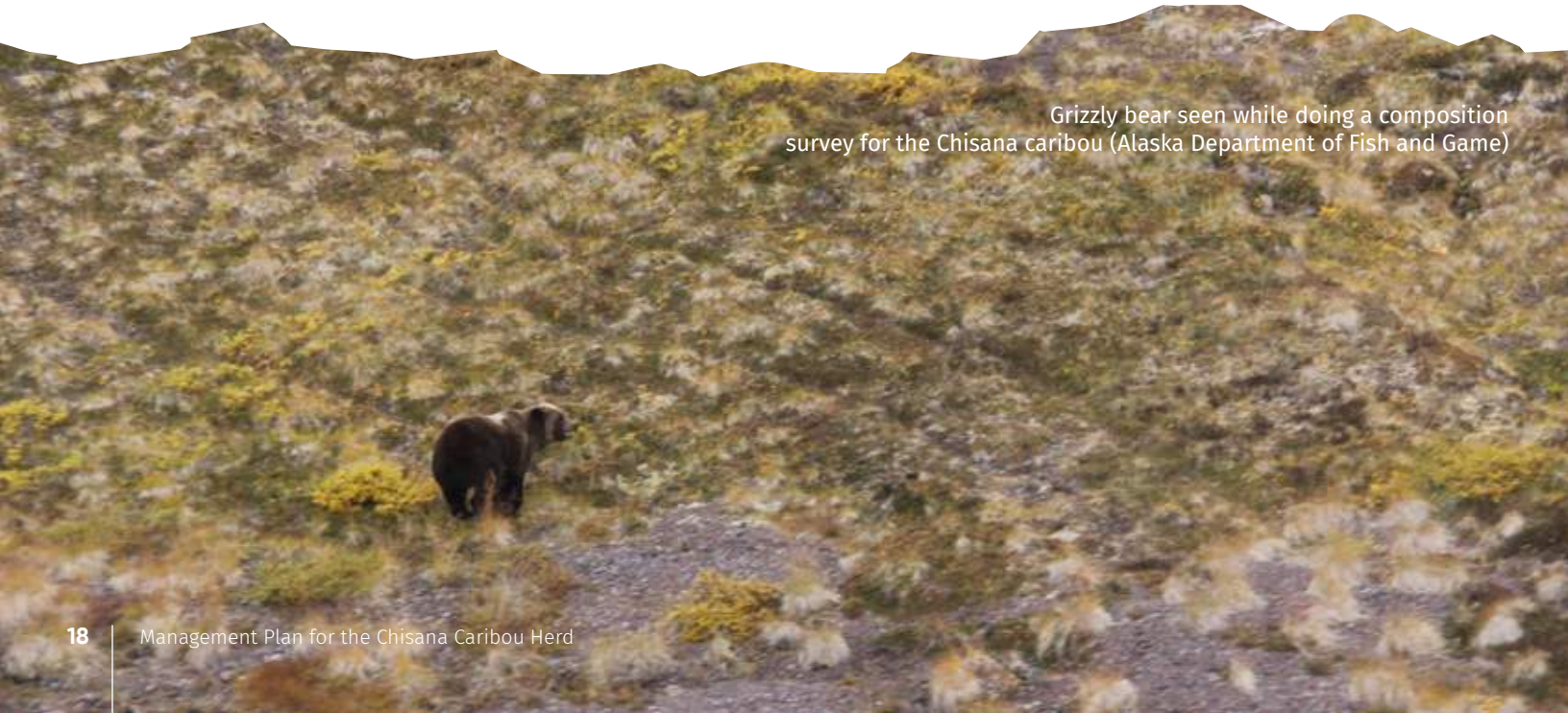
Predator-prey dynamics

Grizzly bears and wolves are the primary predators of caribou. Grizzly bears have the most impact on caribou calves, while wolves are the primary predator of adult caribou. Other predators present in the Chisana caribou herd's range include lynx, coyote, wolverine and golden eagles.

In small caribou populations like the Chisana herd, calf losses from predation by bears and wolves can be substantial in the first few weeks following birth. Given this, the recovery program for Chisana caribou focused on protecting pregnant female caribou and new calves from predation (see Appendix A). Predation can be influenced by climatic factors (e.g., deep snow years) that limit the ability of caribou to separate themselves from their predators.

In 2001, the wolf density in the Chisana caribou herd range was estimated to be 5.6 animals per 1,000 km^2, below average in the Yukon and Alaska[3]. While some trappers and hunters target

3 In 2017, 2018 and 2019, there were three coordinated attempts by Alaskan and Yukon partners to conduct another wolf survey in the Chisana caribou herd range. This work would have completed a recommended task in the 2012 ***Management Plan for the Chisana Caribou Herd***. However, to conduct a wolf survey, there is a need for very specific snow levels and weather conditions, which were not available during any of the attempts. Therefore, there are no updated wolf estimates within the Chisana caribou herd range.



Grizzly bear seen while doing a composition survey for the Chisana caribou (Alaska Department of Fish and Game)

Sidebar 6: Lichen assessments

Farnell and Gardner published a summary of the status of the Chisana Caribou herd in 2002, which included information about the food quality for caribou on the winter range based on analysis of fecal pellets in 1994, 1995, 2000 and 2001.

In 2011, the Government of Yukon's Department of Environment conducted a preliminary assessment of the condition of the winter range in the Yukon. This was to determine if there was sufficient lichen coverage to enable mapping of lichen abundance using satellite imagery. Lichen did not appear to be abundant throughout the Yukon portion of the Chisana caribou herd range. Where lichen was present, it was predominantly *Stereocaulon* spp. intermixed with moss or other non-lichen species. *Stereocaulon* spp. is a lower quality species for caribou. The low abundance of lichen in the surveyed areas indicated that relying solely on a remote sensing-based approach to mapping lichen abundance on the winter range was unlikely to be a useful option.

Macander et al. (2020) modeled lichen cover by using vegetation plots, aerial surveys, and drone imagery across nine caribou ranges in Alaska and the Yukon, including for the Chisana caribou herd range. The resulting lichen cover map provides a baseline for future efforts to estimate change in lichen cover over time. It can also be used to evaluate the influence of estimated lichen cover on caribou resource selection, which the authors did for the Fortymile caribou herd. The results suggested that the amount of lichen cover influences how caribou move across northern boreal forests in both summer and winter.

Clarke, H., and M. Waterreus. 2012. Chisana Caribou Range Lichen Assessment, September, 2011. Yukon Fish and Wildlife Branch Report SR-12-01. Whitehorse, Yukon, Canada.

Farnell, R., and C. Gardner. 2002. Status of the Chisana Caribou Herd 2002. Yukon Fish and Wildlife Branch Report TR-03-01. Whitehorse, Yukon, Canada.

Macander, M., E. Palm, G. Frost, J. Herriges, P. Nelson, C. Roland, K. Russell, M. Suitor, T. Bentzen, K. Joly, S. Goetz, and M. Hebblewhite. 2020. Lichen cover mapping for caribou ranges in interior Alaska and Yukon. Environmental Research Letters 15: 1–14.

wolves in the area, the low numbers of wolves killed in the Chisana caribou herd range likely do not impact wolf density. During the decline of Chisana caribou from 1989 to 2001, wolf numbers remained stable and low, suggesting predation was not the sole factor influencing herd dynamics.

Lynx and coyote are periodically abundant following snowshoe hare population increases and may also prey on caribou. Wolverines and golden eagles are also present at unknown densities in the Chisana caribou herd range.

There was research conducted in 2014 to increase knowledge of predator-prey dynamics in the Chisana range (see Sidebar 7), but there is no current focused work to study these predators of the Chisana caribou.

Human harvest

Since 1994, all hunting of the Chisana caribou herd has been either restricted or managed carefully in both Alaska and the Yukon. From 1994 to 2012 there was no hunting allowed for the herd, including Yukon First Nation subsistence harvest as Kluane and White River First Nations voluntarily banned harvest for the Chisana caribou herd during this time. The management context for hunting is different between the Yukon and Alaska.

Yukon harvest

There is a current ban on hunting in part of the Chisana caribou herd's range in the Yukon, in the area called the Kluane Wildlife Sanctuary, originally established due to concerns about overharvest by Alaska Highway construction workers in the 1940s. When the Kluane Wildlife Sanctuary was first established under the ***Wildlife Act,*** all trapping and hunting was prohibited, including by First Nations people. This ban on traditional harvesting activities caused hardship and alienation from the land. First Nation trapping in the sanctuary was re-established in the 1950s and subsistence hunting was re-established in the 1980s.

Outside of the sanctuary, in the rest of the herd's range, the Government of Yukon's Department of Environment did not issue any hunting licences from 2002 to 2014, following a request by Kluane First Nation and White River First Nation. In 2002, the Chisana caribou herd was listed as a "Specially Protected" population under the Yukon's ***Wildlife Regulations***, which meant that hunting of the herd was prohibited for non-First Nation people. In 2014, the ***Wildlife Regulations*** were amended to remove the "Specially Protected" designation for Chisana caribou. This change was recommended by the Yukon Fish and Wildlife Management Board and was made to be consistent with the 2012 ***Management Plan for the Chisana Caribou Herd***.

Chisana caribou harvest may now occur by non-First Nation people if a permit is provided by the Yukon's Department of Environment. These permits will only be provided in the Yukon in accordance with this management plan (Objective 2) and with agreement by Kluane First Nation, White River First Nation and the Department of Environment. Currently, the Department of Environment does not provide permits for any hunting of the Chisana caribou herd because the three management partners in the Yukon are interested in providing the potential for herd growth. Similarly, the department does not provide a quota to hunt Chisana caribou to the one outfitting concession that overlaps with the northeastern portion of the Chisana herd range.

Bull moose (Government of Yukon)

Sidebar 7: Moose survey in Chisana caribou herd range

In 2014, the United States National Park Service (Wrangell-St. Elias National Park and Preserve) and the Government of Yukon (Department of Environment) funded a moose survey in the Chisana herd range. Additional support for the survey was provided by the Alaska Department of Fish and Game and the United States Fish and Wildlife Service (Tetlin National Wildlife Refuge). This moose survey fulfilled a recommended task from the 2012 Management Plan for the Chisana Caribou Herd. The goal was to better understand the moose population in the Chisana caribou herd range as a part of understanding predator-prey dynamics.

The result of the survey suggests that the moose population within the range of the Chisana caribou herd is similar in density to other areas within interior Alaska and the Yukon. In addition, the results are consistent with other areas where moose populations are at a stable low-density level due to predators. The moose bull-to-cow ratio was moderately high, which suggests that there is low hunting pressure.

Department of Fish and Game, Division of Wildlife Conservation Tok Area Office. 2018. Memorandum: 2014 Chisana moose survey final report. State of Alaska, Tok, Alaska, United States.

Kluane First Nation and White River First Nation have the right to harvest caribou. Both First Nations have continued a voluntary ban on Chisana caribou harvest resulting in no subsistence harvesting of the herd by their citizens. As stated above, this voluntary harvest restriction is to provide the potential for herd growth.

> *Dawson city had a place with a lot of salmon and now they have to hold a ceremony so that the young people don't forget about how to care for salmon. Kluane people have had to cut down on hunting of everything – sheep, caribou. Now we are lucky if we see an animal. I don't want to get to a point where we have to have a ceremony to remember the hunting of caribou for our great grandchildren.*
>
> **-Gùdia -**
> **Mary Jane Johnson,**
> **Lhù'ààn Mân Ku Dan**

Alaskan harvest

In Alaska, the Chisana caribou herd is located primarily within Wrangell- St. Elias National Preserve during the harvest season. Both state harvest and federal subsistence harvest of wildlife are permitted in the national preserve. Management of wildlife in Alaska is a state responsibility. On federal lands, management must be done in concert with federal mandates including a federal subsistence priority for local rural residents over all other consumptive uses. Therefore, state-authorized hunting can be restricted on federal lands if needed to provide for federal subsistence needs. For these reasons, the Chisana caribou hunt and harvest allocation in Alaska are determined through the respective federal (Federal Subsistence Board) and state (Alaska Board of Game) regulatory processes.

The *Alaska National Interest Lands Conservation Act (1980)* states that federal agencies must give harvest priority to federally qualified subsistence users if harvest occurs on federal lands. The United States National Park Service policy also requires that natural processes be maintained for the benefit of wildlife populations to the greatest extent possible, while still providing for subsistence and recreational harvest as directed by the Act.

Under State of Alaska regulations, there is no hunting of the Chisana herd. In spring 2008, the Alaska Board of Game reviewed a proposal to reinstate the harvest of Chisana caribou. Considering the international significance of the herd, the Alaska Board of Game did not approve the proposal and stressed the need to coordinate with the parties in both countries before granting such requests. In spring 2010, the Alaska Board of Game approved a proposal to establish a draw hunt for Chisana caribou within the White River and Upper Chisana River drainage. However, that hunt has not been implemented because there is a federal closure of public lands to caribou harvest in what would be the hunt area, except by federally qualified subsistence users hunting under federal regulations.

A small subsistence harvest of the Chisana caribou herd in Alaska was authorized by the Federal Subsistence Board in January 2012. The hunt area is federal public lands within Game Management Unit 12 that are east of the Nabesna River and the Nabesna Glacier and south of the Winter Trail running southeast from Pickerel Lake to the Canadian border. Much of the hunt area falls within Wrangell-St. Elias National Park and Preserve. The hunt area is closed to the harvest of caribou under State of Alaska regulations.

The Federal Subsistence Board delegated the authority to open the season; to announce the harvest quota, the number of permits and the reporting period; and to close the season to the Wrangell-St. Elias National Park and Preserve Superintendent. There is a requirement in the delegation of authority to notify the Office of Subsistence Management and coordinate with the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the chairs of the Southcentral and Eastern Interior Regional Advisory Councils regarding special actions under consideration. This harvest is managed consistent with this management plan, including setting the harvest quota and evaluating whether to hold the hunt each year.

Consistent with the 2012 *Management Plan for the Chisana Caribou Herd*, the harvest quota was set at seven bull caribou each year from 2012 to 2021. The season was closed in 2022 due to the three-year average for calf-to-cow ratio being lower than the threshold agreed to by the parties, and the quota for the 2023 hunt was six bull caribou (Table 1).

Due to the small harvest quota, eligibility to participate in the hunt was initially limited to those communities determined to be most dependent on the resource, under Section 804 of the *Alaska National Interest Lands Conservation Act*. Subsequent experience indicated that participation was limited, likely due to the challenges associated with accessing the remote hunt area, and eligibility was expanded in 2016 to all communities and areas with a positive customary and traditional use determination for caribou in Unit 12. Specifically, eligibility is open to those rural residents who make their primary permanent residence in Unit 12 (including the communities of Chisana, Nabesna, Northway, Tanacross, Tetlin and Tok along with areas outside of the communities) as well as the communities of Chistochina, Dot Lake, Healy Lake and Mentasta Lake. Alaska Native Villages and Tribes associated with these communities include Cheesh'na Tribe, Healy Lake Village, Mentasta Traditional Council, Native Village of Tanacross, Native Village of Tetlin, Northway Village, and Village of Dot Lake.

Table 1. Chisana caribou permit and harvest information in Unit 12. Success rate is calculated based on the number of individuals hunting, not total permits issued.
Source: Federal Subsistence Permit Database.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Permits Issued	9	9	11	11	8	8	6	4	7	5	0	6
Individuals Hunting	8	7	8	7	8	3	3	3	4	1	N/A	5
Animals Harvested	2	3	2	0	1	0	2	1	3	0	N/A	2
Success Rate (%)	25.0	42.9	25.0	0.0	12.5	0.0	66.7	33.3	75.0	0.0	N/A	40.0

As of 2024, the season dates are August 10 to September 30. Eligible hunters must obtain a federal subsistence registration permit to participate in the hunt. Federal agency staff with Wrangell-St. Elias National Park and Preserve and Tetlin National Wildlife Refuge verify an applicant's residency prior to issuing a permit. For the first several years of the hunt, a cap was set on the number of permits to be issued. However, with limited demand, the cap was never reached, and it was subsequently decided that a cap on the number of permits was unnecessary.

Harley McMahan flying a Super Cub for a composition survey (Alaska Department of Fish and Game)

Access through the Kluane Wildlife Sanctuary into Asi Keyi Natural Environment Park and the heart of the Chisana caribou range is challenging (Government of Yukon)

The permit stipulations include a requirement for harvest reporting. Due to the small quota, hunters are required to report successful harvests within three days, which is shorter than the standard reporting period of five days for federal permits. A telephone hotline facilitates this reporting, and hunters may also report by email. When the number of permits issued exceeds the number of animals in the quota, harvest reports are closely monitored. The quota has not been reached in the decade that the hunt has existed, and thus the season has remained open each year through September 30 (except for 2022 when the season was not opened). However, if the harvest were to approach the quota, park staff would coordinate with the parties specified in the delegation of authority in developing a plan for potentially issuing a special action to close the season and contacting hunters to notify them of the closure.

Commercially guided hunting has a long history in the Chisana caribou herd range. Beginning in the 1920s, wealthy hunters started to come to Alaska in search of big game. Initially, the Chisana-White River region was visited by small parties passing through the area, often supported with pack horses, on extended hunting expeditions. Starting in the 1930s and 1940s, hunting guides established fixed bases for hunting operations at Chisana, nearby Horsfeld, and elsewhere in the region. Wrangell-St. Elias National Park and Preserve continues to permit some sport hunting guides for species other than caribou within the Chisana caribou herd range, therefore there are some structures on the landscape to accommodate these hunters. The park also issues authorizations for other commercial services within the park, such as air taxis, guided hiking, and horseback trips.

Human activities and development

Human disturbance can affect caribou populations both directly (e.g., road mortalities) or indirectly (e.g., avoidance of high-quality habitat or reduced habitat suitability due to sensory disturbances), both of which can have individual- and population-level effects. Industrial development, linear features like roads, cut lines and trails, human recreation and aircraft overflights are some examples of human disturbance that act cumulatively, along with other sources of disturbance (e.g., wildfires, climate change) upon populations. These disturbances may result in changes to habitat use, caribou activity budgets, their calving success, and may increase predation rates.

There is a long history of mining and exploration in the area (see Appendix 10.1.2). Given this history, there are remnants of mining throughout the Chisana caribou range, including disturbed creek beds and remains of human-built structures.

At present, there are limited industrial activities in the Chisana caribou range. In Alaska, there are a few small-scale placer mining operations occurring above the community of Chisana. In the Yukon, there are two small-scale placer prospecting leases currently issued in the lower Wolverine Creek area, accessed off the Donjek River. To the North, there are larger quartz exploration claims in the Flat Top Mountain, Beaver Mountain and White River Lower Canyon areas that currently are approved for class 1 (lowest activity level) exploration activities. Further development of these properties would likely involve new access routes into the Chisana herd range. Within Asi Keyi Natural Environment Park, however, there is legislation that bans industrial activities, including mining. The nearby Kluane Wildlife Sanctuary designation does not restrict development activities.

The core of the Chisana caribou range is remote. The Alaska Highway passes through the northeastern portion (see Figure 1), and Snag Road also provides some access. There are trails (cultural, historical, and modern) throughout the Chisana caribou range that can provide access for all-terrain vehicles, snowmobiles, and horses. Overall, access is difficult due to the terrain and the closed, wet sphagnum and spruce forest that dominate the low-lying areas. Most access points are on the periphery of the range, and, as stated starting on page 9, current collar location data shows that the Chisana caribou largely stay in the core of their range, which is remote and has little human use.

Physical condition of the herd

The role of disease and parasites on the Chisana caribou herd is poorly understood. However, when samples have been collected, no concerning viruses or parasites were found. Overall, there is no evidence to suggest that disease has contributed to, or caused, population trends over time.

Common diseases and parasites in caribou are only of concern at higher intensities in a population, and can include the following:

- Gastrointestinal nematodes.
- Parasitic nematodes that infect the central nervous system and muscles.
- Infectious bovine rhinotracheitis.
- Leptospirosis.

Management authorities and responsibilities

As an international herd ranging across multiple jurisdictions, several management authorities have either a management interest or authority over Chisana caribou. The legislation, regulations, policies, and management directions in place to manage ungulate species, such as caribou, are complex and differ between the Yukon and Alaska. The following sections describe the mandates and responsibilities of the various authorities involved in the management of Chisana caribou.

United States management authorities

In Alaska, the Chisana caribou herd ranges over state-owned land as well as within the boundaries of Tetlin National Wildlife Refuge and Wrangell-St. Elias National Park and Preserve. The following management authorities have responsibilities for the Chisana caribou herd.

The Alaska Department of Fish and Game is responsible for caribou on state lands, private lands, and most federal lands. The department manages caribou for a variety of uses including wildlife viewing, monitoring and harvest, but the extent to which these management activities occur varies among herds.

The United States Fish and Wildlife Service is responsible for the Tetlin National Wildlife Refuge and the United States National Park Service is responsible for Wrangell-St. Elias National Park and Preserve. Both federal government organizations have the mandate to coordinate research, population monitoring, wildlife viewing, public education and awareness, and conservation of wildlife and other resources, including caribou, within their boundaries.

The Alaska Board of Game receives, reviews, and makes decisions regarding state-regulated wildlife harvest on state, private and most federal land, whereas the Federal Subsistence Board manages the harvest by local subsistence hunters on federal public lands. The Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service may all submit proposals to change harvest regulations to the Alaska Board of Game or the Federal Subsistence Board, and they may comment on proposals that have been submitted by others.

The Alaska Department of Fish and Game may issue an emergency order to close a state-managed hunt, if an event occurs that could have negative implications for a caribou herd. As mentioned earlier, the Federal Subsistence Board has delegated to the Superintendent of Wrangell-St. Elias National Park and Preserve the authority to manage certain aspects of the federal subsistence hunt of the Chisana herd. The United States Fish and Wildlife Service and the United States National Park Service also have the authority to close a caribou harvest within their boundaries if they determine a herd is at risk, such as from unsustainable harvest.

Federally recognized tribes in Alaska do not have direct management authority over wildlife, however the tribes must be provided the opportunity to consult with the Federal Subsistence Board, the National Park Service, and the Fish and Wildlife Service when a “departmental action with tribal implications” is proposed. This would include people from both the Upper Tanana and Upper Ahtna. A regulatory proposal is a potential departmental action with substantial direct effect on an Indian Tribe.

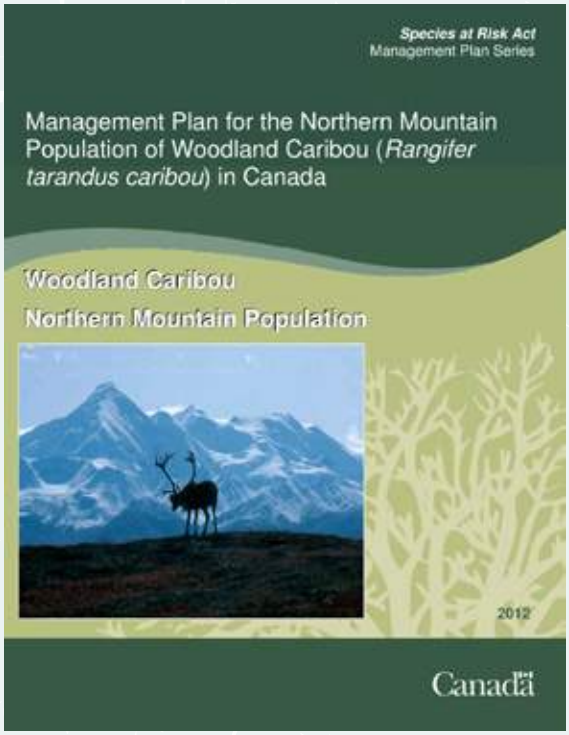
Canadian management authorities

Environment and Climate Change Canada is responsible for promoting the conservation of species at risk and fulfilling Canada's international commitments under the Convention on Biological Diversity. Environment and Climate Change Canada and the Government of Yukon's Department of Environment led the development of the ***Management Plan for the Northern Mountain Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*** (Sidebar 8).

In the Yukon, the Chisana range is within the Traditional Territory of Kluane First Nation and the asserted traditional territory of White River First Nation. Members of Kluane First Nation and White River First Nation have rights for subsistence harvest in their traditional territories. Kluane First Nation is a self-governing First Nation with a right to harvest and the authority to enact laws for hunting, gathering, and the protection of wildlife and their habitat on Settlement Land, as per the ***Kluane First Nation Final Agreement***. White River First Nation has not signed a final agreement; their rights are affirmed within the Canadian ***Constitution Act***, 1982.

The Government of Yukon works with Kluane First Nation and White River First Nation to manage the Chisana caribou herd and its habitat in the Yukon. The Government of Yukon's Department of Environment is the authority responsible for coordinating research and monitoring, wildlife viewing, harvest management and enforcement, and public education. The department can initiate and close harvest of wildlife populations, except on Settlement Land owned by First Nation governments. The Department of Environment must consult with Yukon First Nations and the Yukon Fish and Wildlife Management Board on management decisions, especially as they relate to harvest.

The Yukon Fish and Wildlife Management Board has a management interest for the Chisana caribou herd. The board may make recommendations to First Nations and the Government of Yukon about the conservation of fish and wildlife, which may include recommendations for the Chisana caribou herd.



Sidebar 8: Status of Northern Mountain caribou in Canada

The Chisana caribou herd is part of the Northern Mountain caribou population, which are designated as a species of "Special Concern" under Canada's ***Species at Risk Act.*** There is a Canadian management plan for the Northern Mountain caribou population. The Management Plan for the Chisana Caribou Herd complements the broader recommendations of the Canadian Northern Mountain caribou plan but is tailored to suit the unique management needs of the Chisana caribou herd.

Part of the Chisana caribou herd range in the Yukon is within the boundaries of the Kluane Wildlife Sanctuary and Asi Keyi Natural Environment Park, which are both managed by the Government of Yukon. The Kluane Wildlife Sanctuary has restricted hunting, but subsistence harvest by First Nation people is allowed in the wildlife sanctuary. Asi Keyi Natural Environment Park is a protected area that was established by the ***Kluane First Nation Final Agreement***. The park has not yet been designated under the Yukon's ***Parks and Land Certainty Act***. It is being managed under the principles outlined in the ***Kluane First Nation Final Agreement*** while a steering committee with representatives from the Department of Environment, Kluane First Nation and White River First Nation work to develop a management plan for the park. The park management plan may address some considerations for the Chisana caribou herd specific to management of its habitat and visitor use in the area. Management of the herd itself falls under the purview of the ***Wildlife Act*** and not the ***Parks and Land Certainty Act***.

Mount Natazhat

MANAGEMENT GOAL AND PRINCIPLES

Management goal

Conservation of the Chisana caribou herd is the overriding goal of this management plan. The parties will implement strategies that support a stable or increasing population of Chisana caribou and work together to better understand the factors that affect the herd. Population status will be measured through continued monitoring of population size and the number of calves and bulls per 100 cows.

Management plan principles

The following are principles to guide management of the Chisana caribou herd as well as to guide the implementation of this management plan:

1. Plan implementation must recognize and respect the relationships that exist among traditional and historic users, and First Nation, federal, territorial and state governments.
2. Management of the Chisana caribou herd must respect the mandates of each party.
3. Management of the herd and its habitat will depend on the ability of parties to develop and implement cost-effective and timely programs and approaches.
4. Management must use the best available information and respect traditional, local, and scientific knowledge.
5. Management of the herd relies on the health of all ecosystem components that support the herd.
6. Consistent with the precautionary principle, management strategies that aim to conserve Chisana caribou should not be delayed even if detailed information is limited or lacking. Caution must be exercised to avoid potential effects of human activities to the caribou herd and its habitat.
7. Where possible, this plan will support and be consistent with the Canadian federal ***Species at Risk Act*** Management Plan for the Northern Mountain Population of Woodland Caribou.
8. Implementation of this management plan requires commitment, coordination, and collaboration among the parties.

MANAGEMENT OBJECTIVES AND STRATEGIES

Objective 1: Regularly monitor the Chisana caribou herd in order to acquire information for sound decision-making

Considering recovery efforts, the international significance, and the importance of the herd to Indigenous Peoples and residents of the Yukon and Alaska, a cautious approach is being taken to manage the Chisana caribou herd. This approach requires consistent and ongoing monitoring to feed into decisions that will support the management goal of a stable or increasing population of Chisana caribou.

Strategy 1.1: Conduct regular monitoring of the herd

As described on page 10, there are three ways that the parties monitor the Chisana caribou herd:

- Radio collars and satellite collars are used to monitor seasonal movements of the herd. Radio collars have a long lifespan, their data must be collected during telemetry flights, and they are most useful to help locate where the animals are to facilitate composition surveys and population surveys. Satellite collars provide data that enable accurate delineation of herd movement patterns and range, and can facilitate investigation of ecological questions (e.g., seasonal patterns of habitat use) relevant to this plan's management goal and objectives. The data from satellite collars can be collected remotely, but the collars have a shorter lifespan.
- Composition surveys provide information about the number of calves and bulls relative to the number of cows.
- Population surveys are used to statistically estimate the size of the herd.

These methods will continue to be used to monitor the herd, in accordance with the responsible agencies' approved peer-reviewed protocols, and they will provide the basis for the parties' decisions.

During handling for collar deployment, biologists monitor the health and physical condition of individual Chisana caribou. Indicators monitored include age, morphological measurements, fat reserves, presence of disease and parasites (visual inspection and blood samples), maternal status (weaning and pregnancy status), diet and nutrition (fecal sample collection), and genetic typing (blood samples). This monitoring provides information on the condition of the individual at the time of handling, but also the prevalence of infectious diseases and parasites in the herd to establish baseline values of health parameters for detecting future changes.

	Recommended task	Who[4]	Timeline
1	Conduct a population survey of the herd every three to five years. If weather or other conditions interfere, conduct the survey as close as possible to this timeframe. If the calf-to-cow 3-year average is below the threshold level established in Strategy 2.2 for more than 2 years in a row, prioritize a population survey as soon as possible.	ADFG, WSEPP, YG, TNWR	Every three to five years
2	Conduct composition surveys.	ADFG, WSEPP, YG, TNWR	Annually
3	Conduct one to two telemetry flights.	ADFG, WSEPP, YG, TNWR	Annually
4	Coordinate the recovery of collars from dead caribou during composition counts or telemetry surveys.	ADFG, WSEPP, YG, TNWR	As needed
5	Implement and maintain a collaring program with a mix of 30 to 40 satellite and radio collars.	ADFG, WSEPP, YG, TNWR	Ongoing
6	Continue opportunistic monitoring during collar deployment of the physical condition of Chisana caribou to provide information about health.	ADFG, WSEPP, YG, TNWR	As needed

4 For the recommended task tables, the parties names' are abbreviated as follows: Government of Yukon's Department of Environment (YG), Kluane First Nation (KFN), White River First Nation (WRFN), the Alaska Department of Fish and Game (ADFG), the United States Fish and Wildlife Service, Tetlin National Wildlife Refuge (TNWR), and the United States National Park Service, Wrangell-St. Elias National Park and Preserve (WSEPP).

Bob Gingue, Tok Wildlife Technician and Mark Stott, Pilot weighing a calf to monitor physical condition (Alaska Department of Fish and Game)

Objective 2: Cooperatively manage Chisana caribou herd harvest to maintain a stable or increasing population

Human harvest is a factor that may influence the Chisana caribou herd (page 20). As conservation of the Chisana caribou herd is the overriding goal of this management plan, the parties have agreed on a cautious approach for Chisana caribou harvest. The parties agreed on new direction in Objective 2 for sustainable harvest in this plan as compared to the 2012 ***Management Plan for the Chisana Caribou Herd***, given what they learned from ongoing monitoring (page 10) and the harvest allowed since 2012 (Table 1).

Strategy 2.1: Implement a maximum total annual harvest allocation of two per cent of the herd; up to one per cent harvest in Alaska and up to one per cent harvest in the Yukon

The parties have agreed to a bulls-only harvest not exceeding two per cent of the estimated population for Chisana caribou. A bulls-only harvest is expected to have the least impact on potential herd growth. This harvest allocation is provisional on the population and composition survey data indicating a harvest is sustainable (Strategy 2.2.).

Based on survey and telemetry data from 1979–2022, Chisana caribou are evenly distributed in the Yukon and Alaska. For this reason, the parties recommend that the maximum annual allocation of two per cent be evenly distributed between the Yukon and Alaska, with a maximum of one per cent of the estimated population available for harvest in each jurisdiction.

	Recommended task	Who	Timeline
7	Make harvest decisions consistent with the established harvest allocation.	ADFG, WSEPP, YG, KFN, WRFN	Annually

Strategy 2.2: Use population indicators to determine sustainable harvest level

Determining a sustainable harvest level for the Chisana herd focuses on population indicators rather than a target herd size. The parties have agreed to three population indicators which all contribute information toward harvest decisions for the Chisana caribou herd. No one indicator by itself provides sufficient information for harvest decisions, thus the parties have agreed to use the information from all three indicators together, as shown in the harvest management strategy in Figure 5, to determine if they will allow harvest. A description of how the parties will use the information from the three indicators to reach a management decision, as per the harvest management strategy, follows Figure 5.

Indicator 1: Population trend (assessed every 3-5 years*)	**Indicator 2:** Three-year moving average calf-to-cow ratio (assessed annually)	**Indicator 3:** Three-year moving average bull-to-cow ratio (assessed annually)	**Harvest decision**
Stable or increasing	Greater than or equal to 15 calves per 100 cows	Greater than or equal to 35 bulls per 100 cows	A total harvest of 2% of the herd is allowed
		Fewer than 35 but greater than or equal to 30 bulls per 100 cows	A total harvest of 1% of the herd is allowed
		Fewer than 30 bulls per 100 cows	No harvest
	Fewer than 15 calves per 100 cows	Greater than or equal to 35 bulls per 100 cows	A total harvest of 1% of the herd is allowed
		Fewer than 35 but greater than or equal to 30 bulls per 100 cows	No harvest
Decreasing	Greater than or equal to 15 calves per 100 cows	Greater than or equal to 35 bulls per 100 cows	A total harvest of 1% of the herd is allowed
		Fewer than 35 but greater than or equal to 30 bulls per 100 cows	No harvest
		Fewer than 30 bulls per 100 cows	No harvest
	Fewer than 15 calves per 100 cows	Greater than or equal to 35 bulls per 100 cows	A total harvest of 1% of the herd is allowed
		Fewer than 35 bulls per 100 cows	No harvest

Figure 5: *Harvest management strategy for Chisana caribou herd using three population indicators. The first three columns provide management thresholds for each population indicator. The resulting management decisions for harvest are bolded. *If timelines for assessing the population trend are exceeded, the parties will restrict harvest as described under Indicator 1.*

Indicator 1: Population trend

In Figure 5, the probable population trend is the first indicator to consider because it will only change every three to five years, as per recommended task #1.

Analyses of population survey data and supporting information, including best professional judgement informed by local knowledge, will result in one of four potential conclusions: population trend is (1) stable, (2) increasing, (3) decreasing or (4) not possible to determine based on existing information (indeterminate).

After the population survey in 2022, the parties agreed that the available information indicates a stable herd population (page 10). This is based on the information from the population and composition surveys.

Given the amount of data gathered on the Chisana caribou herd over the years, as well as recent advances in population-estimation techniques, it may be possible to improve upon previously used methods for estimating population trend. The parties are committed to evaluating alternative analytical approaches and establishing a prescribed analytical protocol prior to the next population survey that should occur between 2025 and 2027.

With a population survey every three to five years (recommended task #1) and annual composition surveys (recommended task #2), the parties can be confident in making management decisions based on the estimated population trend, and as per Figure 5. However, if a significant amount of time passes between surveys, the parties will have less confidence in an estimated population trend. Therefore, the parties agreed to harvest restrictions if time elapses past the timelines established for monitoring (recommended task #1) as follows:

- If the time between population surveys has been greater than five years and the time between composition surveys has been more than three years, the population trend will be indeterminate and the parties will make more conservative harvest decisions, in line with a decreasing trend (Figure 5).
- If the time between population surveys has been greater than five years and the time between composition surveys has been greater than five years, harvest is temporarily suspended. Harvest may only occur again once a composition survey is conducted and the estimates are at least 15 calves per 100 cows and 35 bulls per 100 cows.

This approach is in line with the precautionary principle (management plan principle #6).

After considering the population trend, the parties will consider the other two indicators annually, based on composition surveys.

Indicator 2: Three-year moving average for calf-to-cow ratio

The parties have agreed to monitor a rolling three-year moving average of the ratio of calves to cows during annual fall composition surveys. The parties decided to continue to have a management threshold of 15 calves per 100 cows, as was in place in the previous 2012 *Management Plan for the Chisana Caribou Herd*.

Below, Figure 6 shows the management threshold of 15 calves per 100 cows with the three-year average results from the composition survey. The colours are the same as those used for the thresholds shown in Figure 5. If the calf-to-cow ratio is greater than or equal to the management threshold of 15 calves per 100 cows (in the green), there are three possible management decisions in Figure 5, depending on the bull-to-cow ratio. If the calf-to-cow ratio is less than the management threshold of 15 calves per 100 cows (in the red), there are two possible management decisions in Figure 5, depending on the bull-to-cow ratio.

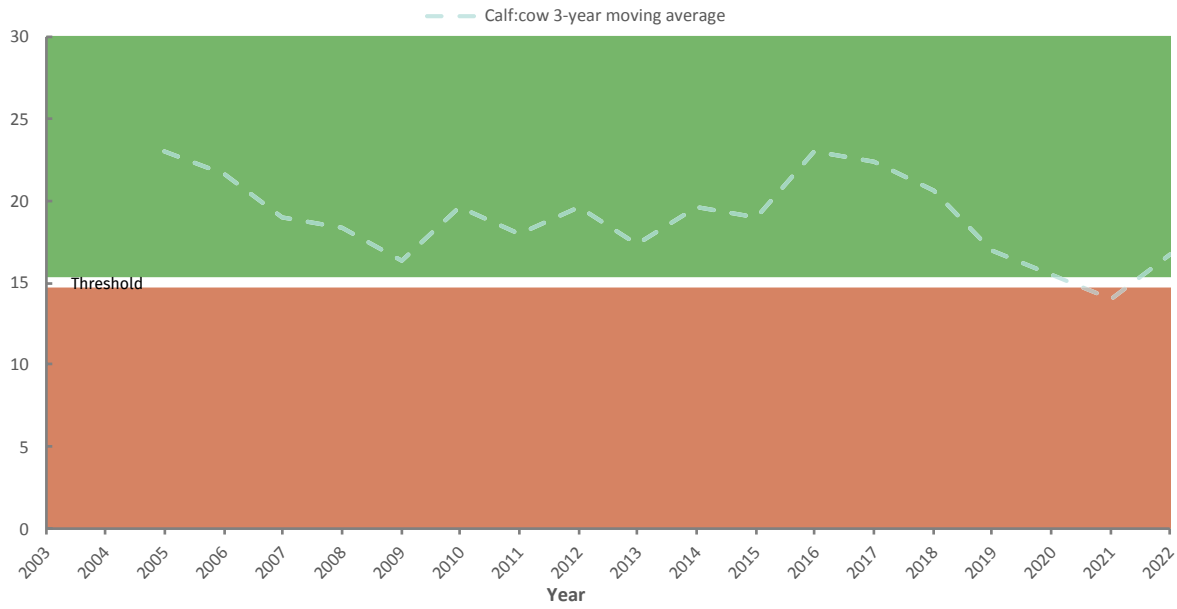


Figure 6: *Three-year moving average of the number of calves observed per 100 cows during Chisana caribou herd composition surveys (see Figure 3) with the management threshold of 15 calves per 100 cows.*

Note that in 2021, the three-year moving average dropped below the calf-to-cow ratio of 15 calves per 100 cows identified as a threshold to make harvest management decisions. The 2012 *Management Plan for the Chisana Caribou Herd* stated that harvest was not allowed if the three-year average for calf-to-cow ratio dropped below this threshold. This is the reason that the Wrangell-St. Elias National Park and Preserve did not issue hunting permits in 2022, as described in Table 1 (page 23).

Once the parties determine the management threshold for indicator 2, they will consider the third and final indicator to reach a harvest decision.

Indicator 3: Three-year moving average for bull-to-cow ratio

The final indicator to consider is the bull-to-cow ratio. The direction from the previous 2012 *Management Plan for the Chisana Caribou Herd* stated that an estimate of fewer than 35 bulls per 100 cows reported in any given year would stop harvest. The parties have now decided the bull-to-cow ratio should be based on a three-year moving average, consistent with the calf-to-cow ratio. The parties also added a second management threshold, so there are now thresholds at 35 and 30 bulls per 100 cows. This means that there are now three possible results of evaluating the bull-to-cow ratio, shown as green, yellow and red in Figures 5 and 7.

Below, Figure 7 shows the management thresholds of 35 and 30 bulls per 100 cows with the three-year average results from the composition survey. If the composition survey finds that there are greater than or equal to 35 bulls per 100 cows is in the 'green.' Fewer than 35 but greater than 30 bulls per 100 cows is in the yellow, and fewer than or equal to 30 is in the 'red.'

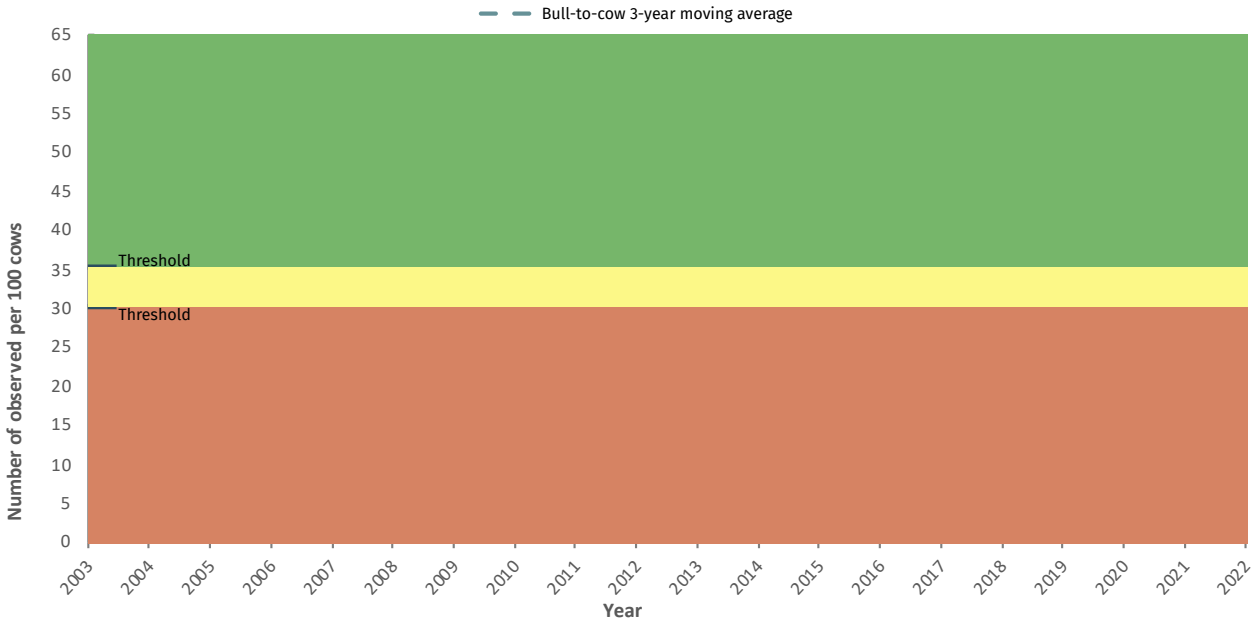


Figure 7: *Three-year moving average of the numbers of bulls observed per 100 cows during Chisana caribou herd composition surveys (see Figure 3) with the management thresholds at 30 and 35 bulls per 100 cows.*

Even though these management thresholds are new to this plan, Figure 7 displays them over past data from 2003 to 2022 to provide a visual indicator of how the thresholds will be applied moving forward. Since 2003, the three-year moving average for bull-cow ratio has not dropped below either of the new thresholds.

	Recommended task	Who	Timeline
8	Based on population and composition survey results, determine if indicators meet the requirements to continue with harvesting of the herd.	All	Annually
9	Make decisions about harvest in accordance with Figure 5. If timelines for monitoring (Recommended task #1) are exceeded, restrict harvest as described in Indicator 1.	WSEPP, YG, ADFG, KFN, WRFN	Annually
10	Develop and agree on an analytical protocol for determining the population trend prior to the next population survey, including what constitutes a concerning population decline.	WSEPP, YG, ADFG, KFN, WRFN	By 2025-2027

Strategy 2.3: Avoid incidental harvest of Chisana caribou when targeting neighbouring herds

As stated previously, the Chisana caribou herd may overlap spatially with neighbouring herds of caribou, including the Nelchina, Mentasta and Kluane herds. At this time, neither the Mentasta nor Kluane herds have a permitted harvest, but harvest can be allowed for the Nelchina herd when it is sustainable for the population. Given that there is a different harvest management regime for Nelchina caribou, other measures must be taken if the herd mixes with the Chisana caribou.

The Government of Yukon's Department of Environment may open a limited hunt for the Nelchina caribou herd. Decisions about the management of the Nelchina caribou herd are made in partnership with Kluane First Nation and White River First Nation. A major consideration for allowing Nelchina caribou hunting opportunities is to ensure that Chisana caribou are not inadvertently hunted. The three management partners in the Yukon communicate about herd distributions before deciding on hunting opportunities, and a Nelchina caribou hunt will not be available if Chisana caribou are present.

A federal hunt may be permitted for Nelchina caribou within the Tetlin National Wildlife Refuge in Alaska, managed by the United States Fish and Wildlife Service. This opportunity is limited to federally qualified rural residents with a positive customary and traditional use determination, essentially only those residents in Upper Tanana communities. With satellite and radio collars on Nelchina, Mentasta and Chisana caribou herds, the Fish and Wildlife Service (in collaboration with the National Park Service and the Alaska Department of Fish and Game) can monitor whether the caribou from different herds are mixing and can take management action to either focus harvest efforts in different locations, or temporarily close the hunt.

	Recommended task	Who	Timeline
11	Consider the distribution of Chisana caribou herd in decisions about neighbouring caribou herd harvest.	YG, TNWR, ADFG, NPS	Annually
12	Prior to and during the harvest season, share data with all parties about distribution of herd.	YG, TNWR, ADFG, NPS	Annually

Setting up traps along a trapline (Government of Yukon)

Sidebar 9: Predator management strategies

Predator management is outside of the scope of this management plan. There are multiple management authorities that have jurisdiction and management directions may differ between them. Two policies regarding predator management that may be relevant are the United States National Park Service's ***Management Policies 2006*** and the Government of Yukon's ***Wolf Conservation and Management Plan.***

Management Policies 2006 generally prohibits predator control as a management practice. Specifically, Section 4.4.3 (p. 47) states:

"The Service does not engage in activities to reduce the numbers of native species for the purpose of increasing the numbers of harvested species (i.e., predator control), nor does the Service permit others to do so on lands managed by the National Park Service."

In 2012, the Government of Yukon and the Yukon Fish and Wildlife Management Board developed a renewed Yukon Wolf Conservation and Management Plan. This 2012 plan shifted management of wolves in the Yukon to a more holistic approach centered around respect and an acknowledgement of the complexity of predator-prey dynamics. The primary tool enabled in the 2012 plan is the community-based local wolf harvest program under Goal 4, which mobilizes trapping as a way to reduce wolf predation on ungulates. This means that there can be support for local wolf harvest programs to reduce predation rates if those programs meet certain criteria. In 2022, the Government of Yukon released an implementation review summary report of the 2012 plan, further committing to initiating action towards community-based wolf harvest programs.

Government of Yukon. 2012. Yukon Wolf Conservation and Management Plan. Environment Yukon. Whitehorse, Yukon, Canada.

United States Department of the Interior, National Park Service. 2006. Management Policies 2006. Washington, DC, United States.

Objective 3: Continue to learn more about the Chisana caribou herd and the factors that influence it so that management agencies make well-informed decisions

The background of this plan (page 14) summarizes current information about the factors that may influence the Chisana caribou herd's population size and dynamics. Research and local information could advance the ability of managers to make better decisions for the benefit of the Chisana caribou herd, considering these many factors. There are potential sources of funding available from each party as well as partnership opportunities with other institutions.

Further work could engage knowledgeable community members and Elders in management of this herd.

Strategy 3.1: Collaboratively address possible future population decline

The parties' overarching management goal for the Chisana caribou herd is to ensure that there is a stable or increasing population. If monitoring demonstrates a concerning population decline (see recommended task 10), the parties will work together to explore potential options to assess factors contributing to the decline. They will then use this information to make the best decisions possible for herd recovery.

If predators are demonstrated to be a main factor in a decline the parties will need to discuss a response. Considering predator control as a management response to a declining trend in herd population size is beyond the scope of this plan and is left to the discretion of individual parties, contingent on their respective management policies and legal authorities (see Sidebar 9). Potential management responses could include trapping incentives or other mechanisms.

	Recommended task	Who	Timeline
13	Convene a meeting if any party is concerned about the herd. This could be based on a population survey demonstrating a concerning population trend or other factors.	All	As needed
14	If monitoring demonstrates a concerning population decline (see recommended task 10), the parties will meet to explore potential options to assess factors contributing to the decline.	All	As needed

Strategy 3.2: Support research

More research may assist the parties in understanding the factors that influence the herd. The parties have provided some guidance in Appendix C about specific topics that would support them in making informed decisions about the Chisana caribou. This appendix is intended to help researchers to do work that is desired by the communities and the parties. There is an expectation that the knowledge and information gained will be shared back to the parties and local community members.

	Recommended task	Who	Timeline
15	As funding, partnerships, and opportunity allow, support or conduct research including local and Traditional knowledge studies (see Appendix C).	All	As needed
16	Ensure that any research supported or conducted by the parties is shared with the parties and with the local communities.	All	As needed

Strategy 3.3: Include considerations for the Chisana caribou herd in planning and decision-making processes

The management authorities involved in decisions about land use and human activities differ across the Yukon and Alaska jurisdictions (page 26).

Annual and seasonal herd ranges can provide valuable information about the Chisana caribou herd's use of an area. Now that the Chisana caribou herd is monitored with satellite collars as well as radio collars, there is better data available to delineate annual and seasonal ranges. This can be a part of the information that management authorities consider during planning and decision-making processes.

Although it is challenging to predict precisely how and when changing climatic factors may influence caribou populations, by carefully monitoring and assessing the changing landscape and the needs of caribou populations, strategies can be developed to promote their long-term persistence. As our understanding of the factors that influence caribou distribution and demographics continues to improve, this can guide informed decision-making.

When it comes to climate change preparedness, carefully planning when, where, and how human development occurs within caribou ranges may be the best approach to reduce adverse effects to distribution and demography (see Sidebar 5). The parties are committed to including considerations for the Chisana caribou herd in planning and decision-making processes.

	Recommended task	Who	Timeline
17	With the satellite collar data that is now available, work together to update and improve annual and seasonal herd ranges.	YG, NPS and ADFG	Ongoing
18	Seek funding or partnership opportunities to conduct habitat modeling to better inform land use decisions.	YG, NPS and ADFG	As needed

Objective 4: Increase communication and information sharing about the Chisana caribou herd

Due to the international attention the Chisana caribou herd has received as well as the recovery efforts conducted by multiple individuals, governments, agencies and First Nations, there is ongoing support and desire for the continued longevity and health of the herd. As such, there is a need to develop and communicate appropriate key messages at critical times for people or groups with an interest in the herd. These could include local communities, First Nations, tribal councils, outfitters, boards and councils, youth, non-government organizations and the public.

Strategy 4.1: Inform the public and key interest groups about the status of current initiatives, conservation, and population trends for the Chisana caribou herd

Communication with the public regarding the status of the herd, past recovery efforts, and its potential vulnerability to harvest will support management of this herd. Critical times for implementing communication objectives would include when a hunt is initiated or closed, and when research or survey initiatives are occurring. Public engagement through existing programs is an efficient way to do so. Additional work in affected communities will provide opportunities for local input to guide herd management.

	Recommended task	Who	Timeline
19	Share information about herd management, when appropriate and available.	All	As needed
20	Develop and distribute public communications about population trends and harvest, when appropriate and available.	All	As needed

IMPLEMENTATION, REVIEW, AND EVALUATION

Objective 5: Implement the plan in a collaborative and timely manner

To date, the management of this herd has drawn on collaborative efforts and shared interest to maintain a healthy herd size. For this plan to be effectively implemented, maintenance of the ongoing relationships that have been built through the recovery planning initiative, and subsequently in developing this plan, are required.

Strategy 5.1: Implement the plan in a manner that improves cooperation and communication among the parties

The Chisana caribou herd is a shared resource. Cooperation, communication and trust will enhance our ability to manage the herd effectively. Because management of the Chisana caribou herd is the responsibility of multiple parties, there is an opportunity to share resources and coordinate efforts among the different agencies. Further, where possible, volunteers will be engaged to support plan implementation.

	Recommended task	Who	Timeline
21	Inform parties about the availability of resources for implementing various sections of the plan, including monitoring and research.	All	As needed

Strategy 5.2: Review and renew the plan

The Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service, as parties to this plan, will implement the plan in an ongoing manner. The approved plan will remain in effect for 10 years unless earlier review is agreed on by the parties. A management plan variance or amendment request can be initiated at the request of the parties to the plan. Meetings of the parties can be called, as needed, to share information and to make decisions about implementation.

	Recommended task	Who	Timeline
22	Review the status of strategies within this plan during management meetings.	All	As needed
23	Renew or extend plan in 10 years unless an earlier review is agreed on by the parties.	All	2034

APPENDICES

Appendix A: Background

History of the Chisana caribou herd population trends and past recovery efforts

Information about the Chisana caribou herd population trends before the 1970s is limited. In the mid-to-late 1970s, the herd's population was estimated at 1,000 caribou. During the 1980s, environmental conditions were favorable, and the herd increased to about 1,900 caribou by 1988. At that time, the parties allowed a small harvest opportunity of primarily bulls.

In the 1990s, management authorities and local residents became concerned about the sustainability of the herd. The calf-to-cow ratios dropped to approximately two for every 100 cows in 1991 to 1993. The overall population of caribou was thought to have declined to about 870 in 1993. The ratio of calves to cows in the fall remained low for the next nine years, and the calf losses after birth were high. The ratio of bulls to cows also dropped to about 19 bulls for every 100 cows during 1995 to 1999. The herd's population declined to an estimated low of 315 caribou by 2002. This represents an average yearly decline of 12 per cent from 1989 to 2002. Weather and predation were assumed to be the causes for the perceived decline.

In 1994, almost all hunting of Chisana caribou was stopped in Alaska and the Yukon due to fears of low numbers, calf-to-cow and adult bull-to-cow ratios.

There was a community workshop held in Northway, Alaska in October 1997 with all representatives present. A second community workshop was held in Beaver Creek, Yukon in 2001. The purpose of these workshops was to record Elder's information about key habitats for moose

and other species. During the 2001 meeting, participants discussed Chisana caribou and their concerns about the herd's decline. As a result of this meeting, Kluane First Nation and White River First Nation requested immediate measures by the Government of Yukon to prevent the extirpation of the herd. These workshops are summarized in Smith's (2004) summary.

In response, Yukon and Alaska initiated a joint experimental maternal penning recovery effort from 2003 to 2006. A pen was created to protect pregnant females from predators in hopes of reducing early calf mortality. Pregnant females were captured and held in pens from late March to mid-June to provide safe conditions for calving and neonatal periods before being released back into the range. In addition to the natural forage available, the parties provided additional food sources of commercial caribou pellets and lichens that were collected elsewhere and transported to the pen. Over the four-year recovery period, this program ran four annual penning trials, with 146 pregnant females included in the program and 136 calves successfully released from the pens and recruited into the population.

Radio telemetry was used to monitor the survival of both caribou calves raised in the pen and those born in the wild. By excluding predators, calf survival was increased through the holding pen and may have helped offset further decline in the herd. The evaluation by Adams et al. (2019) provides a detailed examination of the contribution of the maternal penning program to the Chisana herd.

It was later determined during an aerial survey that a large number of Chisana caribou were likely missed in these earlier counts, and that the herd numbers did not drop as low as documented in the 1990s. Numerous caribou were likely missed because of the small number of radio collared caribou, patchy aggregations of caribou, and the tendency of the herd to use timbered habitat in the fall when surveys were conducted. This suggests that the herd population remained relatively stable; however, very low calf-to-cow and adult bull-to-cow ratios provided evidence that herd demographics were a cause for concern and management action.

References:

Adams, L., R. Farnell, M. Oakley, T. Jung, L. Larocque, G. Lortie, J. McLelland, M. Reid, G. Roffler, and D. Russell. 2019. Evaluation of Maternal Penning to Improve Calf Survival in the Chisana Caribou Herd. Wildlife Monographs 204:5–46.

Smith, B. 2004. Applying the knowledge, experience and values of Yukon Indian People, Inuvialuit, and others in conservation decisions: Summaries of 55 Yukon Projects, 1985-2003. Yukon Fish and Wildlife Branch Report MR-04-01, Whitehorse, Yukon, Canada.

Chisana Compound (Government of Yukon)

History of mining activity in the Chisana caribou herd range

Indigenous Peoples historically recovered native copper from Kletsan Creek at the headwaters of the White River near the present Alaska-Yukon boundary. Mining records indicate that few actively mined placer creeks were reported in the area until 1913 when some of the White River tributaries were found, including the Koidern River and the Tchawsahmon Lake area creeks. Continuing up the White River into Alaska, prospectors discovered the richer Chisana area, and the Tchawsahmon creeks in the Yukon were abandoned.

Non-Natives first entered the Alaskan greater Chisana region in 1891, when a three-man party traversed from the White River to the Nizina River through Skolai Pass. By 1898, prospectors began regularly entering the region and several United States Geological Survey parties also began exploring the area.

In 1913, discovery of gold near the headwaters of the Chisana River provoked Alaska's last major gold rush. This led to the sudden occupation of a previously unknown and wild part of Alaska, with a series of mining camps popping up and then establishment of the community of Johnson City, now known as Chisana.

During anthropologist Robert McKennan's stay in Chisana in late 1929, he was told that before the gold rush "Chisana [was] the best all round hunting place in the old days [for] caribou, moose, and sheep" (Easton 2021). The influx of several thousand miners associated with the short-lived Chisana gold rush in 1913-14 had a significant effect on caribou, sheep, and other game in the vicinity of the mines, with store-bought foods being both scarce and expensive. Geologist Stephen R. Capps (1916) visited the area in 1908 and again in 1913. Although he described the area as "exceptional for the abundance and variety of game," he observed that caribou numbers had been much reduced due to constant hunting. National Park Service historian Geoff Bleakley (2007) noted that the large-scale killing of game forced some residents of a nearby Indigenous village to move out of the area, while others moved to Chisana City, where some of them worked as market hunters, supplying miners with meat. The caribou population seems to have rebounded by McKennan's 1929 stay, however. His diary describes an abundance of caribou around Chisana that fall. Similarly, Upper Ahtna elder Johnny Nicolai, who moved to Chisana in 1936, told Simeone (2006) in a 2004 interview that there were "a lot" of caribou in the area.

Although the mining boom itself was short-lived, small-scale mining has occurred on and off in the area in the decades since the gold rush. In 1929, the Alaska Road Commission hired Gus Johnson to build an airstrip in Chisana City, providing an alternative to the long overland routes into the region.

References:

Bleakley, Geoffrey. 2007. A History of the Chisana Mining District, Alaska, 1890-1990. Department of Interior, National Park Service, Anchorage, Alaska.

Capps, Stephen R. 1916. Chisana–White River District, Alaska. USGS Bulletin U.S. Government Printing Office, Washington, D.C.

Easton, Norman A. 2021. An Ethnohistory of the Chisana River Basin. Wrangell-St. Elias National Park and Preserve, Copper Center, AK, p. 70.

Mishler, Craig, and William E. Simeone. 2006. Tanana and Chandalar. Fairbanks, Alaska: University of Alaska Press.

William E. Simeone. 2006. Some Ethnographic and Historical Information on the Use of Large Land Mammals in the Copper River Basin. Resource Report, NPS/AR/CRR-2006-56. Wrangell-St. Elias National Park and Preserve, Copper Center, Alaska.

Taxonomy of the Chisana caribou herd

In Canada, the Chisana caribou herd is classified taxonomically as ***Rangifer tarandus caribou*** and is one of the Northern Mountain ecotypes of woodland caribou. Behaviorally, the Chisana caribou herd is typical of other mountain herds, particularly with respect to calving, where, rather than calving females aggregating in certain areas, they disperse up in higher elevations and away from other calving females as an anti-predation strategy.

In Alaska, the Chisana caribou herd is classified as ***Rangifer tarandus grantii***. From a management standpoint, this difference in classification between Canada and the United States does not influence recommendations set out in this plan.

Participants in the February 2023 meeting for development of the revised plan in Tok, Alaska.

Appendix B: The planning process

The planning process

The Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service (the parties) formed a working group in 2009 to draft management direction for the Chisana caribou herd. Environment and Climate Change Canada's Canadian Wildlife Service, the United States Geological Survey, the Yukon Fish and Wildlife Management Board, and the Dän Keyi Renewable Resource Council cooperated with the parties and provided important input into the original 2009 planning process.

The plan approval and consultation process varied by jurisdiction. The United States National Park Service, Wrangell-St. Elias National Park consulted with the Cheesh'na Tribal Council and the Mentasta Traditional Council, the Eastern Interior Regional Advisory Council, the Southcentral Regional Advisory Council and the Wrangell-St. Elias Subsistence Resource Commission. The Alaska Department of Fish and Game presented the working draft plan to the Alaska Board of Game and consulted the Alaskan public, including the Upper Tanana/ Fortymile Fish and Game Advisory Committee. On the Canadian side, the Yukon's Department of Environment worked closely with Kluane First Nation, White River First Nation and the Dän Keyi Renewable Resource Council.

All of the parties agreed to and signed on to the ***Management Plan for the Chisana Caribou Herd 2010-2015*** in 2012.

On November 6, 2015, most of the parties met to discuss progress on the management plan including the Government of Yukon's Department of Environment, Kluane First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service and the United States National Park Service. Environment and Climate Change Canada and the Yukon Fish and Wildlife Management Board also attended the meeting. The parties discussed implementation of the management plan and agreed to proceed with a renewal process, which would continue with the original management plan recommendations with updates to background information. Yukon's Department of Environment representatives discussed the proposed renewal approach with White River First Nation's Chief and Council during a separate meeting and gained their support.

The next meeting about the renewal of the management plan occurred on June 25, 2018. All of the parties attended the meeting with the goal to review the recommended tasks of the ***Management Plan for the Chisana Caribou Herd 2010-2015*** and decide on next steps in the management plan renewal process.

Due to capacity limitations, the Yukon's Department of Environment was significantly delayed in updating the management plan as per the direction provided. In July 2022, the department re-initiated the planning process with the parties and provided a new draft plan for review that incorporated changes recommended at the 2015 and 2018 meetings.

In February 2023, the Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, the United States National Park Service and the Yukon Fish and Wildlife Management Board met over two days to discuss the revised draft. The Chair of the Alaska Upper Tanana/Fortymile Fish and Game Advisory Committee also attended for the first day of the meeting, and the Chair of the United States Federal Eastern Interior Regional Advisory Council attended for one portion of

the first day to provide their perspectives to the planning parties. The result of the meeting was direction to update the management plan, including a new harvest management regime. The partners continued to work together to draft the plan and came to agreement on a version to go out for public review in November 2023.

In Alaska, public engagement included:

- The Wrangell-St. Elias National Park Subsistence Resource Commission, which voted at its Fall 2023 meeting to support the harvest-management related changes to the plan: a strengthened commitment to monitoring, a new decision-making framework for harvest management and a new strategy to avoid incidental harvest of Chisana caribou when targeting other herds.
- The Southcentral Alaska Federal Subsistence Regional Advisory Council, which didn't formally make a recommendation, but two members provided comments.
- Reaching out to seven tribal governments, the Tanana Chiefs Conference, Ahtna, Incorporated and the Ahtna Intertribal Resource Commission through sending a letter and following up by phone or email as appropriate.
    - The Tetlin Village requested inclusion of more detailed information about the impact of the mining industry on the Chisana caribou herd, specifically, the killing of large numbers of caribou to provide food for miners.
    - The Ahtna Intertribal Resource Commission provided a comment letter requesting acknowledgement of Alaska tribes, supporting a more conservative approach to herd management when data are lacking or uncertain, urging the incorporation of scientific best practices in the new analytical protocol for population estimates, proposing a revision in the threshold for composition surveys to be indeterminate, and including provisions that allow for the participation of other entities in the cooperative management framework.
- Informal discussions with the Upper Tanana/Forty Mile Fish and Game Advisory Committee and the Eastern Interior Regional Advisory Council.

In the Yukon, the Yukon Fish and Wildlife Management Board led public engagement jointly with Kluane First Nation, White River First Nation and the Government of Yukon. Collaboratively, they hosted a meal with presentation of the plan and opportunity for questions, comments and discussion. There were meetings in Burwash, Destruction Bay and Beaver Creek combined with engagement on management planning for Asi Keyi territorial park and Pickhandle Lakes Habitat Protection Area. Feedback from community members included:

- Request to include information about the names for the caribou.
- Questions and concerns about current monitoring practices, including strong support for incorporating local and Traditional knowledge, continued close monitoring of the herd as well as its habitat.
- Emphasis of the importance of cultural conservation and respecting and practicing what Elders have taught.
- Strong desire for more local and Traditional Knowledge to influence management practices for caribou. Noted that Alaskan Elders were interviewed (see Sidebar 2), but not Yukon Elders.
- Request for the plan to better address how the Parties would respond to a future population decline.

- Questions regarding whether the harvest allocation for Yukon will be shared, and emphasis on the fact that the First Nations are voluntarily not hunting caribou.
- Desire for more action to help trappers and promote predator trapping to increase the caribou population.
- Concern that mining and development is affecting the herd, and wildlife populations in general.

In March 2024, Yukon's Department of Environment, Kluane First Nation, White River First Nation, the Yukon Fish and Wildlife Management Board, the Alaska Department of Fish and Game, the United States Fish and Wildlife Service, and the United States National Park Service met to discuss engagement results and changes to the management plan. The Ahtna Intertribal Resource Commission was also invited to take part in this planning meeting and the rest of the process. The partners' discussions resulted in changes to the management plan, and they reached consensus on a final version in September 2024.

The parties to the plan would like to thank the following people for their hard work and dedication to the planning process.

Alaska Department of Fish and Game	Jeff Gross, Tok Area Biologist
Ahtna Intertribal Resource Commission	Karen Linnell, Executive Director Sterling Spilinek, Research Coordinator and Wildlife Biologist
Government of Yukon's Department of Environment	Amy Law, Fish and Wildlife Planner John Ryder, Manager of Habitat Programs Kelsey Russell, Caribou Biologist Shawn Taylor, Kluane Regional Biologist
Kluane First Nation	Frank Anderson, Lands Manager Geraldine Pope, Director of Lands, Resources and Heritage Kristy Kennedy, Director of Lands, Resources and Heritage
United States Fish and Wildlife Service, Tetlin National Wildlife Refuge	Brent Jamison, Wildlife Biologist, Shawn Bayless, Manager
United States National Park Service, Wrangell-St. Elias National Park and Preserve	Barbara Cellarius, Subsistence Coordinator Mark Miller, Ecologist
White River First Nation	Mouni You, Lands Manager Odin Miller, Lands Coordinator
Yukon Fish and Wildlife Management Board	Graham van Tighem, Executive Director Michelle Dawson-Beattie, Chair

Appendix C: Ideas for potential research topics

Further research can help the parties to better understand the factors that impact the Chisana caribou herd and what they can do about it. The parties have identified the following potential areas of interest to help guide researchers interested in working on Chisana caribou. It is important that results are brought back to the communities and shared with the parties and local people.

- Is climate change having an impact on the herd?
    - How does available climate data compare with population trends of the herd?
    - What weather conditions have the most impact on the herd (i.e., severe winter storms, ice over snow events, etc.)?
    - What impacts are changes to tree line and shrub having on the herd as well as the abundance of wolf and moose in the herd's range?
    - Are there changes in time to the lichen abundance and lichen patch composition that are affecting herd health?
    - Are there effects of permafrost thaw on plant communities important to the herd?

- What are habitat considerations that may be unique to the Chisana caribou herd range?
    - Are there impacts of low-quality lichen and a high moss diet on the herd?
    - Does the heavy surface deposits of volcanic ash in the herd range lead to increased early tooth wear, impacting longevity and health? If so, what are the implications to the overall health of the herd?

- What are the movement corridors of the Chisana caribou herd?

- What are the specific impacts of predators on the Chisana caribou herd?
    - What are the current predator densities within the herd range?

- What changes in habitat selection and survival patterns are seen in relation to spatiotemporal and harvest related factors?

- Could historical remote sensing data (e.g., Landsat) be useful in analyses?

- What fire monitoring or analysis beyond current initiatives would be useful to understand effects on the herd?