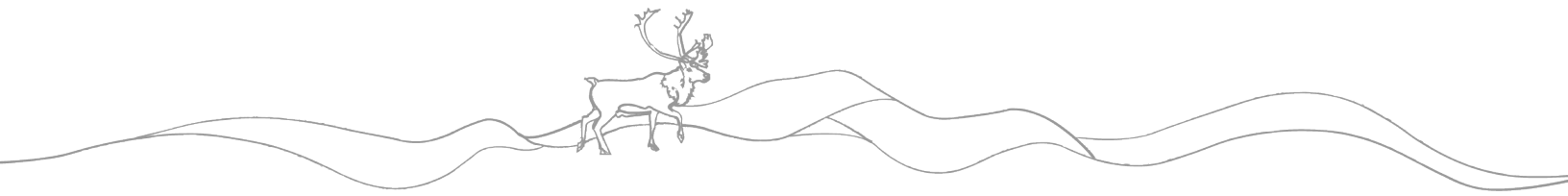

Tłegǫ̀hłı̨ ʔełets’éhkwę Godı
ʔekw’ǫ́ heots’edıgha go ɔeɔá, ʔehdagókégha, nek’e areyone gok’erek ǫ́

NORMAN WELLS 2024 PUBLIC LISTENING SESSION – SUBMISSION

Environment and Climate Change

February 16, 2024

Government of
Northwest Territories

Introduction

The Government of the Northwest Territories (GNWT) Department of Environment and Climate Change (ECC) registered as a party to the Tłegǫ̀hłı̨ (Norman Wells) 2024 ʔełets'éhkwę Godí - Public Listening Session, which will be addressing the question "What should people's role be in addressing the impacts of climate change and wildfires on caribou?". This is the third public listening session in a five-part Public Listening Session series that is addressing the core question "What is the most effective way to conserve caribou?"

The impacts of climate change and fire have been identified as threats to caribou in the Sahtú. The relationship between caribou and their environment, as well as other animals, plants and people, has evolved over time. Understanding and identifying possible ways to mitigate the potential impacts of climate on caribou is very important to help inform the wise management, conservation and recovery of caribou for the benefit of future generations.

This document provides a summary of ECC's mandate on climate change and wildfire management, as well as information on the impacts of climate change and fire on caribou in the Sahtú. It also provides examples of some of the actions that ECC, together with a wide range of partners across the Northwest Territories (NWT), are taking to address the impacts of climate change and wildfire. The information presented in this document has been drawn from the Indigenous, community and scientific knowledge compiled for status reports on barren-ground caribou, northern mountain caribou, boreal caribou, and other wildlife monitoring and research projects carried out in the Sahtu, other parts of the NWT, and elsewhere.

As part of ECC's roles in wildlife co-management in the Sahtú includes, it provides information with the Sahtú Renewable Resources Board (SRRB) and local Renewable Resource Councils (RRCs) to help inform decision making. It is hoped that the information presented here will be useful to the SRRB as it considers ways to manage and conserve caribou in the Sahtú, and to communities as they develop community conservation plans.

Wildfires

ECC's Forest Management Division (FMD) provides the policy, program and regulatory framework to ensure the protection, stewardship and sustainable use of forests across the NWT. FMD is responsible for the delivery of wildfire preparedness, prevention and mitigation, fire science and fire response activities. These programs are essential for managing wildfire, protecting human life, property and other values at risk on the forest land base.

The GNWT Forest Fire Management Policy informs ECC's decisions on wildfire management and operational procedures, and recognizes that wildfire is an important, natural and necessary part of the forest ecosystem. The policy outlines the guiding principles that our fire operations procedures are structured around, starting with the fact that wildfire is a natural and necessary part of the forest ecosystem. ECC's wildfire management approach includes a strong emphasis on community collaboration and using all available Indigenous, local and scientific knowledge to inform wildfire management decisions.

All wildfires receive a response based on consideration of the following criteria:

(a) values-at-risk;
(b) land and resource management objectives;
(c) availability of personnel and equipment;
(d) fire weather and behaviour;
(e) fire risk in higher-valued areas; and
(f) where property or resources are threatened, the relative value of that being threatened.

Decisions on values-at-risk protection are based on the following hierarchical approach where:

- human life and safety are the first priority;
- followed by property and key infrastructure;
- then natural resources, including key caribou habitat, and cultural areas.

Planning for the wildfire season begins well before it begins. Pre-season planning includes restocking gear, getting contracts in place, and meeting with communities to discuss the upcoming season and review Community Wildfire Protection plans. Fire crews and other seasonal wildfire management positions are brought on before the season begins to complete all necessary pre-season training and preparations. In the Sahtú, basic fire crew training is being held for up to 25 firefighters per community.

Planning also includes fire prevention and mitigation measures, including fuel breaks and implementing fire fuel reduction strategies. Some of this work will be funded by $20 million of federal funding that is being administered in the NWT by the Northwest Territories Association of Communities. It is important for communities to have pre-response plans in place which ensures that everyone who needs to implement actions in the event that a wildfire threatens a community know what their role is. Community Wildfire Protection Plans will also be reviewed with community leaders and updated accordingly prior to the 2024 wildfire season.

As the upcoming season approaches, GNWT-ECC will continue to closely monitor weather and fire forecasts as well as the conditions in neighbouring jurisdictions to the south (e.g. Alberta). Depending on these conditions, the start dates for fire crews or equipment can be adjusted to ensure that people and

equipment are in place when they are needed. Given the early start to the 2023 season and forecasted continued drought going into the 2024 season, southern crews will be brought on early to be ready for a possible early start to the season.

When a new fire is detected, duty officers will attempt to initial attack or fight the fire in an effort to fully suppress it before it has an opportunity to become a problem. In some situations, the duty officer may opt for a modified response. For example, for a cabin, sprinklers may be set up or an ignition operation may be conducted to protect the value while making no effort to fully suppress the wildfire. If there are no values threatened by a wildfire it may be monitored allowing the fire to burn and fulfill its ecological role.

After each fire season, the Forest Management Division coordinates an internal After-Action Review of wildfire responses as part of normal wildfire management operations. Given the unprecedented 2023 wildfire season (with record amount of area burned, number of community evacuation, and loss of values at risk), ECC has also contracted an independent review of this year's fire operations. The After-Action Review will also be shared with Renewable Resources Boards as part of annual reporting and engagement with co-management partners.

In addition, ECC will be conducting community visits with local and Indigenous governments, as well as the public, starting in January 2024 to review the season and discuss planning for local wildfire preparedness, and listening to community concerns.

Why doesn't ECC fight all fires?

Wildfires are recognized as a necessary and natural process in the forests of the NWT. While ECC responds to all new fires, not all wildfires are "fought" or "suppressed". Fires are first assessed to determine if they should be monitored or actively managed to protect values at risk.

Wildfire in the boreal forest is necessary to help forests regenerate and stay healthy. A healthy forest is needed to sustain the biodiversity living within, including caribou and other wildlife species. The trees in the boreal forest have evolved with fire and many rely on fire for regeneration. For example, the cones on Jack Pine trees need heat from fires to open their cones and release the seed stored inside. Black Spruce are also dependent of fires for regeneration while many deciduous trees such as Aspen take advantage of the open space to re-sprout and grow under less crowded conditions.

Removal of all wildfire from the landscape results in an unnatural aging of the forest and loss of the natural habitat mosaic. As a forest ages it becomes less resistant to insects and disease, and wildfires help keep a healthy balance of insects and diseases by killing the pathogens infecting a stand. Natural fire cycles also help burn off excess fuel on forest floors protecting us from bad fire seasons because there's less fuel to burn in the forest. If we remove fire from the landscape it can lead to excessive fuel loading, meaning that when fires do start in these areas, they can be much more difficult to control and can cause catastrophic fires putting communities and life at greater risk. This is why ECC only fights about half of the wildfires in the NWT – while keeping a close eye on the rest. Protecting human life and communities is our top priority, and we focus our resources on fighting fires that pose a threat to our communities and other important values at risk.

Changes in Wildfires

NWT ecosystems and species (including boreal caribou) have evolved with wildfire over time, and fire is the principal driver of forest health and renewal. In recent times, active fire suppression was introduced to protect people, communities, critical infrastructure and other values at risk. Where active wildfire suppression has been concentrated, typically around the communities, there has been a shift from the younger, less-flammable forests that would be typical of the natural fire regime to older, fuel-rich, less stable, and more flammable forests.

Under a natural fire regime, boreal forests are renewed and maintained by high-intensity crown stand-replacing fires, moderate crown and surface fires, and low-intensity surface fires. The resulting mosaic of fire-generated forest stands of varying age classes and species composition provided diversity, health, and stability of the ecosystems.

The introduction of extensive fire suppression during the last few decades has resulted in a forest ecosystem more susceptible to fire as fuel builds up due to stand age class distribution shifting to older vegetation community types. This increases the amount of forest areas vulnerable to diseases, and results in a higher fuel accumulation than occurs under a natural fire regime.

Annual total area burned fluctuates each year, with large differences seen in area burned and the number of wildfires between years. As reported in the 2022 State of the Environment Report, on average, there are around 249 fires every year in the NWT, burning on average 500,000 hectares. In 2023 303 fires impacted 3.571 million hectares. It is predicted that climate change will result in an increase in the frequency and intensity of fires, due to hotter, drier summers meaning a longer fire season.

Wildfires occurring within the NWT have been mapped by the Government of Canada and the GNWT since the 1950's. Figure 1 shows the wildfires that have occurred across the NWT from the 1950's through to today.

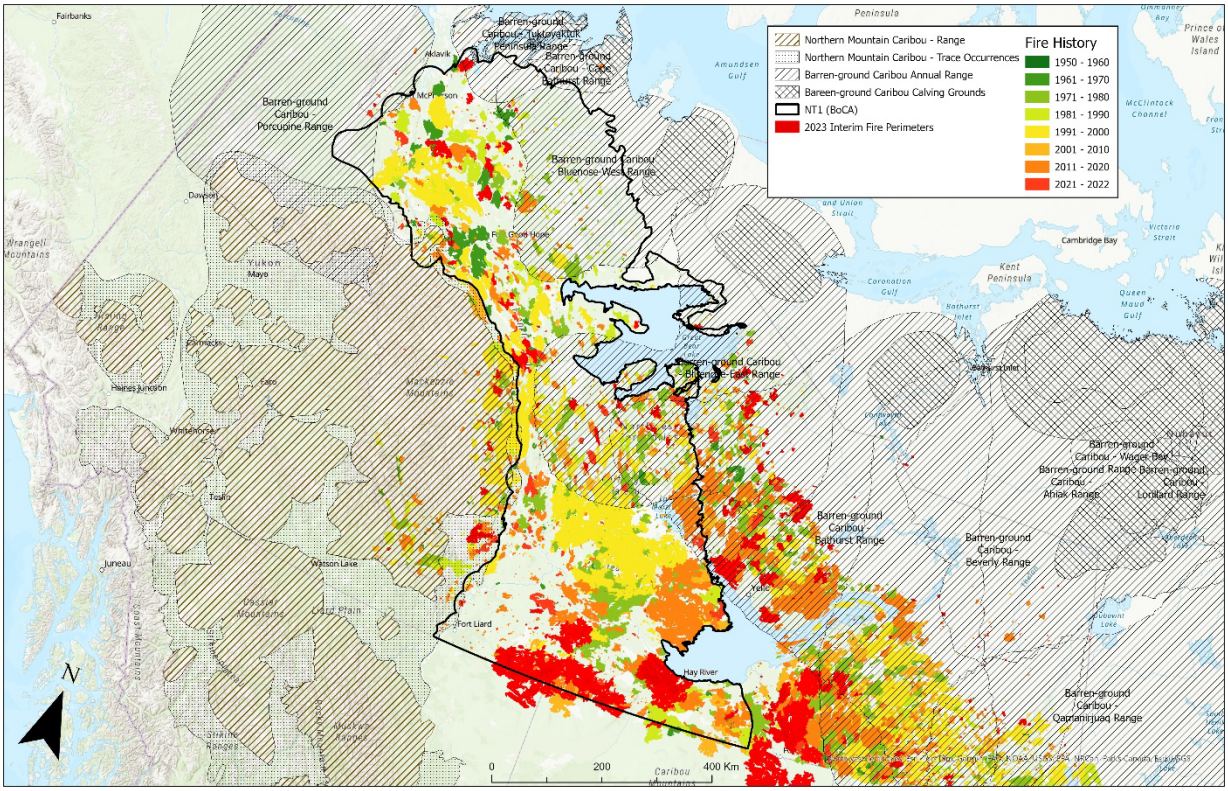

Figure 1: Locations of fires that burned between 1950 and 2023.

Caribou and Wildfire

Wildfires are a natural process that creates a dynamic landscape for caribou that contains a constantly shifting mosaic of habitats in different successional stages (different fire ages). Wildfires can have both immediate impacts on caribou, as well as longer-term impacts that reflect how caribou habitat (and habitat for other competitors and predators) changes with time since fire, and the amount of area in different fire ages. NWT Species at Risk Committee (SARC) status reports and assessments on boreal caribou, barren-ground caribou and northern mountain caribou all identified climate change as a main threat.

Barren-ground Caribou

The Species Status Report for Porcupine Caribou and Barren-ground Caribou in the Northwest Territories (SARC 2017) compiles the best available information, including both traditional knowledge and science, about the status of barren-ground caribou in the NWT. When assessing barren-ground caribou, SARC identified forest fires as a main threat, representing the most visible factor driving habitat fragmentation and change, which impacts caribou's forage availability as well as their movement. This threat is particularly important within the winter range. Climate change may lead to even hotter and drier summers in the NWT, which could increase the frequency and intensity of fires. Loss of habitat due to forest fires and effects related to climate change are probably the two most common factors cited in the traditional and community knowledge literature.

Both traditional knowledge and science identify fire as one of the most visible impacts on barren-ground caribou habitat even though caribou have co-existed with fire for thousands of years. Both knowledge systems identified that barren-ground caribou habitat required long time periods after a fire to become suitable. Traditional knowledge holders described barren-ground caribou coming back to an area affected by fire between 10 and 60 years (depending on regional productivity), while others believe barren-ground caribou will never return to a burned site, or that it may take upwards of 100 years for habitat to become suitable again. Traditional knowledge holders predicted that large fires would remove forage, leaving habitat unsuitable for caribou for decades, if not centuries. This could result in changes to migration routes, reduced survival of calves, and reduced body condition in adults. Knowledge holders noted that while the habitat destroyed during fires in the 1950s appears to have recovered, the caribou still have not returned. The same is true of the Bluenose herd's migration route.

The scientific knowledge component of the report noted that regeneration of lichen-supporting forest stands can take 70-230 years. This section of the report predicted that if wildfire cycles were shorter than the regeneration time of a given region, forest stands could stall in earlier seral stages, which would result in lower quality winter habitat for barren-ground caribou.

As identified in the scientific knowledge component of the species status report, avoidance of high density burn areas by barren-ground caribou is well established. Site selection in the winter range often favours mature forest stands. These mature forest stands have better high quality forage availability, more favourable snow conditions, and offer better predator protection than younger forest stands.

Thomas et al. (1996) and Thomas and Kiliaan (1998) noted that the Beverly barren-ground caribou herd tended to use forest stands 151-250 years after fire more than other age classes; however, use of forests 51-100 and 101-150 years after fire was substantial. Use of forests 0-50 years after fire was limited. Thomas (1998) found that lichens were the main component in the diet of the Beverly barren-

ground caribou herd based on fecal and rumen samples, and lichens were 87-90% of relative density. Further, "Cladina-type lichens, including Cladina, Cladonia, Stereocaulon and Alectoria dominated the lichen component and usually comprised 60-85% of fragments." (Thomas and Kiliaan 1998).

A study of burned and unburned sites used by the Bathurst barren-ground caribou herd in winter 2008-2009 (Barrier and Johnson 2012, Anderson and Johnson 2014) found that "Winter range habitats important to caribou were characterized by a high percentage of ground cover of lichen and herbaceous forage and a close proximity to lakes and rivers. Although caribou avoided areas densely populated with burns, there was considerable use of early-seral habitats as well as areas adjacent to the burn boundary." (Anderson and Johnson 2014). In addition, Anderson and Johnson (2014) found "that at some spatial and temporal scales, individual barren-ground caribou may be less averse to fire than previously thought". Recently regenerated green growth of forbs and graminoids after fire may be attractive to caribou because the plants are readily digestible and have high nitrogen content, whereas lichens are highly digestible but low in nitrogen (Klein 1990).

Studies of barren-ground caribou range use in Alaska are generally consistent with the study results from the NWT (e.g. Joly et al. 2010). Joly et al. (2007a) studied winter range use by the Western Arctic barren-ground caribou herd and found that "caribou strongly selected against burned areas within the tundra ecosystem. Recent burns were selected against at both large (range-wide) and intermediate (5658 m) spatial scales. Caribou particularly selected against 26- to 55-year-old burns and the interior (core) portions of all burns. We found that caribou were more likely to select burned areas in the late fall and early spring than midwinter." In addition, Joly et al. (2007b) found that lichens made up 50-58% of plant fragments in fecal samples in winter from this herd. In the range of the Nelchina herd in interior Alaska, Joly et al. (2003) found that "caribou used recently burned areas (<50 years old) much less than expected, regardless of methodologies used. Moreover, within burns, caribou were more likely to use habitat within 500 m of the burn perimeter than core areas." Russell et al. (1993) found that in winter, lichens made up 62-66% of fecal fragments of Porcupine caribou; they noted further that lichens in fecal samples of caribou are under-represented because they are easily digested, hence that the percentage of lichens in the diet was likely significantly higher (over 70%). The remainder of the winter diets was made up of a wide range of plants (Russell et al. 1993, Joly et al. 2007b).

Boreal Caribou

Within the Species Status Report for Boreal Caribou (Rangifer tarandus caribou) in the Northwest Territories (SARC 2022), SARC identified disturbance as a main threat for boreal caribou, representing the most visible factor driving habitat fragmentation and change, which impacts caribou's forage availability as well as their movement. This threat is particularly important in the winter range.

Climate change may lead to even hotter and drier summers in the NWT, which could increase the frequency and intensity of fires. Loss of habitat due to forest fires and effects related to climate change are probably the two most common factors cited in the traditional and community knowledge literature.

Furthermore, traditional knowledge identifies areas burned by fire or disturbed by industry are generally not used by boreal caribou until the habitat recovers. Habitat recovery is complex and full habitat recovery takes many decades. Traditional knowledge holders also warned that climate change is increasing the size and severity of fires, which may result in a larger effect as habitat takes longer to recover.

Although it is recognized that fires are natural occurrences and can have a rejuvenating effect on the land, the impacts of wildfires on boreal caribou habitat and populations have been well documented in a myriad of Indigenous and community knowledge reports. Knowledge holders report that fires destroy habitat, and the effects can last for many years, if not decades. Traditional knowledge indicates that the fires not only impact the vegetation boreal caribou eat, but also make it harder for caribou to find cover habitat to avoid predators. There are also reports of smoke and ash affecting boreal caribou movements, causing caribou to find new habitat.

Boreal caribou's need for large tracts of contiguous old boreal forests that have not been altered by natural or human-caused disturbance is documented in the scientific knowledge component of the status report.

GNWT-ECC undertook a comprehensive assessment of how boreal caribou select habitat based on fire age and the type of vegetation that burned or grew back following a fire (DeMars et al. 2020), using collar location data from over 300 adult female boreal caribou collected between 2002 and 2018 across the NWT range. Boreal caribou generally showed higher selection for younger burns (<10 years old) and older burns (>30 years old) and avoided middle-aged burns (11–30 years old). Selection for recent burns by caribou in the NWT appeared to be strongest during the snow-free seasons (calving, summer and into fall), followed by increasing avoidance of burns ≤40 years old from early to late-winter. During late winter, areas that hadn't burned in 41-60 years or greater than 60 years, were the most strongly selected, unless they were dominated by deciduous tree species. This pattern of selection for recent (<10 years) burns during the snow-free season and then switching to selection for older forests (41-60 years, and >60 years) during the winter months is generally consistent with patterns in summer and winter food abundance observed by Cook et al. (2023); however, boreal caribou seem to avoid mid-aged forests (11-30 years) despite them having peak levels of summer food abundance. It is possible that boreal caribou avoid stands in this age category because of high amounts of fallen trees killed in the fire, or because other browsers such as moose are selecting these areas, which in turn might attract more wolves and increase predation risk for boreal caribou.

The impact of fires on boreal caribou habitat, and their use of regenerating burns, may also depend on fire severity. In 2015, GNWT began monitoring boreal caribou within the large 2014 Birch Lake fire complex situated between Fort Providence and Behchokǫ̀. Using collar location data from between 2015 to 2021, boreal caribou were observed to prefer unburned and low-severity burn areas to medium and high severity burn areas within the fire perimeter throughout the year (Kelly et al. 2023). During the calving and summer seasons boreal caribou used all burn severity classes roughly equally (low to high), and during calving, early fall and late fall preferred low-severity burn areas over unburned areas within the fire perimeter. Medium and high burn severity areas were avoided during late winter. These findings suggest that burn severity and fire age are both important considerations for understanding how wildfires affect boreal caribou habitat. Despite the high proportion of recently burned habitat within the Mackenzie monitoring area (which includes the Birch Lake fire complex), the boreal caribou population has been increasing in that area since 2016.

Despite being the dominant source of habitat disturbance for boreal caribou in the NWT, wildfires have been found to have a much smaller impact on boreal caribou population dynamics than human disturbance. Johnson et al. (2020) assessed the effects of fire and human disturbances (like roads, seismic lines, forestry cut blocks) using information about survival rates of adult female boreal caribou and calf recruitment rates from 58 study areas across Canada (including study areas from the NWT). They found that the negative effect of fires on calf recruitment rates was three to four times smaller

than that of human disturbance, and models that only included human disturbance best explained patterns of adult female survival (suggesting a negligible impact of fires on adult female survival).

Northern Mountain Caribou

The Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories (SARC 2020), compiles the best available information, both traditional knowledge and science, about the status of northern mountain caribou in the NWT. Traditional knowledge holders in the NWT warned of fires becoming a problem with climate change, while traditional knowledge holders in the Yukon reported that they are seeing shifts in northern mountain caribou range due to fires. The scientific knowledge component of the status report identified fire as a primary threat or limiting factor. The range of northern mountain caribou in the NWT is relatively undisturbed, with fire and industrial activity being the main disturbances.

Climate Change

Overall, climate change is occurring faster in Canada's north than other parts of Canada, with most warming occurring in the winter. Between 1948 to 2016, the Canadian north, on average, experienced a yearly warming of 2.3°C which is roughly three times the warming rate of the global mean temperature. Over that same period, winter has experienced the greatest warming, with an increase of 4.3°C, while summer has experienced an increase of 1.6°C. This information and more on how Canada's climate has changed, why it has changed and what other changes are predicted can be found in Canada's Changing Climate Report (Bush & Lemmen 2019).

Every four years, the GNWT releases a State of the Environment Report as legislated under the *Environmental Rights Act*. The 2022 State of the Environment Report provides information on topics relevant to the environment intended to help the public and decision makers better understand what has occurred over time and what changes might be expected in the future. One of the sections of the State of the Environment Report is dedicated to climate change which provides information and examples of environmental trends and phenomena occurring in the NWT. This section includes three indicators related to climate – trends in observed temperature and precipitation in the NWT, trends in lightning events and projected temperature and precipitation in the NWT.

At an even finer scale, Environment and Climate Change Canada's Canadian Centre for Climate Services created community climate change profiles for the NWT's 33 communities. As referenced in the responses to the first round of information requests, for Norman Wells we expect conditions in the 2051 to 2080 time period (under the highest emissions scenario – RCP8.5) to be warmer than current conditions (about 4°C warmer in summer and about 7°C warmer in winter) with more precipitation (about 7 cm more precipitation throughout the year). Warmer conditions will result in a shorter winter road season in the Sahtú. In the fall and spring, more precipitation will fall as rain than snow, leading to reduced snowpack in the spring, which could lead to more frequent drought conditions. With increased precipitation and thawing, permafrost thaw slumps or landslides on hills containing permafrost will likely be more common, which could impact caribou habitat and lead to decreased water quality (more sediment in water) and fish.

Warmer conditions could lead to more mid-winter rainfall events, and later freeze-up and earlier thaw of the Mackenzie River. Mackenzie River water levels will likely be more variable due to higher variability in precipitation. With a longer ice-free summer, there will be more evaporation from Great Bear Lake, potentially leading to lower water levels. Over the last five years, water levels on the Mackenzie River south of Fort Good Hope have shifted from extremely low (July 2019) to the highest on record (2020 to 2022) back to extremely low (August 2023 to present). The magnitude and frequency of these fluctuations have not previously been seen in the 84-year record. While it is difficult to isolate individual events, these weather systems are likely a combination of climate variability from global teleconnections (La Niña and El Niño events) and climate change.

As it gets warmer the tree line is predicted to move upward in elevation in the Mackenzie Mountains. By the end of the century, vegetation may change so that vegetation currently seen near the NWT-Alberta border becomes more common in the Sahtú. In the tundra east of Great Bear Lake increasing shrubs are predicted. Shrub expansion in the tundra has been observed at the GNWT Daring Lake Research Station and by satellite observations of ground cover. As vegetation changes, animal ranges are expected to move north resulting in species in the Sahtú that are currently more common in the southern NWT and northern Alberta.

Indigenous Knowledge holders have noted changes in weather. At the 2022 Climate Change Annual Gathering, an Elder from Fort Simpson said: “This summer, we had a very limited amount of rain. I used to cut the grass two or three times a week in the summer and now I only cut it two times in the entire season.”. At the 2018 Climate Change Forum and Charrette, hosted by the NWTAC and supported by GNWT, Elders and locals in the Sahtu regional session discussed unpredictable weather.

Caribou and Climate Change

As part of the process to consider listing species under the *Species at Risk (NWT) Act*, the Species at Risk Committee (SARC) status reports and assessments on boreal caribou, barren-ground caribou and northern mountain caribou all identified climate change as a main threat. For all three ecotypes of caribou in the Sahtú, the effects of climate change will have various impacts, both negative and positive, that are both direct and indirect (also reviewed in Mallory & Boyce 2018). Each of the three caribou ecotypes will experience unique impacts of climate change due to the differences in where and how they live, but they will all be impacted by climate change through changes to their habitat, pests and pathogens, and changing snow and ice conditions. Most climate change impacts are predicted to be negative, but there is considerable uncertainty about how caribou populations will do in the Sahtú overall, and responses of caribou and their habitats will probably differ across regions and local areas.

Barren-ground Caribou

The Species Status Report for Porcupine Caribou and Barren-ground Caribou in the Northwest Territories (SARC 2017) compiled the best available information, including both traditional knowledge and science, about the status of barren-ground caribou in the NWT.

Both traditional knowledge and science identified heat stress in the summer as a threat, which could be exacerbated by climate change. The traditional knowledge component of the status report also warned of increased chances of large forest fires with hotter summers. The scientific knowledge component of the status report identified weather and the summer range as having importance in the growth, or decline, of barren-ground caribou populations. A warming climate will also affect parasites and diseases, but how this threat will impact caribou populations is complex.

The traditional knowledge component of the status report spoke to many other climate change impacts, including direct impacts like freezing rain events which make it more difficult for caribou to access their food and indirect impacts like changes in predator abundance or the range of different predators. Traditional knowledge identified the potential beneficial impact of earlier access to vegetation, but most impacts were negative.

Knowledge holders shared that healthy herds are more likely to adapt to changes due to a warming climate compared to herds that are declining. Other climate change impacts identified by traditional knowledge include melting permafrost and erosion changing caribou habitat along with increased caribou mortality due to extreme weather events and changing snow conditions (i.e., deep or wind-packed snow making it harder for caribou to reach their food).

The scientific knowledge component of the status report summarized climate change as complex, starting with shifts in the time when vegetation first starts to grow, which would have impacts on the quality of food available for caribou. Changes in food quality could impact calf production or survival and the ability for cows to reproduce, and ultimately result in herd or population declines. At the same time,

plants are expected to be more productive which could be a positive impact of climate change for caribou. However increased productivity in plants may not mean increases in food for caribou, because the amount of sun and temperatures plants are exposed to could lower the quality of those plants as food for caribou. Shrubs are already expanding in areas of the tundra across the NWT which are home to barren-ground caribou (Dearborn & Danby 2022, Nill et al. 2022) and this expansion is predicted to continue (Liu et al. 2022).

Boreal Caribou

The Species Status Report for Boreal Caribou (Rangifer tarandus caribou) in the Northwest Territories (SARC 2022), the second status report done for boreal caribou in the NWT, compiles the best available information, both traditional knowledge and science, about the status of boreal caribou in the NWT.

Both knowledge systems identified a wide range of impacts from climate change, including changes to snow conditions, changes in distribution and abundance of predators and other ungulates, changes in habitat, and increased occurrences of diseases and parasites. Both traditional knowledge and science identified icing or rain in the winter as a problem for boreal caribou, covering vegetation in ice and making conditions harder for caribou to travel. The scientific knowledge also warned that icing could make traveling easier for wolves by allowing them to travel on top of the snow.

The traditional knowledge and science components of the status report also agreed that melting permafrost will mean changes for boreal caribou. Both knowledge systems identified changes in the water table due to melting permafrost as well as less black spruce as potential impacts to habitat. Traditional knowledge holders identified permafrost thaw causing large changes to the terrain which could make travel difficult for boreal caribou, while the science warns that melting permafrost may change the types of vegetation that are on the land.

Changing fire behaviour and frequency due to climate change was identified as a threat to boreal caribou by both knowledge systems, given changes to the vegetation available for boreal caribou. Traditional knowledge holders shared that larger, more intense fires will become more common, which will mean it will take longer for boreal caribou to return to those affected areas.

Even without natural disturbance, like fire, the science in the status report predicts that the vegetation within the boreal caribou range will change. Changes to vegetation that are favored by other ungulates could lead to these populations increasing, which could impact boreal caribou. The timing of vegetation emergence could change in the future due to climate change, which could impact caribou calves, but the science indicates that caribou seem to be able to adapt to this change.

The science in the status report also warns that climate change could also cause changes in the parasites and diseases that affect caribou. Some parasite ranges could extend northward. Longer warmer summers may lead to longer periods of insect harassment which could mean that boreal caribou have to expend more energy which could affect their body condition.

Northern Mountain Caribou

The Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories (SARC 2020) compiles the best available information about the status of northern mountain caribou in the NWT. In their assessment, SARC identified northern mountain caribou as vulnerable to the effects of climate change, in particular

due to the already noticeable decline in ice patches in the Mackenzie and Selwyn mountains. Ice patches are used by northern mountain caribou to escape insects and cool down in the summer. At the same time as these ice patches are disappearing, both science and traditional knowledge point to warmer summers making it harder for caribou to avoid insects, potentially causing caribou to expend more energy.

In the status report, both knowledge systems identified increases in wildfires as a threat which could change the vegetation that caribou depend on. In addition, increases in icing events was identified as a threat that could become more frequent in the future, making it difficult for caribou to get to their food. There was also agreement that climate change could cause ecological changes which could support other wildlife, including other ungulates and/or predators.

Traditional knowledge holders also warned that climate change could cause changes to spring thaw and fall freeze-up with rapid snowmelt making river crossings dangerous or drying out tundra areas. These changes could cause shifts in the timing of caribou seasonal movements which could lead to changes in their distribution. The scientific section of the status report identified the loss of permafrost as a threat with climate change, causing changes to the vegetation across the northern mountain caribou range.

How is the threat of climate change being addressed for caribou?

There are a number of reasons to be optimistic about caribou management in the Sahtu Settlement Area, including the wildlife co-management system, less disturbance compared to other areas, local and regional differences in how caribou respond to climate change, and potential areas of climatic refugia (areas where climate change may not be felt as strongly). There are a number of plans in place for the three ecotypes of caribou that are found in the Sahtú Settlement Area, and many of these include actions that address the threat of climate change.

Barren-ground Caribou

The Recovery Strategy for Barren-ground Caribou in the NWT (CMA 2020) includes a number of objectives and approaches for conservation and recovery of barren-ground caribou that address climate change impacts. Objective 2 of the Recovery Strategy calls for monitoring barren-ground caribou, their habitat and key factors and threats, including climate change and changes to habitat due to climate change. ECC has assessed how climate trends may be affecting barren-ground caribou trends. For example, the last published survey report for the Bluenose-East herd included a section that looked at how climate trends may have influenced the herd.

The third objective of the Recovery Strategy focuses on filling knowledge gaps, including assessing the impacts of natural and human-caused landscape change on barren-ground caribou and their habitat. The fourth objective focuses on conserving and protecting barren-ground caribou populations and their habitat, including developing approaches for management of cumulative impacts.

The Taking Care of Caribou: the Cape Bathurst, Bluenose-West, and Bluenose-East barren-ground caribou herds management plan also calls for reviewing monitoring, including cumulative effects to ensure enough habitat is available for caribou. Addressing these objectives, approaches and actions, ECC is leading a collaborative cumulative effects assessment on the ranges of the Bluenose-East, Bluenose-West, Cape Bathurst, Tuktoyaktuk Peninsula and Bathurst herds. This project included knowledge holder sessions with the Sahtú Renewable Resources Board, a summary of Indigenous knowledge on these

herds, climate change and land use/development forecasting scenarios, and Bluenose-East calibration and forecasting scenarios.

Boreal Caribou

The Recovery Strategy for the Boreal Caribou in the NWT (CMA 2017) includes objectives and approaches for conservation and recovery of boreal caribou that address climate change impacts. Ensuring adequate habitat for boreal caribou across the NWT to maintain healthy and sustainable populations is the first objective of the Recovery Strategy. ECC is currently working to draft regional boreal caribou range plans in accordance with the NWT Framework for Boreal Caribou Range Planning. ECC and the SRRB are engaging with communities to develop a collaborative process for range planning in the Sahtú. Range plans will manage overall disturbance on boreal caribou range in the Sahtú and manage impacts to caribou and their habitat.

The third objective of the Recovery Strategy focuses on obtaining information to inform sound management decisions. ECC has been participating in the Western Boreal Initiative landscape forecast modeling project led by Environment and Climate Change Canda and Natural Resources Canada. In 2023, a journal article was published that suggested that habitat suitability for boreal caribou may increase in central and southwest regions of the NWT's Taiga Plains ecozone but decrease in southern and northwestern regions. The article did not project changes in boreal caribou population growth rates even with the changes in habitat suitability. Work with researchers at Wilfrid Laurier University and elsewhere continues on the ESRF-funded project 'Assessing terrain sensitivity to permafrost thaw and fire to understand and predict boreal caribou habitat and forage quality in the Sahtú'. This online report includes updates (and lists of output publications) on various related components of a research program addressing aspects of thermokarst, permafrost, lichen, fire, caribou forage, and climate change in the NWT boreal forest.

Northern Mountain Caribou

The Management Plan for Northern Mountain Caribou in the Northwest Territories (CMA 2023) includes objectives and recovery measures for conservation of northern mountain caribou. The third objective of the management plan is focused on caribou health and the assessment of the risks to their health which includes climate change. ECC supported the NWT Ice Patch Study which was a collaborative effort to learn about the history of the NWT through the ice patches in the Mackenzie Mountains.

The seventh objective promotes conservation through environmental and cumulative effects assessment, through input into land and resource use planning forums. ECC provides input and expertise into environmental assessments that may impact wildlife in the NWT. ECC was involved in the environmental assessment and drafting and approval of a Wildlife Management and Monitoring Plan for Canadian Zinc's Prairie Creek mine. ECC also provides input into land use planning processes, including land use plan reviews across the Mackenzie Mountains (Dehcho, Sahtú and Gwich'in regions).

How is the threat of climate change being addressed for wildlife?

Because wildlife is central to ecosystem functioning and the livelihoods and cultures of northerners, ECC has developed an Adapting Wildlife Conservation and Management to Climate Change Discussion Paper that will go out for public engagement in the coming weeks. This will provide an opportunity for co-management partners to share their thoughts and concerns around climate change and identify areas to improve on current strategies and management. Feedback on this paper will also be used in the development of the next Climate Change Action Plan to be released in 2025.

Input received through this engagement process will help to inform GNWT efforts to:

- Identify a vision, goals, and guiding principles for wildlife management and conservation in a changing climate;
- Better understand climate change risks and impacts (positive and negative) on wildlife and their habitats; and
- Identify and prioritize actions for mitigating and adapting to climate change impacts on wildlife, their habitats, and the people and communities that rely on them.

The discussion document builds on preliminary interviews with co-management partners from across the NWT, which included the SRRB. It was also informed by a climate change vulnerability assessment for species at risk (Singer & Lee 2021).

Feedback received will set the stage for further conversations aimed at adapting wildlife management and conservation efforts in response to climate change in the NWT.

How is the threat of climate change being addressed in the NWT?

In response to the numerous changes and impacts the NWT is experiencing due to a rapidly warming climate, the GNWT has developed coordinated actions with partners on climate change to support a strong, resilient territory for future generations. These actions are outlined in the *2030 NWT Climate Change Strategic Framework* and the *2030 NWT Climate Change Strategic Framework 2019-2023 Action Plan*. Within the GNWT, ECC is the lead department for climate change. ECC coordinates and works closely with other GNWT departments to achieve the three goals outlined in the Strategic Framework:

- Transitioning to a lower carbon economy;
- Improving climate knowledge; and
- Building resilience while adapting to the impacts of climate change.

The Framework focuses on tracking and reporting progress on mitigating the impacts of climate change, and building resilience and adapting to a changing climate. The Framework includes several guiding principles:

- Taking Action: The substantial extent of climate change impacts has created an urgent need for action, and climate change needs to be considered in all relevant planning, decision-making and operations;
- Meeting Climate Change Commitments: The NWT has a responsibility to contribute to national and international efforts to address climate change, particularly in reducing fossil fuel use and greenhouse gas emissions;

- Sharing responsibility: All segments of the NWT are responsible for taking action on climate change, including governments, businesses and residents;
- Strong Collaboration: Strengthening the collaboration between governments – including community and Indigenous governments, stakeholders and residents – on mitigation and adaptation actions, based on recognition of rights, respect, cooperation and partnership;
- Respecting Aboriginal and Treaty Rights: Climate change mitigation and adaptation decisions respect Aboriginal and Treaty rights, including land, resource and self-government agreements;
- Traditional, Local and Scientific Knowledge: Accessing all knowledge types to understand and make decisions related to climate impacts and adaptation measures; and
- Transparency and Accountability: Decisions made to implement the Framework are transparent and accountable.

The Strategic Framework and Action Plan require collaboration across government departments, Indigenous governments, Indigenous organizations, communities and stakeholders such as industry and non-government organizations in order to increase our knowledge of climate impacts and building our resiliency while adapting to a changing climate.

ECC is currently developing the 2025-2029 NWT Climate Change Action Plan which builds on the 2019-2023 Action Plan, a Risks and Opportunities Assessment, engagement with the NWT Climate Change Council, and public engagement including engagement with Indigenous governments and Indigenous organizations.

The NWT Risks and Opportunities Assessment is currently being finalized. This assessment will help to identify the key risks and opportunities for climate action in the NWT.

In addition, the NWT Cumulative Impacts Monitoring Program produces science and traditional knowledge that is used to support environmental decision-making in the NWT and fills key gaps in the understanding of cumulative impacts and environmental trends related to caribou, water and fish.

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