

THE EFFECTS OF CLIMATE CHANGE AND WILDFIRE ON CARIBOU IN THE SAHTÚ

Western Science Perspective

Toolbox for Public Listening Session #3
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The ʔehdzo Got'Jne Gots'é Nákedı (Sahtú Renewable Resources Board) has conducted two Public Listening Sessions to seek out and coordinate knowledge from the five Sahtú communities to assist the declining caribou herds. The goal has been to use traditional knowledge and western science to help and protect boreal and barren-ground caribou populations. The importance of the combined knowledge became clear when the major caribou herds (e.g., Bathurst, Bluenose-East and Bluenose-West herds) began to decline in the 1990's. The herds have since been reduced to a fraction of the herd size in the 1980's. Direct support for the caribou herds has been provided by reducing and changing harvesting practices (e.g., bulls only) and by reducing the number of wolves on calving grounds.

The third Listening Session will be held in 2024 to discuss the impact of climate change and wildfires on caribou in the Sahtú. In order to provide background information to the parties to the Listening Session, the SRRB has requested a review of western science on the effects of climate change and wildfire on barren-ground and boreal caribou. As in the earlier sessions, the review will take the form of a Toolbox which summarises important information from scientists and provides resources for participants to review if they want to further investigate the topics. The Toolbox will be stored in the registry for distribution to all interested parties. The science papers will also be available in the registry.

CLIMATE CHANGE AND CARIBOU

Summary of Key Points of Climate Change Impacts to Caribou

- The Arctic is warming up at more than twice the rate of the rest of Canada.
- The effects of the warming climate on the northern environment have been observed and recorded by scientists over the last 30 to 40 years. The changes are expected to continue in the coming decades.

- Warmer conditions, especially in the winter, will result in thawing permafrost which will release water and minerals to local streams and lakes. It will also make migration more difficult for caribou.
- Precipitation is expected to increase over time, and most of the additional precipitation will be in the form of rain.
- Weather will be more variable with more extreme storms and droughts. These storms will impact caribou in a number of ways but will be more critical during calving and when calves are young.
- There will be less snow and it will melt sooner in the spring. Large areas of snow that used to last all year, and in which caribou would rest to avoid insects, will disappear.
- Caribou rely on the timing of major events during the year (e.g., migration, calving, the rut, etc.) but the environment might be changed with a warmer climate. For example migration to calving grounds may be delayed due to storms or thawed permafrost. Snow will melt earlier and arrive later in the year. Ice cover on lakes will melt earlier in the year and freeze-up will occur later.
- Caribou can adapt to some of these environmental changes by changing migration routes, expanding or changing their range, and by adapting to changes in the timing of environmental events.

What Causes Climate Change?

Most scientists accept the fact that air temperatures around the globe are increasing due to the buildup of greenhouse gases that have been released from the burning of fossil fuels such as oil, gasoline and natural gas. Greenhouse gases accumulate in the atmosphere and hold in the heat from the surface of the earth (Figure 1). Measurements of carbon dioxide, one of the greenhouse gases, has been shown to steadily increase in the air above Hawaii (Figure 2). Carbon dioxide is at a very low concentrations in the environment but is now at the highest concentration in history.

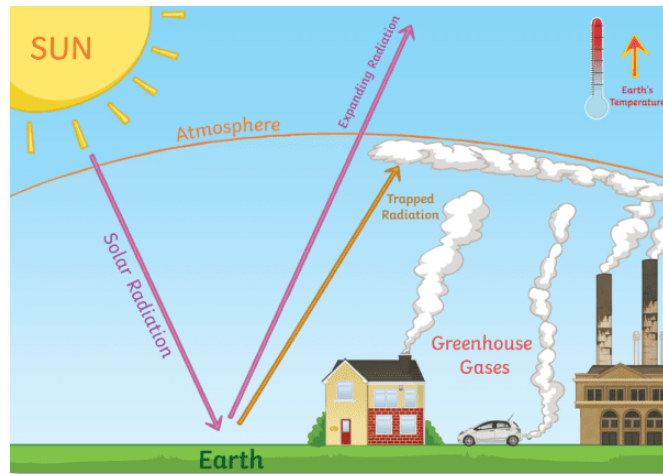


Figure 1 Description of greenhouse gases in the atmosphere causing a warming earth.

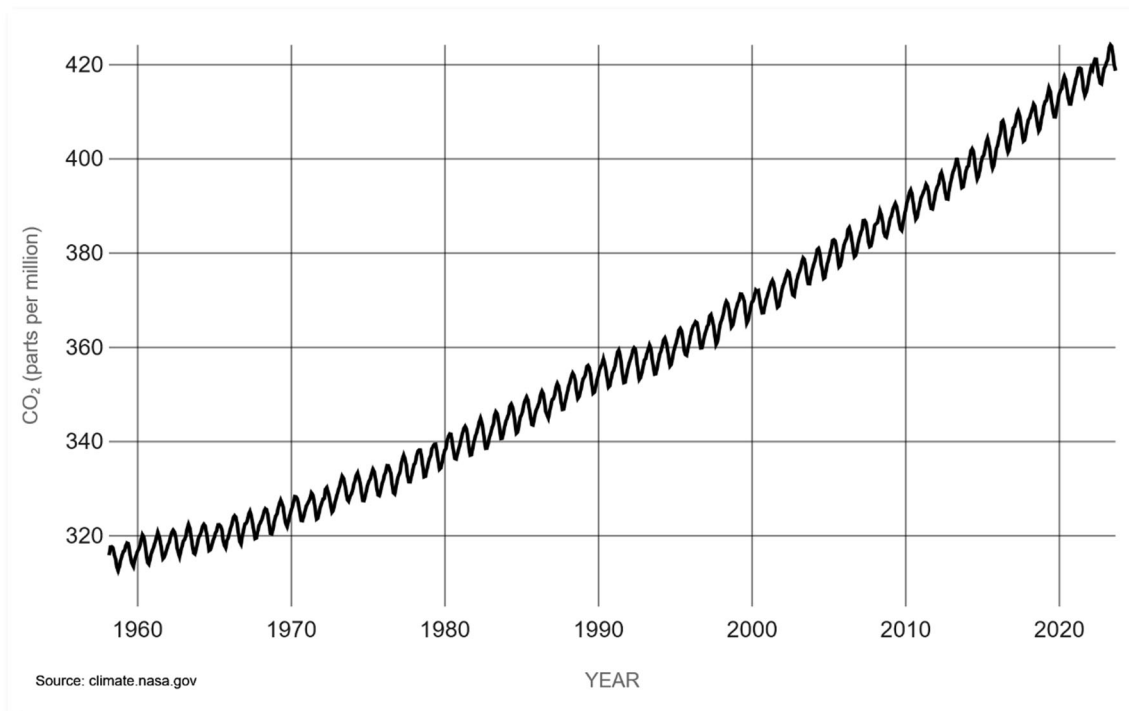


Figure 2 The concentration of carbon dioxide, a greenhouse gas, in the air above Hawaii. Source NOAA, Climate.org.

Climate change has become one of the leading issues for society to understand and confront. Across the globe, 2023 was the hottest year on record (Figure 3). Air temperatures in the Arctic have increased at rates twice as high as the rest of the planet, and some scientists have reported increases as much as 8 times higher in some areas of the Arctic. Although warming temperatures affect several areas of the NWT, the focus of this report is how climate change is affecting caribou populations, mostly through changes in caribou habitat. In many ways, the Sahtú, the NWT and the Arctic in general are expected to show the impacts more than in southern Canada. Air temperature has increased more than in the south, partly because of the loss of sea ice and snow.

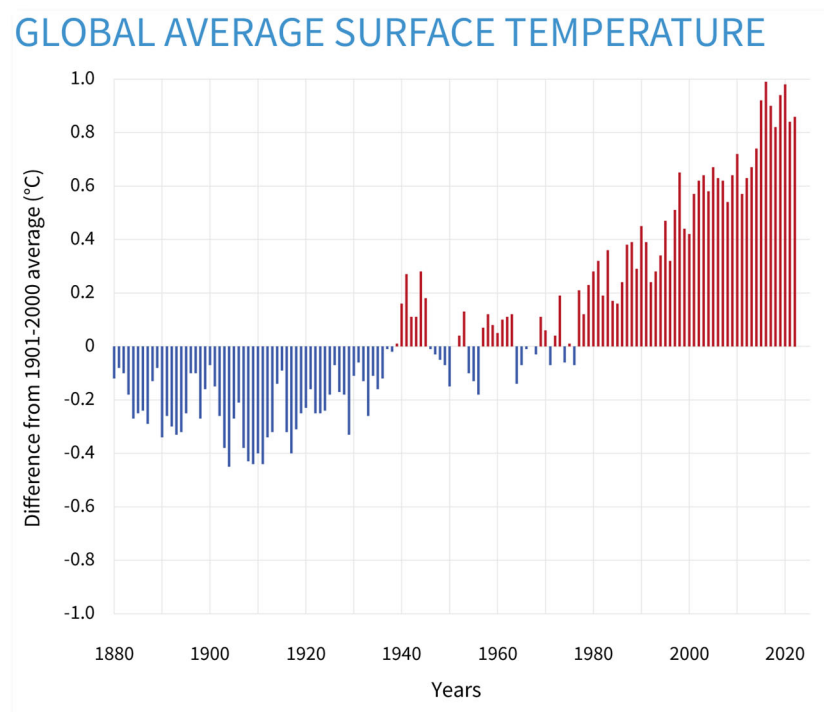


Figure 3 Increase in global temperature over the last 150 years. Source: NOAA, Climate.org.

The Government of the Northwest Territories recognizes that climate change is impacting “the natural environment, the health and safety of its residents, the culture and heritage, infrastructure and the economy” of the NWT (ECC 2018). Because of the massive changes occurring across the NWT, which are predicted to continue well into the future, the GNWT has developed an action plan with the intent of reducing greenhouse gas emissions that contribute to climate change and to conduct research into impacts and how to respond to those changes. The action plan will be reviewed in 2024.

This is a summary of some of the areas where scientists have documented changes occurring over the last 30 to 40 years. Research in these areas is ongoing.

Warming Air Temperatures

Most scientists accept the fact that air temperatures around the globe are increasing due to the buildup of greenhouse gases. The loss of snow and sea ice allows the surface of the earth to warm up which means that the Canadian Arctic is warming up at about two to three times the global rate. This warming air causes changes in precipitation, snow melt and water flow in stream and rivers. The warmer temperatures also allow new species of plants and animals to move up from the south and may reduce the populations of resident animals that have adapted to cold. Warmer temperatures may also cause increased numbers of insects that will harass caribou in the summer.

Permafrost

Permafrost is defined as ground that stays frozen for at least two years in a row. The Mackenzie Valley Basin stretches from areas with no permafrost in the south to discontinuous permafrost in the central areas around the Sahtú and continuous permafrost in the north. Scientists are studying the effects of climate change on permafrost because they expect thawing permafrost and the surface soil layers will have a large impact on the arctic ecosystem, including caribou populations. Thawing permafrost has been observed throughout the NWT and the Sahtú.

Ice Free Arctic Ocean and Beaufort Sea

The loss of sea ice in the Beaufort Sea has exposed the ocean to increasing temperatures and the development of storms. The open ocean has also been shown to affect the weather in the Mackenzie Valley and caribou range because of the warmer surface waters and increasing humidity. A study linking declining sea ice with caribou habitat showed that plant biomass increased on the caribou range, but the quality of the range declined due to an increase in shrubs and other plants (Fauchald *et al.* 2017).

Snow and Ice

Scientists predict that precipitation will increase as the climate gets warmer, but that precipitation will come as rain, with less snow in the future. How this will affect caribou is difficult to predict. Less snow might make food in winter more accessible and travel easier during spring migration. It might also mean more insects and a longer season of insect harassment. Ice-free lakes earlier in the spring might also slow down migration of barren-ground herds.

Timing of Environmental Events

Caribou follow a very specific timing for major life events, such as migration, calving, rutting, etc. A warming climate changes the timing of rain and snow events, greening of vegetation, snow melt, drying of the land, insect emergence and lake ice melting. These changes may affect caribou reproduction and the survival of calves. Migrations routes may become more difficult to traverse in spring and fall, slowing down herd movement. Caribou can adapt to many of these changes, but when occurring together the cumulative changes may reduce the size of the herds (Brotton and Wall 1997). Gustine and co-workers (2014) showed that relatively few of the expected impacts affected the Porcupine herd, but other herds may respond differently.

Severe Weather Events

Scientists use computers to predict how the environment will change and how caribou and other wildlife will adapt to the new environmental conditions. The computer programs indicate that air temperature and precipitation are the biggest expected changes but along with these changes are the presence of more extreme weather events, including floods, larger thunderstorms and lightning, ice storms and droughts. Caribou can adapt to some of these changes by changing their home range and changing the timing of life events to accommodate some changes. Some events, such as calving, must occur at a critical time but others, such as winter and fall movements can be modified.

Changes in Plant Species

Scientists have been documenting the changes in dominant plant species in the NWT and Alaska for several years. There has been an increase in shrubs and other plants from the south as air temperatures increase in a process called shrubification. There has also been a decline in the lichen communities in some environments as new species move in. The presence of new plant species has resulted in new wildlife species moving north as well, including species such as white-tailed deer. These species will continue to move north as the plant communities change in the future.

SUMMARY

Wildlife, including caribou, are known to adapt to new environmental conditions and show enough variability in their habits to overcome many of the changes that have been caused by climate change. Adaption is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to lessen the effects of the changes, to avoid harm or to exploit good aspects of the changes and beneficial opportunities. Caribou have been surviving in an extreme climate for thousands of years and there may be benefits from some of the changes from a warming climate.

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THE EFFECT OF WILDFIRES ON BOREAL AND BARRENGROUND CARIBOU

Summary of Key Points about Wildfires and Caribou

- Wildfires are a destructive force in caribou habitat but are natural in origin and can renew and replenish habitat. They have been shaping caribou habitat for thousands of years.
- Wildfires are common in the boreal forest throughout Canada and the NWT and extend up to the Arctic coastline.
- The number of fires in the NWT and in the Sahtú varies by year. In 2023, there were 303 fires in the NWT and 55 fires in the Sahtú. Some of these fires are still active.
- The area burned in the NWT reached a maximum in 2023 at over 4 million hectares, roughly 42% of the area burned in Canada this year. Most of the area burned in the NWT was in the South Slave.
- Roughly 87% of wildfires in the NWT were started by lightning between 1990 and 2023. Scientists believe that lightning might become more common in the future due to warmer air temperatures and drier air.
- Wildfires can have a significant impact on caribou habitat and caribou body condition when the range of boreal and barren ground herds are restricted by development or forestry. In most of the NWT, caribou generally avoid burned areas and seek out better food resources, particularly in the winter. Individual caribou may remain near burn scars and unburned areas within the larger burn scar.
- Boreal caribou can also use unburned patches in larger burn scars for calving due to food availability and being able to detect approaching predators.
- Lichen in burned areas requires decades to recover to the point of supporting caribou populations. Studies have shown that reindeer lichens take 40-50 years to become established and up to 150 years to regrow to maximum biomass.
- Other plant species grow more quickly than lichens, take over burned areas and may provide browse for moose. In the southern NWT, white-tailed deer may also become established in the new plant growth in burned areas.

There is a general understanding by scientists that fires are destructive to caribou habitat by destroying lichen and other plants, thawing the upper layers of permafrost and soil, and generally reducing the suitability of habitat for caribou. Wildfires also have also been part of nature for thousands of years and help the environment to renew and recover. A map of wildfires larger than 200 hectares since 1980 (Figure 4) across Canada shows that fires are a common feature of the boreal forest and extend across Canada, north of 60° and up through the Sahtú to the Beaufort Sea.

This report will review information on the status of wildfires in the NWT and Sahtú in recent years. The focus of the report is from a western science perspective and comes from reading reports from scientists working with caribou habitat and wildfires. Much of the research involves understanding how wildfires affect the health of caribou populations and how the number and intensity of fires are affected by climate change. This research looks at several factors such as the types of fuels and changing weather conditions in addition to the number of fires and the size of the area burned.

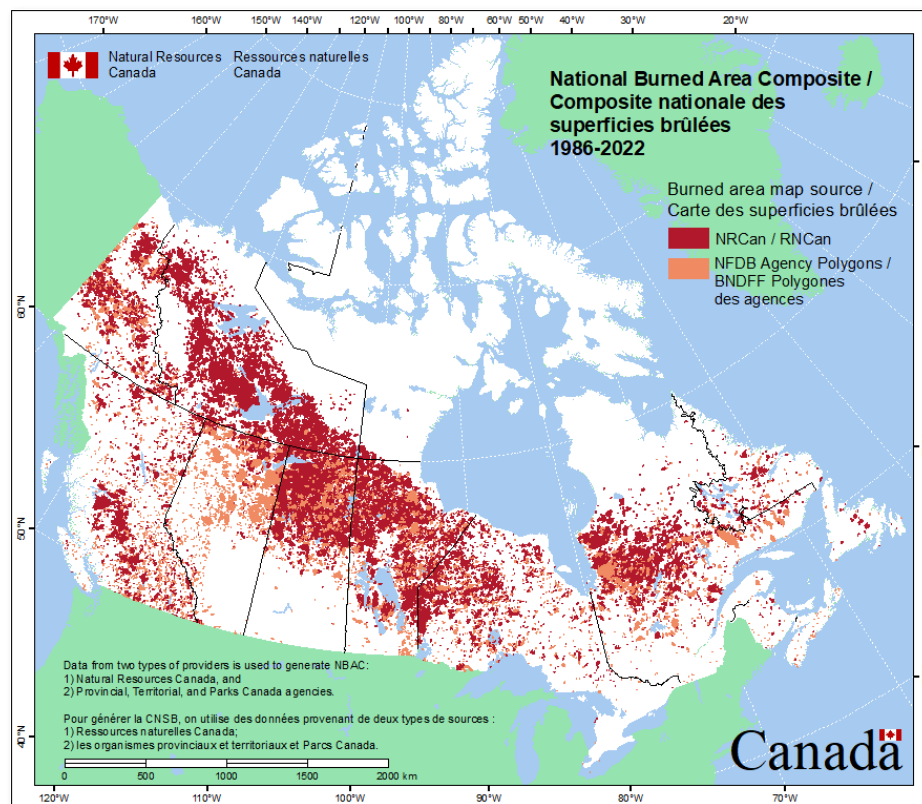


Figure 4 Area burned by wildfires in Canada from 1986 to 2022 showing the distribution throughout the boreal forest. The map only includes fires larger than 200 hectares. Source: Canadian National Fire Database.

Sources of Information on Wildfires

There is a lot of research on what causes major fires, how to predict when fires will occur, where they will spread and how to control or manage fires as they develop because of the damage they cause to communities and resources, such as forestry, trapping and harvesting. As a result, there are resources on the internet for understanding wildfires and their influence on the environment across Canada and the NWT. Data on individual fires is available from territorial and federal websites. Territorial and provincial agencies collaborate and exchange information on the number and intensity of fires, and the status of active fires during the fire season. Some of the major internet sites for more information are listed at the end of this report.

One good resource is the Canadian Wildfire Information System (CWFIS) at Natural Resources Canada which has maps of current fires and historic trends (<https://cwfis.cfs.nrcan.gc.ca/home>). The site also includes the Canadian National Fire Database (<https://cwfis.cfs.nrcan.gc.ca/ha/nfdb>) which includes historic information on fires in the NWT and the Sahtú (Figure 5). The GNWT has released a poster that explains the impacts of wildfires on caribou habitat (Appendix A).

Status of Fires in the NWT in 2023

The number of fires occurring in the NWT changes every year, as does the area burned (Figure 5). The number of fires that have occurred in the NWT since 1990 seems to have declined (Figure 5) but the area impacted in some years (e.g. 1995, 2014 and 2023) is very large. Until 2023, the largest areas impacted were in 1995 and 2014.

Recent years have shown a large increase in the area damaged by fires in the NWT. The number of fires changes every year in the NWT and may have decreased slightly over the last 30 years (Figure 5). The total area burned per year also changes and reached a record of over 4 million hectares in 2023. Most of the burned area in 2023 is in the South Slave and near Yellowknife (Figure 6, 7). In 2023, over 4 million hectares were burned, second only to Québec in the area burned within Canada and accounted for about 42% of area burned in Canada in 2023. The fires started by lightning in the NWT has remained above 80% since 1990 (Figure 8).

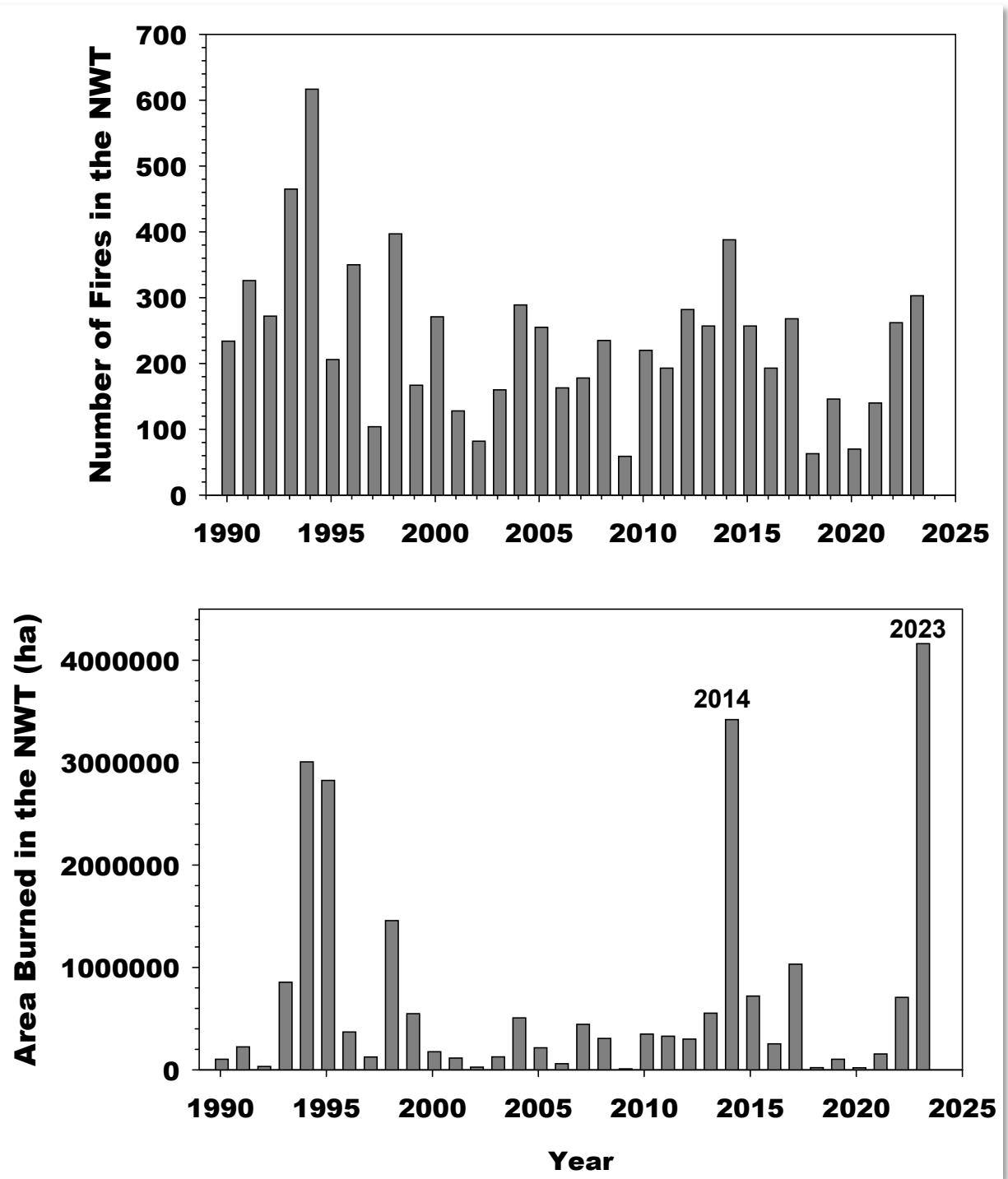


Figure 5 Number of wildfires in the NWT (*top graph*) and the area burned (*bottom graph*) from 1990 to 2023. Source: National Forestry Database.



Figure 6 Placement of wildfires in the Sahtú as of October 1, 2023. Burned areas are shown as light brown patches. The GNWT reports a total of 55 fires in the Sahtú in 2023. Source: <https://cabinradio.ca/137696/news/yellowknife/fire-map/>



Figure 7 Placement of wildfires in the South Slave as of October 1, 2023. Burned areas are shown as light brown patches. Total area burned in the NWT in 2023 was over 4 million hectares, most of it in the South Slave.

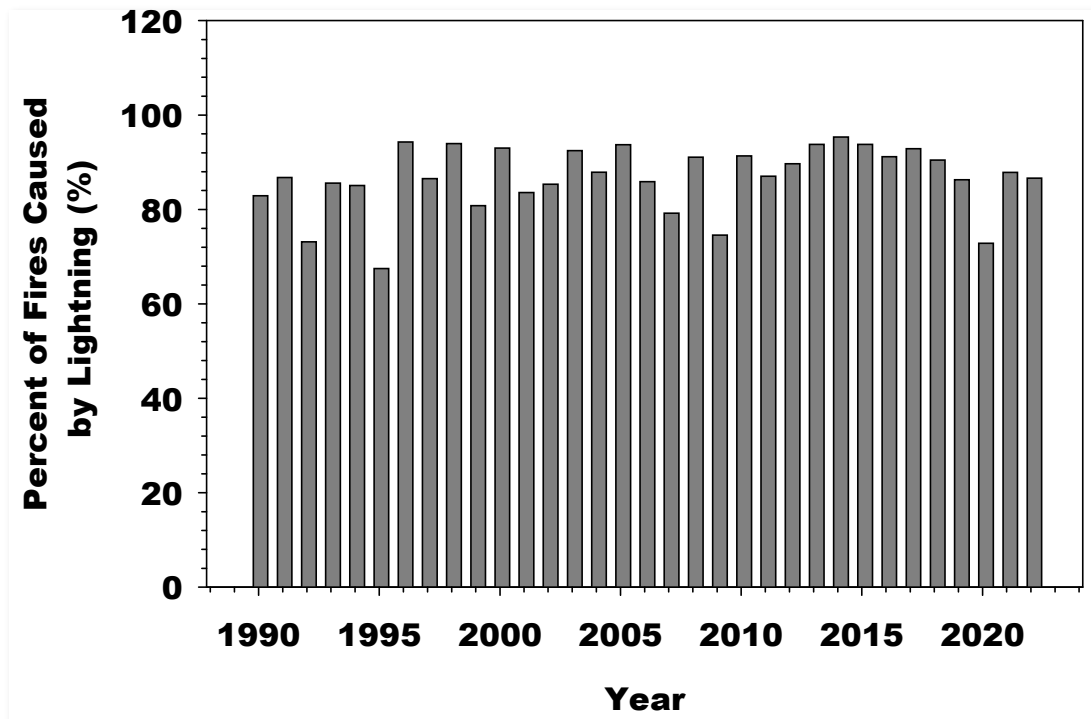


Figure 8 Percent of fires in the NWT caused by lightning strikes between 1990 and 2022.

Wildfires in the Sahtú in 2023

Environment and Climate Change (GNWT website) reports the following information on fires in the Sahtú in 2023 as of October 27, 2023 (Figure 9):

Current Wildfires in the Sahtú (October 27, 2023)

Total active fires: **22**
 New fires in the last 24 hours: 0
 Fires receiving response: **22**
 Fires declared out: **33**
 Total fires this year: 55
 Hectares affected: 382,732 Ha

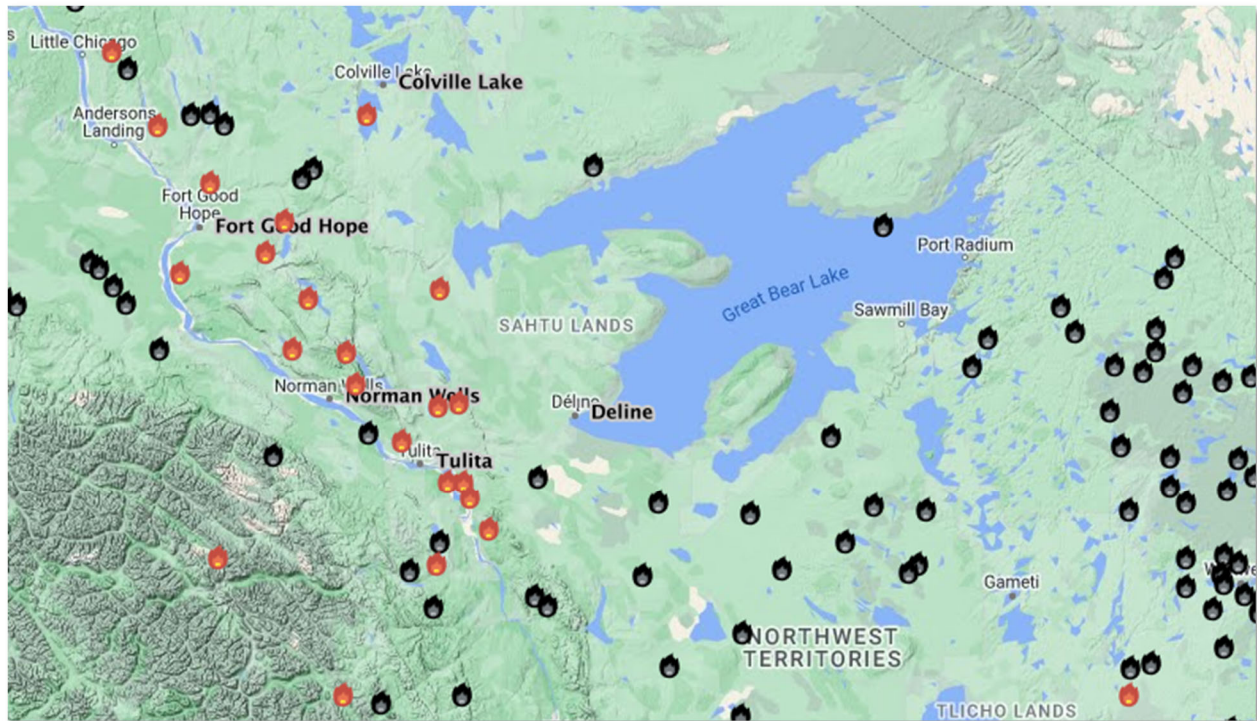
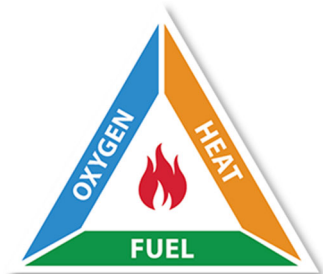


Figure 9 Wildfires in the Sahtú in 2023, as of October 1, 2023. Red dots are still active. Black dots are considered to be out.

Causes of Wildfires

There are a lot of resources on the internet to explain how wildfires are started and why they can develop very quickly. All fires are the same in that they need three things to develop: air or oxygen, heat and fuel. Wildfires are different because the fuel is organic material in the environment, such as trees, grasses, lichens and other plant material. The drier the material, the more likely a wildfire will develop.



The heat source can occur from lightning or from human-caused factors such as campfires or sparks from ATVs on dry ground. Scientists have predicted that the number of fires and the area burned will increase in the NWT with a warming climate as lightning strikes and drier conditions promote new fires. Lightning caused 87% of the fires in the NWT between 1990 and 2022, and only 13% were caused by humans. The number of human-caused fires is low in the NWT and may reach 70% in some provinces (e.g., Manitoba in 2020) in some years. The number of lightning-caused fires is expected to increase in the NWT over time with warmer temperatures and drier air and an increase in thunderstorms. Although precipitation as rain is expected to increase with

the changing climate, evaporation of moisture off the land will also cause drier conditions and a greater chance of fires. Fire managers use several measurements and indicators, such as the types of fuel and their moisture, drought, air temperatures and others to estimate the behavior of the fire and its intensity (Source: Fire Weather index (FWI) System - National Wildfire Coordinating Group).

The GNWT's Environment and Climate Change Wildfire Science website describes how the weather conditions, such as wind, temperature, humidity, and amount of precipitation can allow a lightning strike to quickly develop into an intense fire. The amount and type of fuel available also determines how quickly a fire can spread. The GNWT assesses the fire for size, and location, rate of expansion and the behavior of the fire as part of its decision whether to use resources to manage or control a fire.

All of these factors influence the timing and amount of damage that can occur to caribou habitat. Several changes in caribou habitat have been recorded in the North, probably due to a warming climate. The number of wildfires has been linked to the warmer climate due to the drying out of the land with warmer, drier air. Major changes such as thawing permafrost, melting ice in soils, increased precipitation in the form of rain instead of snow and drier summers due to higher temperatures increase the chances of a wildfire.

In Alaska, the snowpack that usually melts in the spring and feeds into streams and lakes has been reduced, which dries out areas of the land. The amount of rain may also change resulting in extreme amounts in some years, which causes flooding, and other years of drought. Also, the location of precipitation has changed resulting in large areas with dried vegetation. Together, these conditions favour the development of large fires from lightning strikes.

Impacts of Fire on Caribou habitat

Depending on wildfire intensity and how the fire develops, there may also be areas that are untouched by the fire, leaving patches of trees and ground cover (called refugia). These areas help to regenerate and repopulate plant species as the land recovers after the fire. Some studies have shown that boreal caribou may seek out the unburned patches for calving to seek protection from predators such as wolves (Skatter *et al.* 2017). A study by Anderson and Johnson (2014) showed that although barren-ground caribou avoid densely burned areas, individual caribou fed at the edges of burn areas and in areas that were in the early stages of recovery. This suggests that burned areas can still be used by caribou before full recovery of the site.

The damage to tundra and forested taiga areas varies during wildfires due to the amount of surface water and the unevenness of the tundra. Raised, isolated peat areas that were well drained were most damaged in a survey of 136 fires, while peat that was connected to groundwater and surface streams were less damaged and expected to recover quickly

(Bouyrgeau-Chavez *et al.* 2022). A study of fire and caribou over the last 200 years using trampling scars on tree rings in Quebec found that major fires changed the migration route of barren-ground herds but didn't affect the size of the herd (Payette *et al.* 2004).

Recovery of Caribou Habitat after Fire

Several studies have recorded the changes in lichen species after a fire. Individual lichens are usually killed when in contact with fire, but some lichens survive in areas not directly touched by the fire. These lichens then repopulate the burned areas and the range recovers over several decades.

A study of the recovery of the habitat of the Beverly herd after a fire showed the recovery of some areas after 40-60 years but as long as 150 years in other areas (Thomas *et al.* 1995). This also occurred in Alaska where caribou returned to fire-impacted taiga after approximately 60 years and lichen didn't return to full growth until 180 years. (Collins *et al.* 2011). This variability in recoveries was also observed in NWT ecozones where lichen recovered within 30 years in jack pine stands but 75 years in the Taiga Plains (Greuel *et al.* 2021). Each burn is different in the amount of damage to lichens and the rate of recovery of lichens, with factors such as the number and type of trees present affecting the number of lichens present after a fire (Russell and Johnson 2019).

Typical recovery times reported by Thomas *et al.* (1995)

Gray reindeer lichen – 50 years but increased slowly up to 150 years

Green reindeer lichen – increased rapidly from 20 to 50 years after fire and reached maximum size at 90 years.

Snow lichen – took 100 years to reach maximum size.

Most studies conclude that fires damage food supplies in caribou range for both barren-ground and boreal caribou, but it usually doesn't impact the population because the range is large enough for the herds to find enough food. The loss of habitat is more of an issue in the south (e.g., Alberta) where the ranges are smaller due to forestry and industrial development. A study of boreal caribou in Alberta after a fire found that caribou did not change their home range even when most of the range was burned. The scientists concluded that the home range was large enough for the caribou to avoid burned areas but still be resilient to the effects of the fire (Dalerum *et al.* 2007). In Alaska, scientists found that caribou overwintering in forest would be more impacted by fire than those that overwintered on the tundra because of the high incidence of fire in treed areas (Gustine *et al.* 2014).

The regeneration of forests after fires may result in different plant species growing more rapidly than recovering lichens. These new shrubs and grasses provide browse for other species such as moose, and white-tailed deer may also expand into the southern NWT with the warmer climate.

The change in species as the forest and taiga recover is called succession and can take hundreds of years to develop to a stable environment again. Examination of burn scars in Alaska reported the loss of lichens and an increase in grasses after the fire. Areas that had burned twice showed an increase in shrubs and an increase in the number of plants (Breen *et al.* 2015).

Summary

The western science research shows that fire can be a destructive force in treed, taiga and tundra ecosystems by destroying caribou food and sheltering habitat. Fires have been a natural part of the ecosystem for thousands of years and caribou adapt to the damaged landscape by finding other areas untouched by fire. Burned areas can be slow to recover and take decades and even centuries to return to pre-fire conditions. Burned scars can be uneven, with unburned areas present that individual caribou may seek out for calving and to avoid predators.

Sources of information

Fire Resources –

Natural Resources Canada - Canadian Wildland Fire Information System (CWFIS)

<https://cwfis.cfs.nrcan.gc.ca/home> a great site that summarises fire conditions across Canada.

British Columbia government website

<https://www2.gov.bc.ca/gov/content/safety/wildfire-status/wildfire-response/about-wildfire>

Canadian interagency Forest Fire Centre (CIFFC) website: <https://www.cifffc.ca/>

Government of the Northwest Territories

<https://www.gov.nt.ca/ecc/fr/services/nwt-state-environment-report/14-state-vegetation>

Canadian Forest Fire Weather Index (FWI)

<https://cwfis.cfs.nrcan.gc.ca/background/summary/fwi>

Canadian Wildland Fire Information System (CWFIS) <https://cwfis.cfs.nrcan.gc.ca/home>

National Wildfire Coordinating Group (NWCG) <https://www.nwcg.gov/>

Fire Effects Information System (FEIS) US Department of Agriculture

<https://www.fs.usda.gov/database/feis/lichens/claspp/all.html#FIRE%20EFFECTS>

Map of NWT fires in 2023

<https://cabinradio.ca/137696/news/yellowknife/fire-map/>

Maps of fires in the NWT from GNWT's Environment and Climate Change
<https://www.gov.nt.ca/ecc/en/easymap>

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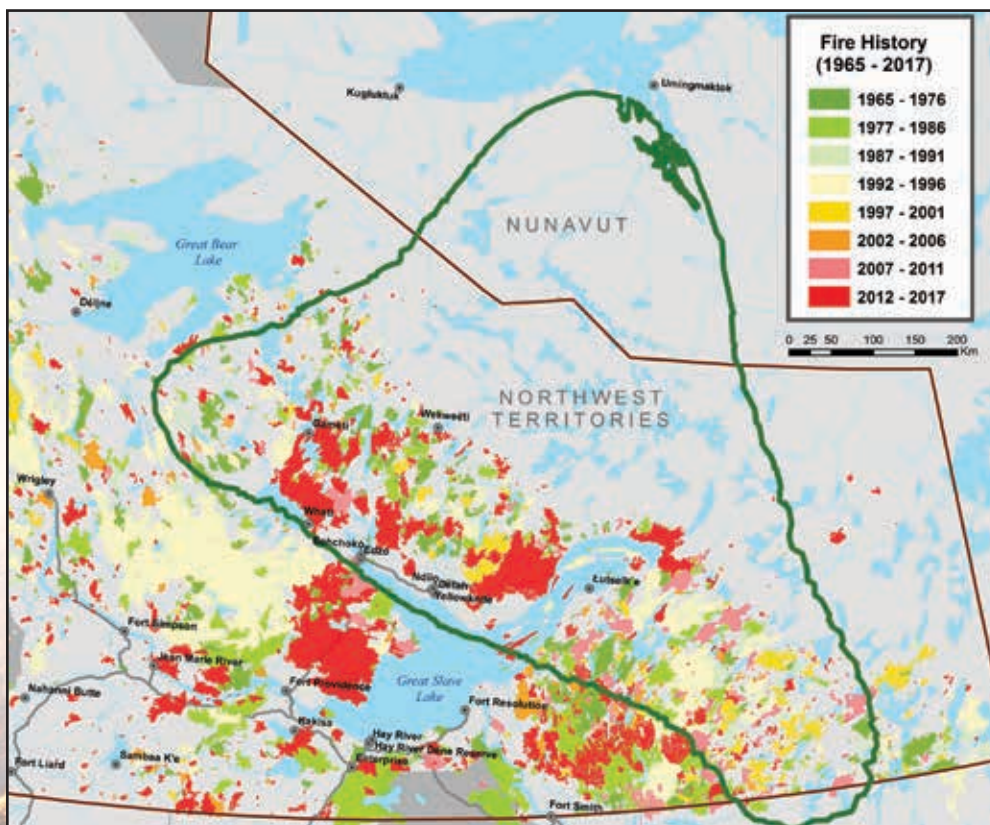
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Barren-ground Caribou Habitat and Fire

Fire is a natural and important part of the boreal forest ecosystem. Northern plants and animals have adapted to the cycles of fire and regrowth, and barren-ground caribou have co-existed with the effects of forest fires on their winter range for thousands of years.

Fires do not burn uniformly across the landscape. Unburned patches and corridors often remain inside of large fires, and these unburned patches can still provide foraging areas for caribou as they move through burned areas.

On average, fires burn nearly 1% of the forest in the Northwest Territories (NWT) annually, with some areas affected by fire more frequently than others. It is common to experience several years with many small fires on the landscape before experiencing a fire season where very large fires occur, as we saw in 2014.



This map shows the history of fires on the Bathurst caribou herd's traditional range between 1965 and 2017. Most of the bright red burns are from 2014.



How are fires affecting caribou today?

Fires can affect the forested portion of barren-ground winter ranges, impacting their movement and choice of habitat.

Caribou prefer to eat ground-based lichens as their main winter diet. Both traditional knowledge and science tell us caribou prefer to go where the best food is located, and will vary their winter range year to year to select areas where lichen is plentiful. These areas tend to be mature forests that are at least 50-80 years old.

While caribou generally use mature forests more often than recently burned forests, they do not always avoid burned areas or areas of new growth. Research on the Bathurst caribou winter range has shown substantial use of young forests and areas adjacent to burns by the herd.

Collar data has also shown us that, in recent years, some barren-ground caribou herds have not used their full historic ranges. Instead, they have used a smaller portion of their traditional range, choosing to winter near or above the tree-line in the tundra portion of their range.

Working together to address challenges

Changes to the weather have added to the challenge of managing fires in some years. Warmer springs result in earlier snow melt and a quicker start to the fire season. Drier air and more wind help fires spread, making them harder to control and sometimes impossible to stop. Longer summers can result in drier ground and fires that burn deeper, making them harder to put out.

It is important to note that despite these changes, fire is still a normal and important part of the boreal forest ecosystem, and that fighting all fires is neither desirable, nor possible. Fire is needed to get rid of old fuels and regenerate forests, and the patchwork of young forests that grow following a fire help to

What role does fire management play in caribou conservation?

Northerners have expressed concerns regarding the amount of recent fire activity within the caribou winter range, and the negative effect this could have on caribou feeding and movements. The Department of Environment and Natural Resources (ENR) continues to track and assess natural and human-caused land disturbances as part of decisions made to protect barren-ground caribou habitat in the NWT.

Forest fire response decisions are made based on a hierarchy of values-at-risk, where the protection of communities and infrastructure are top priorities. Important caribou habitat is also considered a value-at-risk, and ENR is looking at the feasibility of increasing fire response activities on key caribou winter ranges during the fire season.

ENR has also introduced new detection methods to find fires while they are still as small as possible. Recent improvements to fire modelling can help predict fire growth and show us where and how large a fire may spread. This information combined can help fire managers take actions to reduce the size of a fire before it gets too big. New research is also looking at how hot fires burn, as this can affect how quickly certain plants and trees regrow in an area.

Our approach to forest fire management is designed to be responsive to the needs of NWT residents, and to draw upon local and traditional knowledge. Through active engagement with communities, our wildlife and fire managers can determine important areas that are used by caribou. Key caribou habitat, such as corridors and unburned winter ranges, can be added as a value-at-risk and receive an appropriate response from fire managers. It's important that communities help us to identify values-at-risk before the fire season starts.

keep new fires from getting too big. There are also practical limits to firefighting in remote areas. The NWT is large, and our limited resources must be prioritized for the protection of our residents above all else.

Today, wildlife and fire managers are working more closely together than ever before. Co-management partners, Indigenous governments and organizations, scientists and community members all contribute to making the best decisions regarding caribou and fire management. It is essential that all groups continue to work together to find the best path forward.