



Peter Mather

20  
25

# Porcupine Caribou Herd Annual Monitoring Update

from the Porcupine Caribou Technical Committee  
Annual Summary Report 2023-2024

# About the Porcupine Caribou herd

The Porcupine Caribou herd is one of North America's largest caribou herds, with an annual range of over 200,000 square kilometres. The herd moves across the Arctic landscape on one of the world's longest migrations, taking it through Alaska, Yukon, the Northwest Territories and the traditional territories of the Gwich'in, Vuntut Gwitchin, Tr'ondëk Hwëch'in, First Nation of Na-Cho Nyäk Dun and Inuvialuit and Inupiat people. The Porcupine Caribou herd was the first international caribou herd with its own formal co-management agreements and boards. Land claim agreements solidify the Indigenous right to hunt caribou for subsistence and local participation in wildlife management. In 2024, Aullaviat/Anguniarvik, an area that contains important habitat for the herd, was formally recognized as a Traditional Conservation Area. This part of the herd's range covers 8,500 square kilometres of the eastern Yukon north slope.





## About the Porcupine Caribou Technical Committee

The Porcupine Caribou Technical Committee (PCTC) coordinates research and monitoring of the herd collaboratively among management agencies, which is beneficial to partners and the herd. It provides technical information to co-management boards and agencies, First Nations, the Inuvialuit, and other governments.



Peter Mather



Sonny Parker

## About this report

This report is a summary of the annual technical report prepared by the PCTC, which is informed by scientific and technical information. This report is for co-management boards and agencies, First Nations, the Inuvialuit, and other governments, and for people who are interested in science and monitoring related to the herd. It is intended to help the Porcupine Caribou Management Board (PCMB) make recommendations on conservation and management of the herd and its habitat. The PCMB works with the Parties to the Porcupine Caribou Management Agreement at the Annual Harvest Meeting to ensure both science and Indigenous knowledge is used by the Board in its recommendations.

This report will help the PCMB and others who care about the Porcupine Caribou herd make decisions:

- to conserve the herd and its habitat
- to ensure opportunities for customary and traditional uses of the herd
- to assist with collaborative management of the herd across boundaries and among governments and users of the herd

## How are we gathering knowledge about the Porcupine Caribou herd?

The users of Porcupine Caribou have been following and learning about the herd and their yearly cycle for generations. Since the establishment of the PCMB and the plan for international conservation of the herd, scientists and managers have been finding ways to study and monitor the herd. This monitoring helps us learn more about the herd's health, habitat, population size, and behaviours, and to watch for changes in the herd.

## *INDICATORS*

*Indicators are pieces of information that can be studied over time to track changes in the Porcupine Caribou herd's numbers, health, and habitat. They are updated each year using measurements, analysis, and comparison tools.*



Sonny Parker

# What does the latest monitoring tell us about the Porcupine Caribou herd?

## *INDICATOR Caribou Population*



Sonny Parker

### Photocensus

**Why do we measure this?** Knowing the overall number of caribou, or the population size, and how it changes over time is important for managing the herd, particularly when it comes to harvest.

**How do we measure this?** A successful photocensus relies on the herd congregating in few large, tight groups. Once the insects come out during the warm weather in early summer, the caribou respond by gathering into these groups, sometimes consisting of tens of thousands of caribou. Satellite GPS collars help researchers locate the caribou. Planes fly over the groups and caribou are photographed and then counted from the photos.

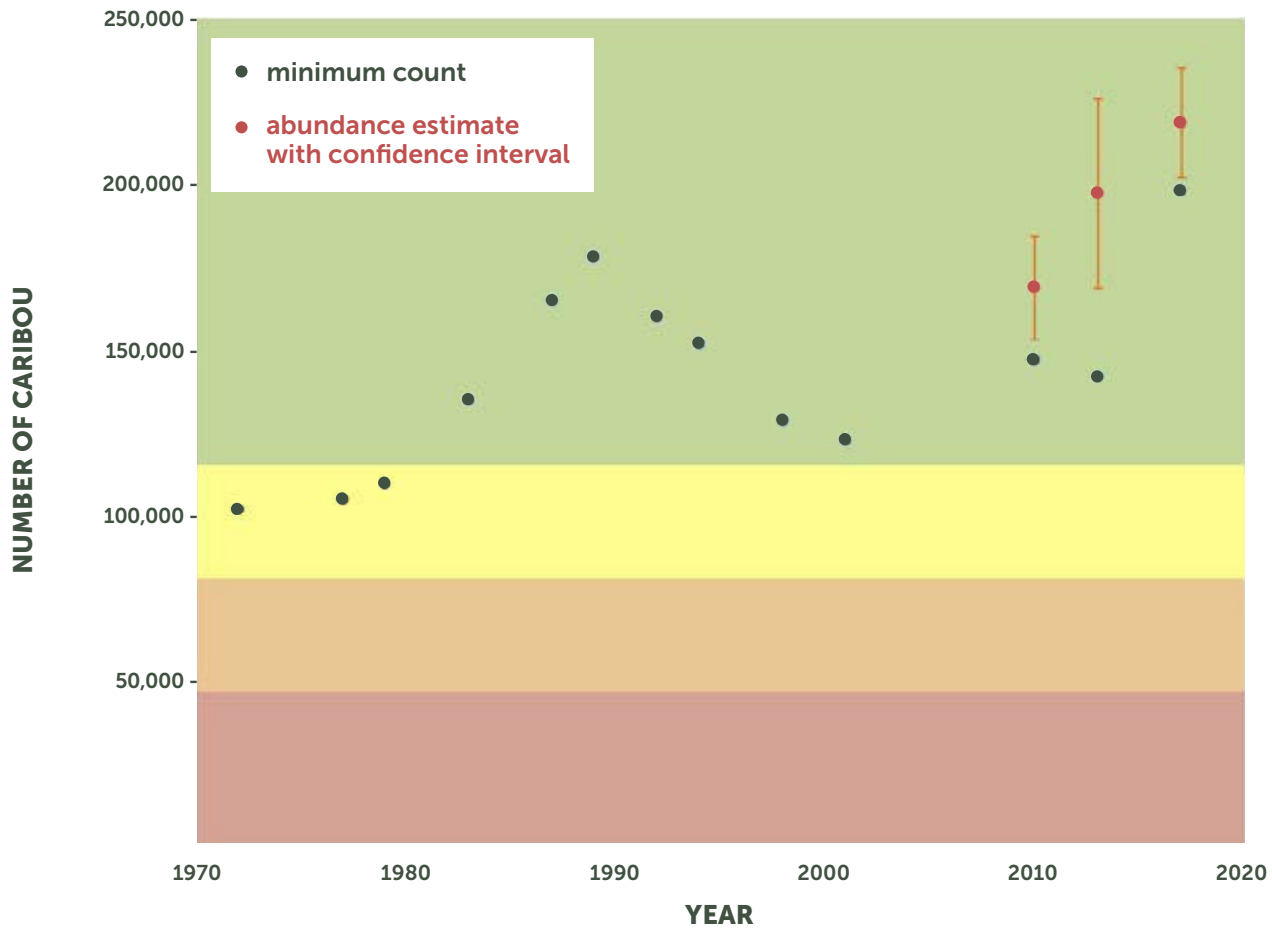
**How often do we measure this?** To monitor the population, researchers hope to estimate the size of the Porcupine Caribou herd every few years. The photocensus method has been used to count the number of caribou since 1972. The last successful count was in 2017. We attempt a count every year. In 2024, photocensus flights were attempted in late June and early July, but the herd did not gather in a large group. The PCTC will be increasing the number of flights to improve the chances of a successful photocensus in summer 2025.

#### What did we learn?

Population estimate:

<b>2013</b>	197,228	(95% CI = 168,667 – 225,789)
<b>2017</b>	218,457	(95% CI = 202,106 – 234,808)

(We are 95% confident the true population size of the herd is within this range) Photos taken in June 2023 have been evaluated but are not complete enough to allow for an estimate of the minimum herd size.



**FIGURE 1 | PORCUPINE CARIBOU HERD POPULATION SIZE**

From 1972 to 2001 the photocensus established a minimum count, which is not an estimate of the herd's total size. Since 2010, we have estimated the herd size more accurately. We use minimum counts and other information to estimate herd abundance along with our certainty about the number. The background colours show the Harvest Management Colour Zones as established in the Harvest Management Plan.

**What does this tell us about the herd?** Since the first photocensus was conducted in the early 1970s, the herd has numbered from just over 100,000 to over 200,000 animals. It was at a population peak in 1989, with a minimum count of 178,000 caribou. Between 1989 and 2001, the herd declined. It recovered to 169,000 animals by 2010, and increased to 218,000 in 2017, its highest number since surveys began. Between 2010 and 2017, the herd was growing at a similar rate to its last growth phase (1972-1989). Although previous estimates indicate the herd was growing, the absence of a photocensus since 2017 means we cannot determine the trend of the herd at this time. Completing a photocensus is a priority for upcoming years.

- 0-45,000 = RED
- 45-80,000 = ORANGE
- 80-115,000 = YELLOW
- 115,000+ = GREEN

## CONFIDENCE INTERVAL

A confidence interval is a range of values that describes the uncertainty surrounding a number. It's a measure of our confidence that the number is between a given range, based on the data we have. A narrower range means we are more certain about the estimate, while a wider range means there is more uncertainty.



# Caribou Population

## MAKING A MODEL

*A population model incorporates many different combinations and scenarios of collected monitoring data, including survival and previous photocensus estimates, to produce current estimated numbers for the herd size. It helps us understand if it is likely that the herd is increasing or decreasing. While we don't know the exact number of calves that survive each year, we do know the likely minimum and maximum numbers, and we can input these numbers to create scenarios that represent optimistic and pessimistic situations. The range of possibilities produced by the computer model can show if the herd is in decline and what harvest management colour zone the herd is in.*

## Population computer model

**Why do we measure this?** The computer model was developed as another way of estimating the size and trend of the Porcupine Caribou herd. It is especially useful when a photocensus cannot be completed, due to poor weather or when the caribou don't gather in large numbers. Estimates from the model can help us understand the amount of growth or decline that might be happening. Different inputs to the model (for example, a small increase in calf mortality) can show different trend lines and allow us to better understand impacts to the herd when changes happen.

**How do we measure this?** The computer model brings together a lot of our monitoring information to collectively estimate the number of caribou, with an indication of how certain we are about that number. The model is built on a computer using information from herd indicators, such as photocensus numbers, estimates of the proportion of female caribou (cows) and adult males (bulls), harvest numbers, survival and calving success. The model produces many scenarios that, when considered together, show how likely it is that the caribou population is increasing, decreasing, or remaining stable.

**How often do we measure this?** An advantage of computer modelling is that it can be updated as new data comes in, and the model can be run using different combinations of the monitoring data we collect. Doing so helps us understand how certain we are about the size and trend of the herd. As more time passes since the last successful photocensus (2017), the less confident we will be in the actual size of the caribou herd.

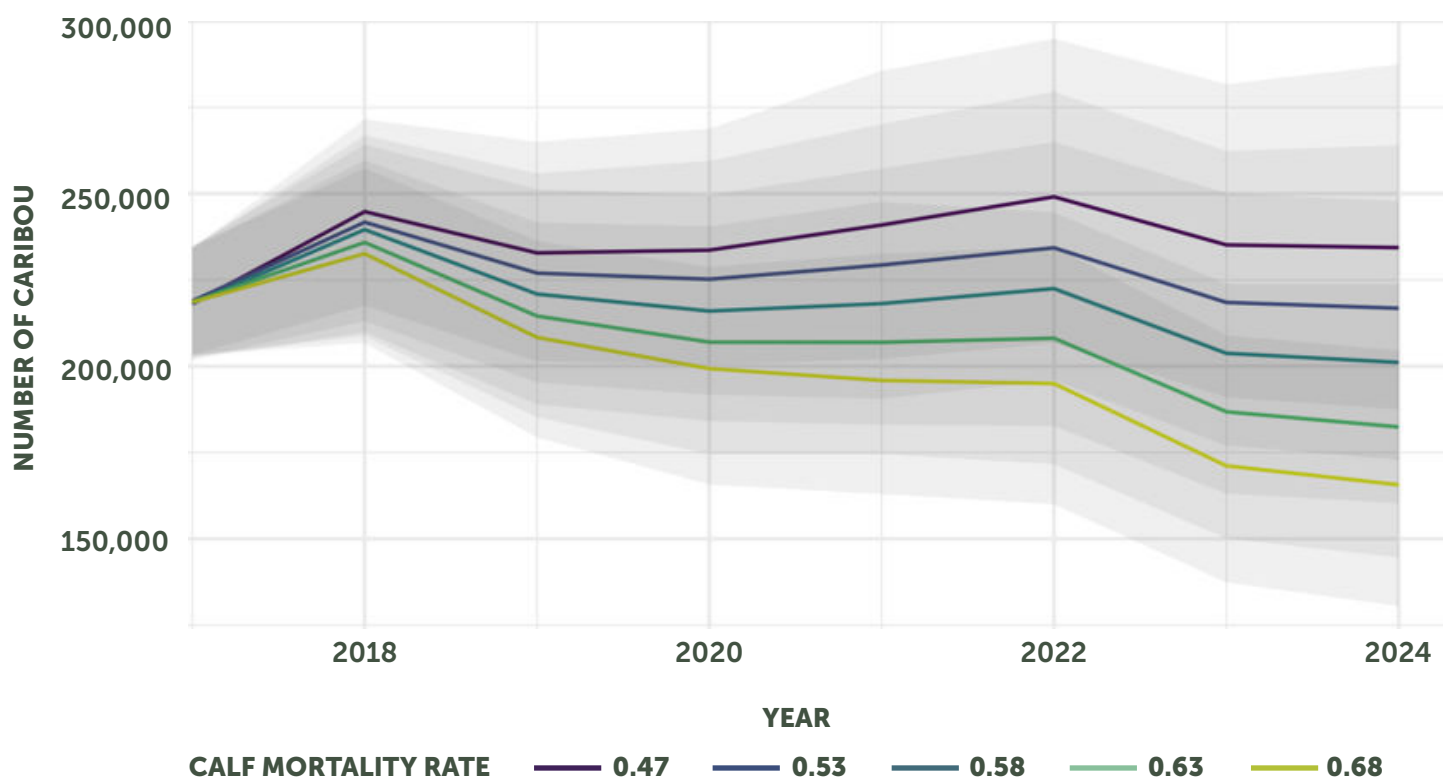
**What did we learn?** All model results this year showed the herd remains within the Green Zone as identified in the Harvest Management Plan. This year's population model indicates that the herd was stable or slightly declining in 2023-2024.

**What does this tell us about the herd?** The herd has likely decreased since the last photocensus in 2017. Because of the length of time since the last photocensus, there is a wider range of projections (i.e., more uncertainty) for herd size, but this year's models show there is a much greater probability that herd has declined more than 10% from the 2017 count.





Peter Mather



**FIGURE 2 | COMPUTER MODEL OF HERD SIZE SINCE 2017**

*The computer model projects the population size of the Porcupine Caribou herd using different inputs. The coloured lines show the population size and trend using different calf mortality scenarios (i.e., the percentage of calves that die each year). The shaded area shows the uncertainty in the model (the area in the darker grey is the more likely outcome). Results from our models indicate that it is likely that the herd is not increasing and has decreased since the last photocensus in 2017.*

# INDICATOR *Survival estimates*

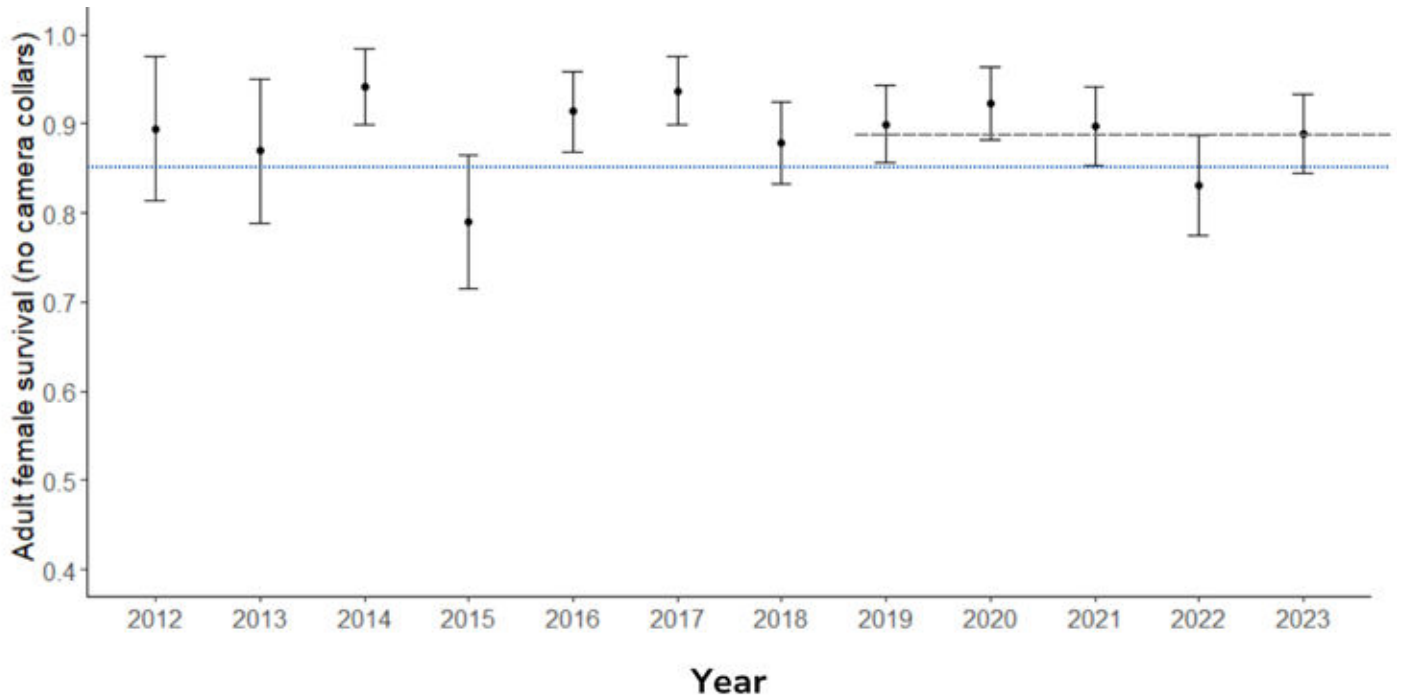


## Survival Estimates

**Why do we measure this?** Caribou survival is critical to the health of the herd. We consider adult female survival to be one of the most biologically important monitoring indicators for the herd. Even small changes in the survival of adult females can make the difference between an increasing or decreasing herd. Trends or major changes in calf survival (young between birth and one year) yearling female survival (females between one and two years old) or adult male survival (usually four years and older) can also help us understand changes in the herd.

**How do we measure this?** Caribou wearing GPS collars are tracked throughout a year (from June to May) to determine an annual survival rate. When a collar stops moving, researchers can determine if the caribou died. We can use that information combined with the knowledge of which caribou have survived to estimate the percentage of the herd that died in a year.

**How often do we measure this?** Survival rates are calculated and monitored every year. The survival year goes from birth (June 1) to the following May 31.



**FIGURE 3 | SURVIVAL ESTIMATES OF ADULT FEMALE PORCUPINE CARIBOU**

*The figure shows survival estimates for female caribou with confidence intervals. Generally, the herd needs at least 85% (shown as a blue line) of its adult females surviving each year for a stable or increasing population.*

**What did we learn?**

- Adult females 2023-24 – 89% (5-year average is 89%)
- Adult males 2023-24 – 64% (5-year average is 68%)
- Yearling females 2023-24 – 75% (5-year average is 81%)
- Calves to three weeks old 2023-24 – 79% (5-year average is 86%)

**What does this tell us about the herd?** Adult female survival remained high in 2023-24, but male, yearling female, and 3-week calf survival were lower than average. Adult female survival is a big factor in population growth, but when the herd is struggling, we expect to first see more deaths in males and yearling females. Low survival in calves tells us that fewer baby caribou may reach adulthood (though this can be offset if a high number of caribou have calves). Understanding calf survival is another way managers can estimate what will happen to herd size over the next few years. Adult male survival is almost always lower than adult female survival.



Peter Knamiller

# INDICATOR *Reproduction and Growth*

## Calving

### **Why do we measure this?**

Calves are baby caribou. From birth to 1 year of age they are most vulnerable to predators, environmental factors, and illness. It is important to know how many calves are born each spring because they represent the future of the herd. Knowing the number of calves and their chance of survival helps us know what might happen to herd size in the next years.

### **How do we measure this?**

Female caribou with satellite GPS collars are located from an airplane in June. The researchers then classify them as barren (neither pregnant nor with a calf), pregnant, or having given birth to a calf. They can tell that female caribou are pregnant if they have hard antlers or bulging udders. Recent mothers will have a calf next to them or “at their heel”.

### **How often do we measure this?**

The birth rates of calves have been tracked yearly during late May and early June since the 1980’s.



## What did we learn?

### PARTURITION RATES 2024:

4 years or older females: 86% (5-year average is 82%)

3-year-old females only: 33% (5-year average is 56%)

All female caribou: 73% (5-year average is 77%)

### CALVES FOR EVERY 100 FEMALE CARIBOU:

Late June cow/calf ratio 2024: 57 calves per 100 female caribou (cows) (5-year average is 61 per 100 female caribou)

On average, biologists see about 82 calves born to every 100 adult female caribou. Biologists monitor caribou and their calves the following March to note the relative number of calves that survived to nine months. If they can reach that age, the chance of them surviving to adulthood is high.

**What does this tell us about the herd?** Yearly fluctuation in calving numbers is normal. But if birth rates and calf survival rates remain low for several years in a row, population growth for the herd is unlikely.

Although the number of calves for every 100 female caribou was similar to long term averages, overall survival of calves is much lower than the long-term average. Adult caribou over 4-years-old are having normal to high birth rates, but 3-year-old caribou are having low birth rates. Researchers believe that the birth rates of 3-year-old caribou are related to environmental conditions including changes in nutrition (the quality of caribou forage, such as willow or lichen). Data from recent years indicates cows may be in poor condition going into the fall rut. The pregnancy rates of the 3-year-old caribou might reflect overgrazing or bad weather conditions. On-the-land observations from hunters and biologists report fewer calves in fall and late winter in recent years.



**Parturition:**  
the act of giving birth.

**Parturition rate:**  
the percentage of adult cows  
that had calves.



# Reproduction and Growth



## Peak of Calving and Extent of Calving Grounds

### Peak of calving:

The estimated date when more than half of the collared adult female caribou have given birth each spring.

### Why do we measure this?

The date of peak calving helps us understand if changes in climate are affecting the herd and how they might be responding to those changes.

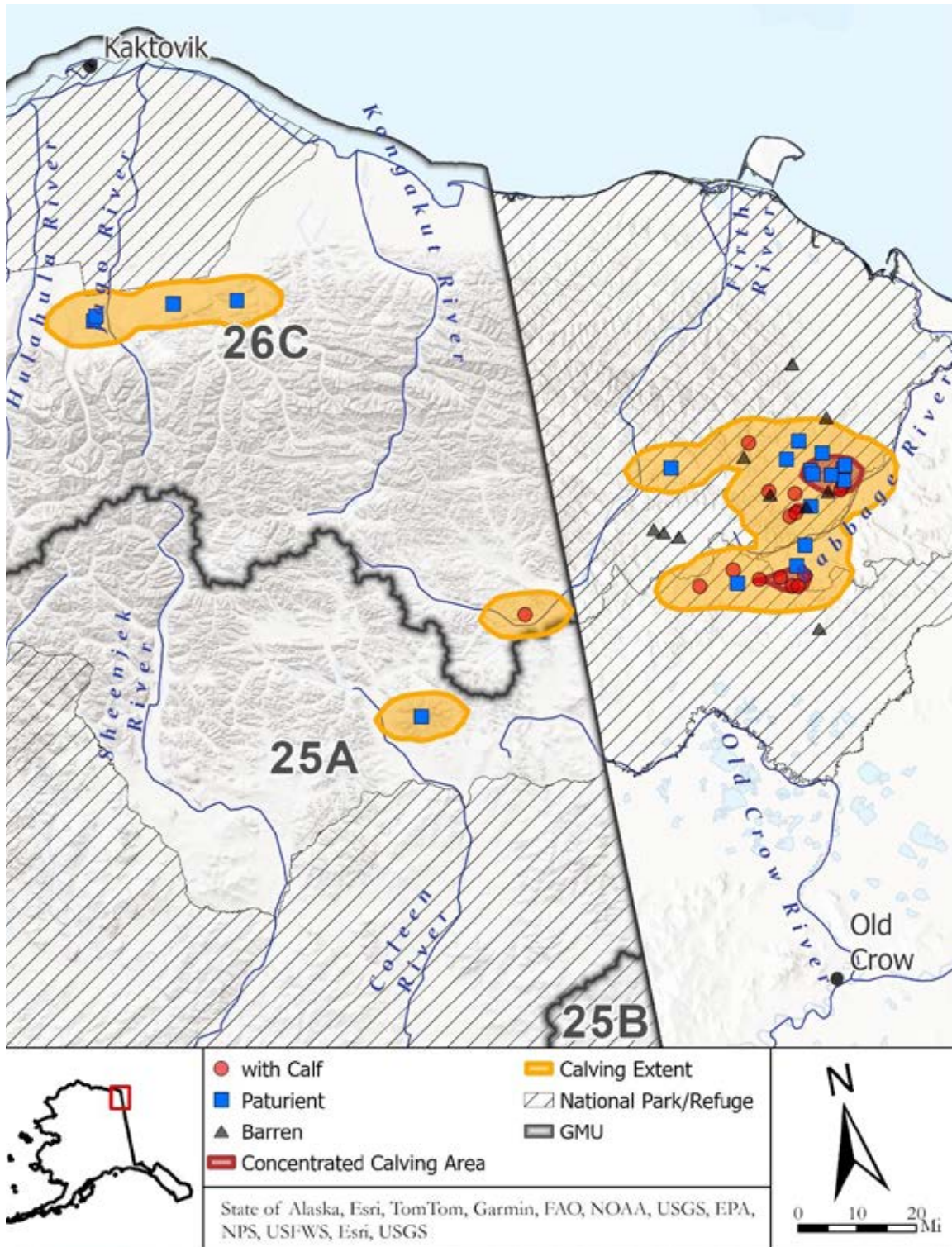
### How often do we measure this?

The peak calving dates have been tracked yearly during late May and early June since 1999.

**How do we measure this?** Female caribou with satellite GPS collars are located from an airplane. Researchers record how many of the collared caribou have given birth and they estimate the birth dates of the calves. When more than half of the female caribou are observed with a calf, this is the peak of calving.

**What did we learn?** In 2024, researchers estimate the peak of calving for Porcupine Caribou was June 4th, two days later than average. In 2024, calving happened mostly in Canada along the Trail, Tulagaq, Babbage, and Timber rivers, with some calving occurring in the upper Firth River and in Alaska on the North Slope near the Hulahula and Jago rivers. Concentrated calving occurred between the Trail and Babbage rivers in the Yukon.

**What does this tell us about the herd?** Porcupine Caribou generally give birth all at once, with most female caribou calving within days of each other. This is a way to reduce the risk of predation on any single calf. The similar birth date means that the female caribou were also bred at a similar time and can be an indication of how the rut went the previous fall. If the calving period is extended, it could mean that the rut was disrupted. This is important because calves born late in the season may be more likely to die from predators or too small to survive the migration south for the winter.



**FIGURE 4 | EXTENT OF CALVING GROUNDS 2024**

*This map shows where caribou calved this year. The red line circles the concentrated calving area, where a greater than average density of caribou gave birth. The orange area identifies the places where most (99%) of the herd calved.*

# Short yearling calf weights

A “short yearling” is a nine-month-old caribou calf.

**FIGURE 5 | SHORT YEARLING (NINE-MONTH-OLD) FEMALE CALF WEIGHTS**

The figure shows the annual weights of 9-month-old caribou calves in the early 2000s and since 2020. The average weight in the mid-2000s was around 47 kilograms. Since 2020, the average weight is around 42 kilograms.

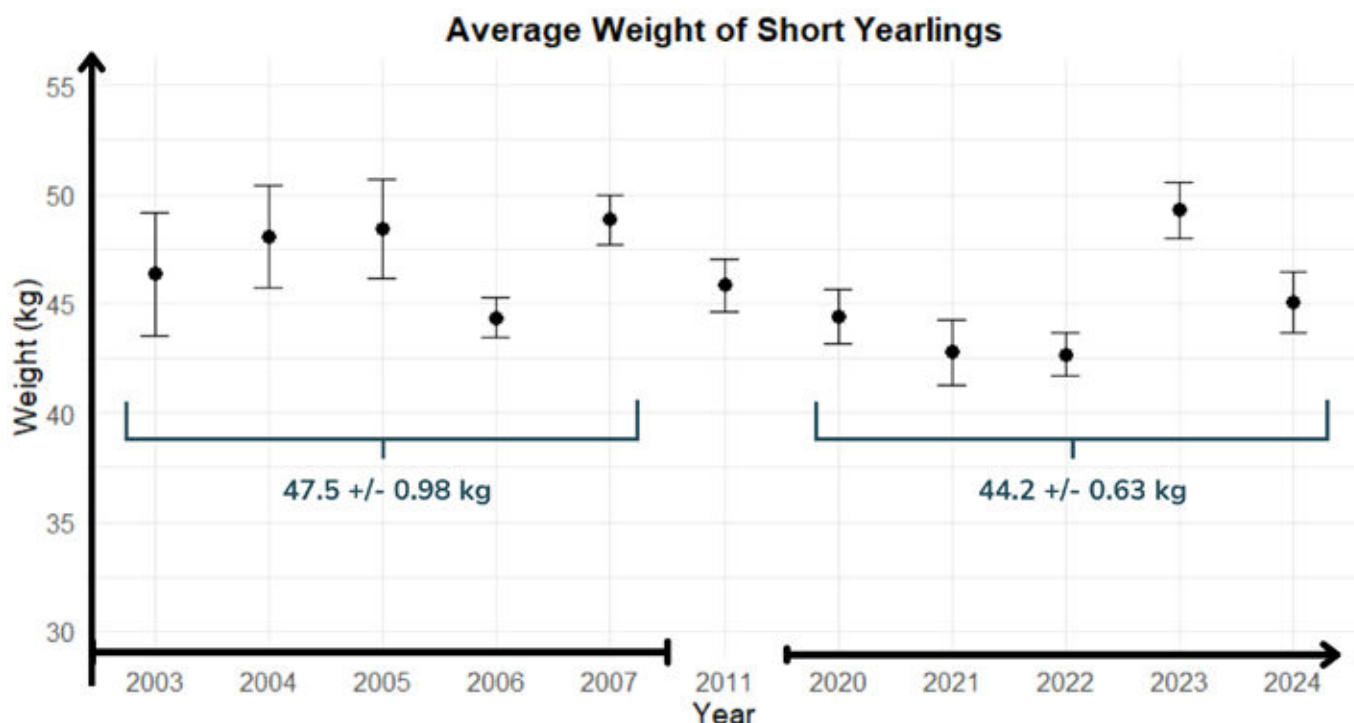
**Why do we measure this?** The weight of calves at nine months old is an indication of their health and reflects many other factors. These include the condition of the mother caribou the previous summer as well as during the winter before she gives birth, the quality of summer vegetation, and environmental conditions in the calf’s first fall and winter.

**How do we measure this?** During March, researchers capture caribou, weigh the nine-month-old female calves, and fit them with collars for ongoing monitoring.

**How often do we measure this?** Researchers will weigh short yearlings in the spring when they are putting collars on caribou. These measures began in the early 2000s and have been collected each year since 2020.

**What did we learn?** Calf weights have been lower since 2020 compared to the mid-2000s (2003-2007).

**What does this tell us about the herd?** The survival of caribou calves is directly influenced by their weight. When herd sizes are large, competition for high quality food increases, and the weight of calves is likely to decline. Reduced body condition may affect the age when caribou first have their calves. Lower weights measured over time may indicate decreases in juvenile caribou survival.







# *INDICATOR* Caribou Body Condition

Peter Maher

## Body Condition

**Why do we measure this?** Learning about caribou body condition helps us understand the overall health of animals in the Porcupine Caribou herd. Hunters submit samples and record and rate the body condition of the caribou they harvest. This helps us track the fatness of harvested caribou and what it means for herd health.

**How do we measure this?** Each year, hunters are asked to take samples from some of the caribou they harvest in the fall and measure the depth of backfat on the animals. Hunters can also rate the condition of caribou at that time of year relative to their long-term observations. Observations from hunters and other people on the land are also collected and incorporated into monitoring efforts.

**How often do we measure this?** Since 2001, a formal program has existed for hunters to submit samples and record the body condition of the caribou they harvest. Each year, hunters provide reports about the condition of caribou they have seen or harvested.

**What did we learn?** Too few samples were submitted to draw conclusions about overall condition, although personal communications with hunters indicated the caribou were not in great condition in fall 2023.

**What does this tell us about the herd?** In the fall and winter of 2023-2024, most of the Porcupine Caribou were not available for hunters in Canada. Some groups of caribou returned to the Yukon in mid-October, but few samples were collected. Caribou were available for community harvest as the winter progressed.



# *INDICATOR Habitat*

## Wildland Fires

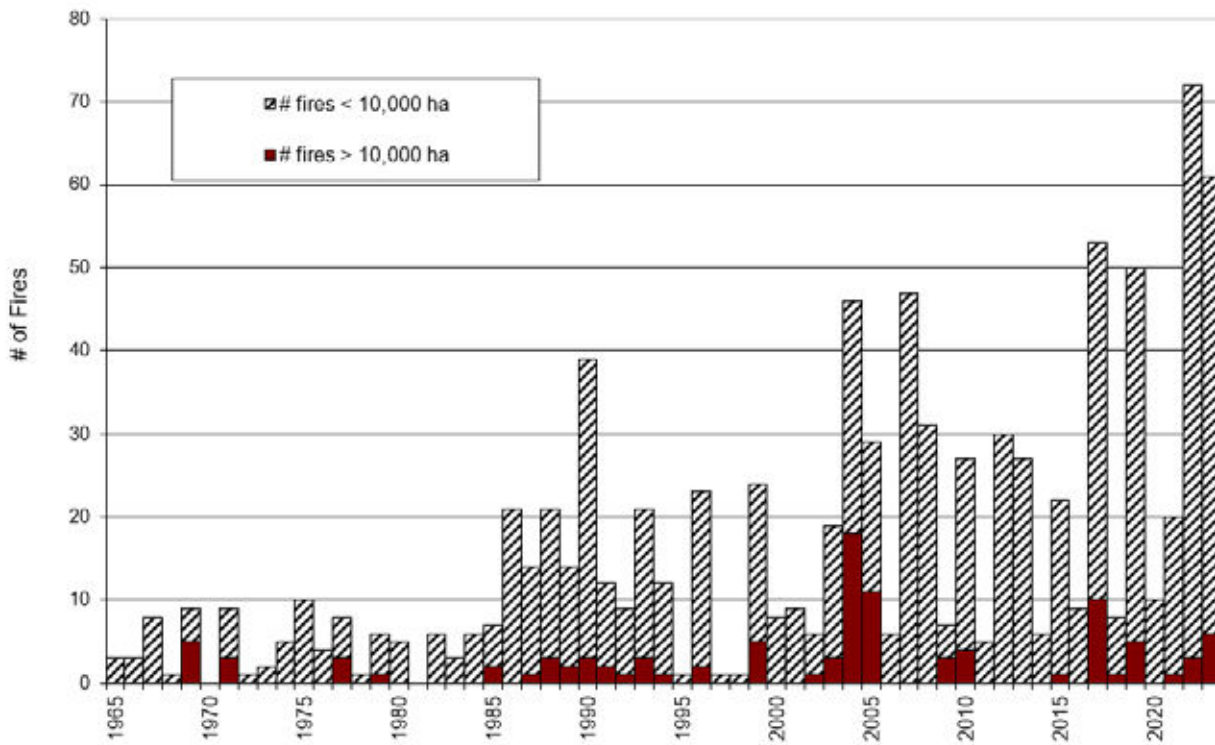
### **Why do we measure this?**

Wildfires affect the habitat of caribou. After a forest fire, lichen can take anywhere from around 40 to over 100 years to recover. Caribou tend to avoid large burned areas, especially during winter. We track wildfires to see how each year's fires affect the condition of the Porcupine Caribou herd's range.

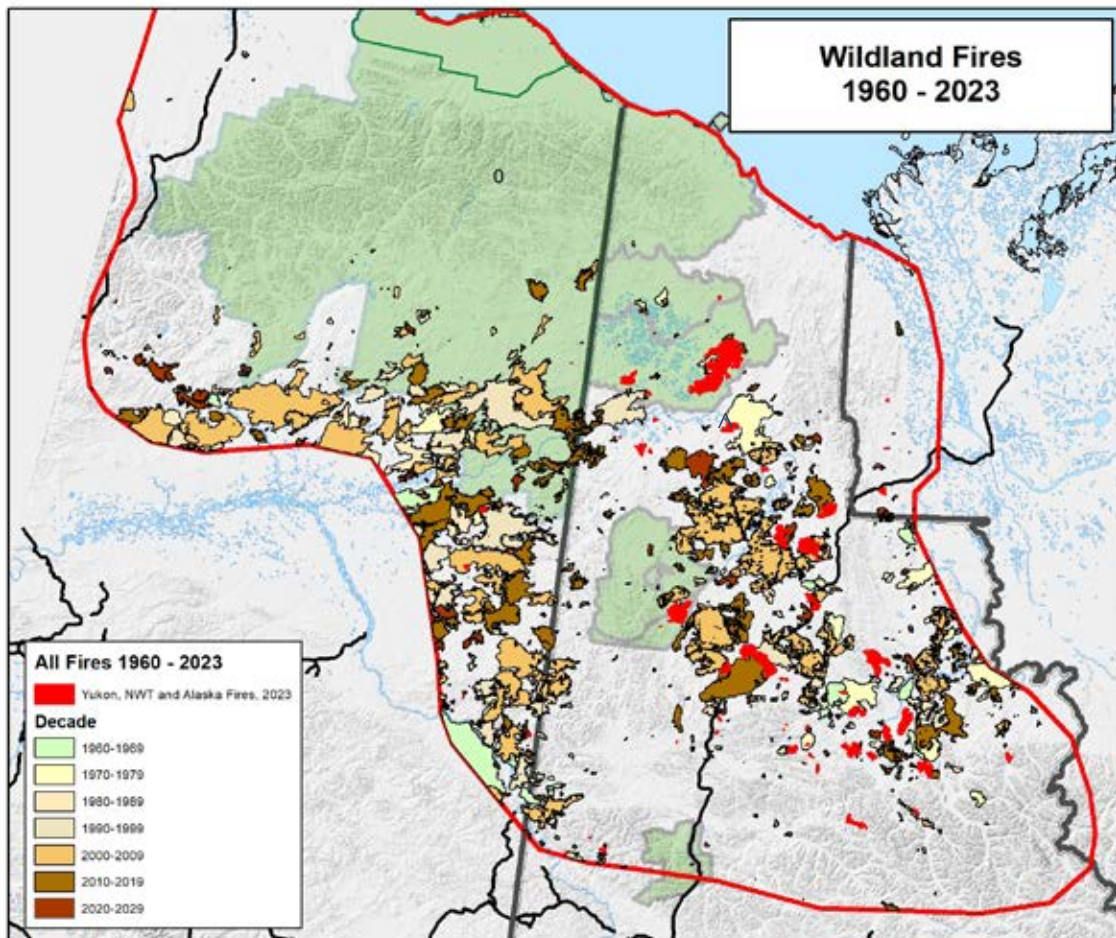
**How do we measure this?** We measure the total area burned and the number of wildfires each year. Wildfire data have been tracked across the herd's range since the 1960s, although mapping of fires has improved considerably over the past decade.

**How often do we measure this?** Every year, wildfire numbers and the extent of fires are compiled by fire management teams using data compiled from satellites and field teams.

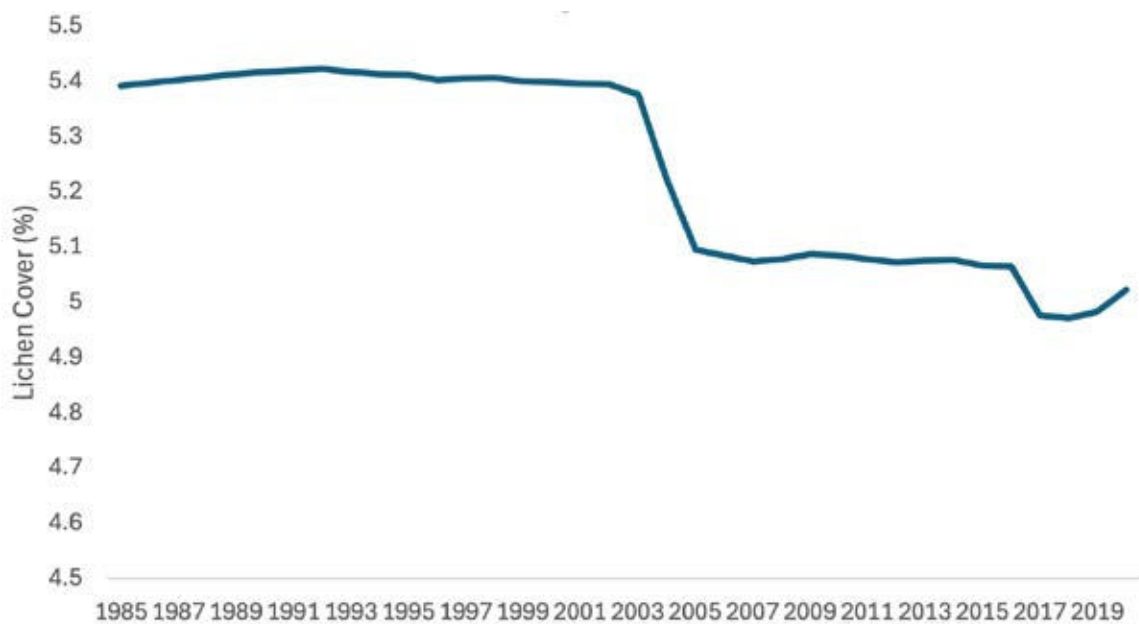
**What did we learn?** In 2023, about 2,250 square kilometers (km<sup>2</sup>) were burned by wildfires, which is above the 5-year average of 1,434 km<sup>2</sup>. There were 49 wildfires in the herd's range in the Yukon in 2023, 11 fires in Alaska and one in the NWT. Six of the Yukon fires in 2023 were considered large, burning a total of about 1,470 km<sup>2</sup>. The largest burn was on the eastern edge of the Old Crow flats, in tundra tussock habitat which is part of the herd's summer and winter range. The other large wildfires occurred in winter range areas. Wildfire map data for 2024 are not yet available, however the total number of fires in 2024 was significantly less than in 2023.



**FIGURE 6 |**  
 TOTAL NUMBER OF FIRES AND NUMBER OF LARGE WILDFIRES (GREATER THAN 1,000 SQUARE KILOMETERS) IN PORCUPINE CARIBOU HERD RANGE, BY YEAR



**FIGURE 7 |**  
 1960-2023 MAP OF WILDLAND FIRES



**FIGURE 8 | CHANGES IN LIGHT MACROLICHEN COVER ACROSS THE PORCUPINE CARIBOU CORE RANGE FROM 1985 TO 2020**

# Habitat



## Lichen Monitoring

### **Why do we measure this?**

Lichens are the primary food for caribou in winter. Climate changes to vegetation and wildfires may affect the availability and growth of lichen across the Porcupine Caribou herd's range.

**How do we measure this?** Researchers map lichen cover and total biomass (amount of lichen) across the landscape using satellite imagery. Mapping lichen allows us to track changes in the amount of lichen, as well as its distribution and availability to caribou in parts of their range.

**How often do we measure this?** Because the satellite imagery used starts in 1985, data is available describing changes in lichen since that time. Lichen mapping happens every 5 years. The next scheduled mapping of lichen imagery will be after the 2025 summer period. Once images are available, mapping and analyses will be done.

**What does this tell us about the herd?** Research has shown small decreases to the lichen cover and biomass across the herd's core range, and larger declines across the Yukon and Alaska more generally. Declines within the herd's core range have mostly been associated with a few significant fire years. As the frequency and severity of wildfires is expected to increase with climate change, we will continue to monitor lichen cover and mass as an indicator of the state of the caribou range.

**LINEAR DISTURBANCE:**

includes cut lines and trails, roads, and seismic lines that are cut across the landscape.



Peter Mather

Peter Mather

# Habitat

## Linear disturbance and human development footprint

**Why do we measure this?** Large patches of intact habitat are critical to caribou herds. Human activities in caribou habitat, particularly development activities, can impact the way caribou use their habitat and their seasonal movements at critical times, such as calving. Increased access to the herd's range can add to hunting pressures. Linear developments like cut lines and roads can help predators access caribou. Development also increases stress levels for caribou.

**How do we measure this?** Disturbance and development data is collected in NWT, Yukon and Alaska. Historical disturbance has been tracked through cumulative effects studies. Land use planners have evaluated historical disturbances and vegetation recovery.

**What did we learn?** There have been no major human development footprint changes across the Porcupine herd's range in recent years. Most prior development occurred before the 1980s. Three-dimensional-seismic work in the winter range cut around 2,000 km of seismic line in 2013-14. In late winter 2023, the Old Crow winter road (from Eagle Plains) was open to vehicles.

In November 2024, United States federal agencies completed a Supplemental Environmental Impact Statement for the Coastal Plains Oil and Gas Leasing Program in the 1002 area of the Arctic National Wildlife Refuge. No leases were sold during a sale in January 2025. However, the new Trump Administration has ordered additional leasing and expedited permits for oil and gas production in Alaska.

An application to do oil and gas work near Eagle Plains has also been received in the Yukon and is in a consultation process at this time.



Peter Mather

**What does this tell us about the herd?** If coastal plains oil and gas lease sales and development occur in Alaska, major new disturbances and footprint will occur within parts of the Porcupine Caribou calving, post-calving and summer ranges.



## *Habitat*

Peter Mather

### Snow Condition

#### **Why do we measure this?**

We study snow depth and hardness because when snow is deep or hardened by wind, caribou use more energy digging through it to ground lichens and moving around their habitat to find suitable conditions. Using a lot of energy can affect the caribou's body condition and reproductive capability. Climate changes impact snow depth, distribution, and condition, and monitoring these snow conditions is part of understanding climate change effects.

**How do we measure this?** The depth of the snow and its condition is measured at several permanent locations throughout the herd's range. Samples are taken to measure the density of the snow or snow/water equivalent. We are working on new measures of snow conditions using satellites to help us understand more about how snow affects the habitat selected by the caribou and to better understand snow conditions across the herd's range.

**How often do we measure this?** Snow condition measures have been taken from 17 locations in the Yukon since the 1970s. Snow is measured annually in most cases.

**What did we learn?** Eagle, Old Crow and North Slope regions were well above long-term averages for snow depth. The Eagle and Porcupine River areas recorded a record snowpack. Ogilvie was also above long-term average snow depth. The Porcupine Caribou herd wintered in Alaska in 2023-24, from the Dalton Highway to east of Arctic Village. Field observations reported snow depth in these areas as 40-50 cm on average, with deeper snow in meadows and rivers, and windswept ridges. A small band of caribou wintered in the Yukon in the north part of Fishing Branch Territorial Park. Snow density in all Yukon regions was above average.



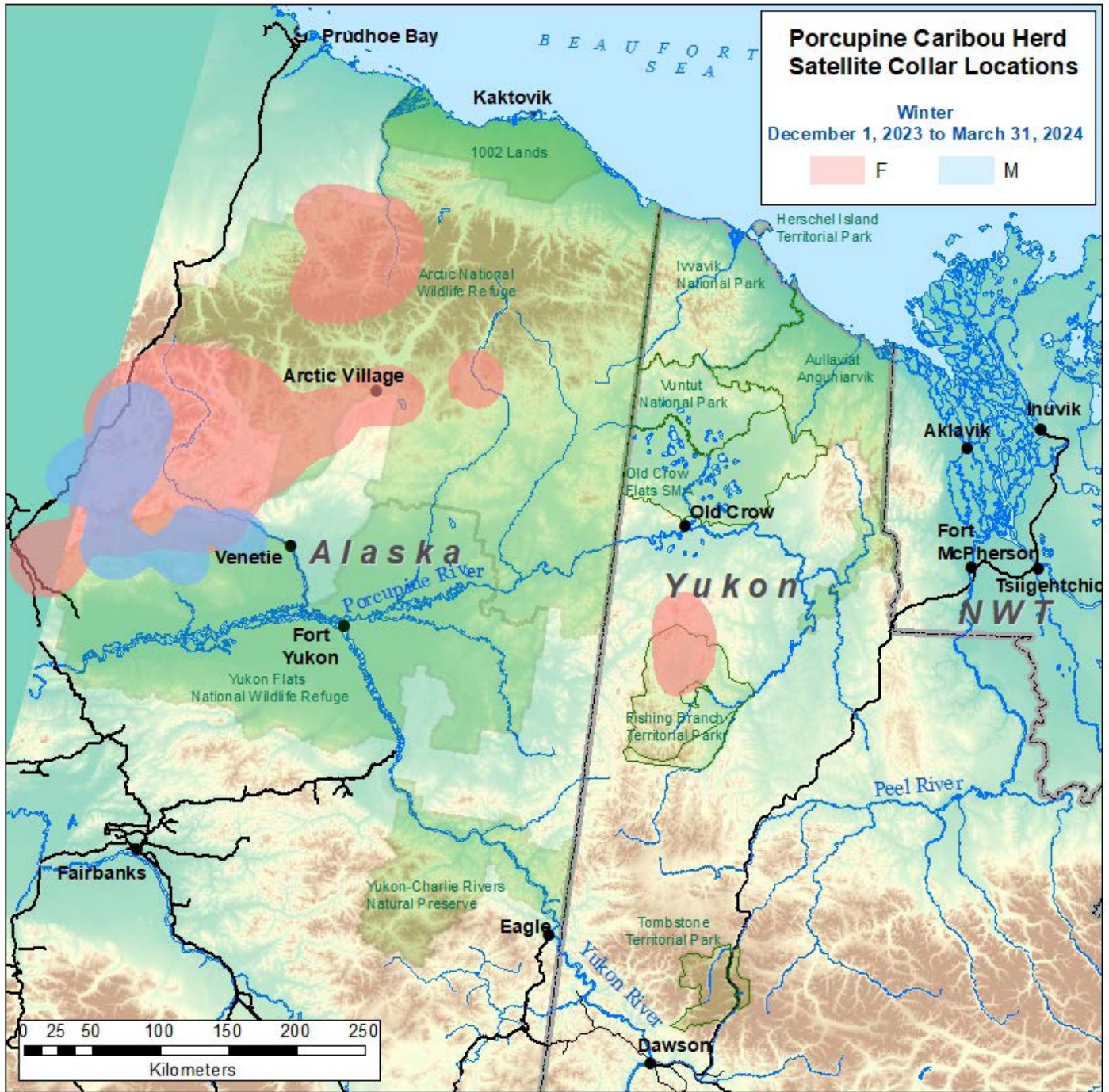


FIGURE 9 | WINTER DISTRIBUTION OF CARIBOU



## **The Porcupine Caribou herd is likely stable or slightly declining.**

### **What do our indicators tell us about what's next?**

In November 2024, the PCTC reviewed recent indicators, studies and reports to provide their technical opinion on the current status of the herd. Their findings indicate that the herd is no longer growing in size but is likely stable or slightly declining. As this report shows, several key herd indicators are lower than average, and some have been below average for more than one year. Taken together, this indicates a shift away from growth and towards a decreasing herd size. It will be important to watch the herd status indicators carefully and continue the current monitoring. Capturing a photocensus to update population size is a priority for all agencies.

Using all of the sources of information in this report along with Indigenous knowledge will yield the best understanding of the status of the herd.





Peter Mather

FOR FURTHER INFORMATION:

Porcupine Caribou Management Board | [dlemke@pcmb.ca](mailto:dlemke@pcmb.ca) | [pcmb.ca](https://pcmb.ca)