



Caribou Blueprint

Objective 1: Develop a cumulative impacts monitoring approach for barren-ground caribou

Background

Traditional and scientific knowledge suggest that barren-ground caribou herds have fluctuated widely in abundance over time scales of decades, although these fluctuations are not necessarily predictable in duration or extent. It is possible that the current low numbers and declining trends in several herds in the NWT are unprecedented and that climate change may be contributing to these trends. The listing of barren-ground caribou in 2016 by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) as Threatened, and a similar listing by the NWT Species at Risk Committee (SARC) in 2017 underscore the current vulnerability of these populations.

Management actions to conserve barren-ground caribou herds when they are at low numbers are generally directed at those factors that people have some control of; these can include harvest, human disturbances on the landscape, predator numbers, and to a limited extent, fire suppression. These actions may reduce caribou mortality rates (harvest or predator reduction) or minimize changes in caribou health and condition (limited disturbance). However, a number of other factors have been suggested as driving population trend in barren-ground caribou, such as changes in weather and range condition, and fire on the winter range. Participants at various meetings and hearings in recent years have accepted that the caribou declines are real, but have expressed a desire for a better understanding of the underlying drivers of change.

The GNWT and co-management partners believe that a regionally-based cumulative impact monitoring and research approach is necessary to assess human and natural factors that affect barren-ground caribou populations and their habitat, and to improve our understanding of their significance. Research is needed on how these factors may be linked to demographic indicators like adult survival, pregnancy rate, and calf survival. The influence of these factors will vary among herd ranges and within them.

A cumulative impact monitoring and research approach is necessary to determine how the effects of development combine with other factors, such as fire, predation, environmental variability, harvesting, wildlife, or climate change, to affect barren-ground caribou. This may include use of integrative models for an assessment of their relative importance and projections of likely future trends. Understanding the relative contribution of each factor and their systemic dynamics will help decision-makers to understand what factors most affect caribou, where information gaps remain, and where management efforts should be best focused.

Components of a cumulative impact approach for barren-ground caribou should include a comprehensive understanding of how NWT barren-ground caribou herds are doing in terms of size and trend, monitoring of key factors that affect caribou status and trend, combined with an understanding of how natural and human factors affect herd dynamics across their historic range. Currently, the GNWT has a lead role in demographic monitoring programs for five NWT barren-ground herds (Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, Bluenose-East, and Bathurst), with a supporting role in collaboration with Alaska and Yukon for the Porcupine herd, and Nunavut for the Beverly/Ahiak and Qamanirjuaq herds. The GNWT barren-ground caribou program was peer-reviewed in 2008-2009 and includes information on herd size and trend, calf recruitment, estimated cow survival, and fall sex ratio, and periodic monitoring of health, disease, and

condition. What is lacking is a full understanding of how factors such as fire, predation, environmental variability, harvesting, wildlife, or climate change affect the size and trend of the herds, including potential interactions among factors. NWT CIMP seeks to fill those gaps through monitoring and research.

NWT CIMP Funding Priorities

The **four** funding priorities for Objective 1 of the Caribou Blueprint are listed below.

- 1.1 Develop methods and approaches to calculate and track landscape metrics in barren-ground caribou range (e.g. amount of human and natural disturbance, type of disturbance including fire, human development, road access, and range condition). This includes considerations of scale, shape of disturbance, use of composite indicators, and ease of administration.
- 1.2 Identify species appropriate indicators, thresholds of disturbance, and actions and limits of acceptable change.
- 1.3 Determine the relative impact and relationships among human and natural factors that influence barren-ground caribou herd demographics and/or habitat, including:
 - a. Industrial activity/disturbance. For example:
 - i. standardize methods of current monitoring between industry and government
 - ii. innovative approaches to monitoring using remote sensing and emerging technologies
 - iii. identify potential mechanisms of zone of influence of development on caribou
 - iv. novel approaches to mitigate the effects of industry on caribou
 - v. measure habitat fragmentation and connectivity
 - b. Predation. For example:
 - i. changes in predator numerical and functional responses, and whether predators are limiting recovery of caribou herds
 - ii. abundance of predators
 - iii. predation rates on adult and calf caribou, and where and when these are most significant
 - c. Health, condition, and disease. For example:
 - i. measures of insect harassment and trends by season and year
 - ii. pregnancy rates over time
 - iii. caribou condition and changes over time
 - iv. incidence and prevalence of emerging pathogens and parasites, their causal factors, and significance to caribou demography
 - d. Range condition. For example:
 - i. habitat quality and/or quantity (e.g. vegetation classification, resource selection function models) over time
 - ii. seasonal changes in vegetation biomass and trends over time
 - iii. fire impacts on the winter range and likely trends in future
 - iv. changes in vegetation over time and relations to climate change
 - v. effects of snow conditions (depth, ice layers and timing of melt) on caribou

- vi. estimation of how changes in vegetation, climate and range conditions are affecting caribou
- e. Behaviour. For example:
 - i. activity budgets both within and outside development Zones of Influence (ZOI), and implications to caribou energetics and demography
 - ii. seasonal diets and feeding rates, and changes over time
- f. Harvest. For example:
 - i. accurate and complete reporting of harvest on all herds
 - ii. significance of harvest to declining herds, particularly in relation to increased road access

1.4 Integrate existing information on barren-ground caribou and their ranges:

- a. Collate historical monitoring data, including industry data and traditional knowledge, to determine if they can be used in regional cumulative impact assessments.
- b. Population modeling that integrates demographic data and assesses the impacts of various factors on population trend.
- c. Cumulative effects modeling that assesses effects of development and natural factors.
- d. Research that helps to explain current and recent demographic trends in barren-ground caribou herds.

Objective 2: Develop a cumulative impact monitoring approach for boreal caribou

Background

Boreal caribou are a priority Valued Component that are listed as threatened under the federal Species at Risk Act and under the Species at Risk (NWT) Act. Local studies indicate that boreal caribou in the northern NWT may be self-sustaining, while those in the southern NWT may be declining.

Declines in the southern NWT may be attributed to the cumulative impact of human and natural disturbance on the landscape, which, based on extensive research in southern Canada, increases predation pressure on boreal caribou. Based on the National Recovery Strategy for Woodland Caribou, boreal population in Canada, maintaining or recovering boreal caribou requires that at least 65% of boreal caribou range remain free of human or natural disturbances. As defined in the Strategy, disturbed habitat is habitat showing i) anthropogenic disturbance (e.g. linear features) visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the disturbance and ii) fire disturbance for the last 40 years. As of fall 2015, roughly 34% of boreal caribou range in the NWT is considered disturbed. Most disturbances are driven by fire (28%), although there is some human disturbance as well (8%).

There are concerns about how fire, in combination with new human development, such as commercial timber harvesting in the South Slave region, oil and gas exploration and development in the Sahtú region, and major

infrastructure projects such as the Mackenzie Valley Highway and Tłı̄chǫ all-season road, will impact boreal caribou across their NWT range.

The GNWT and Environment and Climate Change Canada believe that regionally-based cumulative impact monitoring approaches are necessary to assess and monitor how human and natural factors affect the size and trend of the NWT's boreal caribou population. Knowing this will help decision makers to understand what management actions are most crucial in order to protect boreal caribou. For example, this information can be used as inputs in cumulative impact models that can help guide management actions related to land use activities and fire management.

A cumulative impacts monitoring approach for the NWT's boreal caribou population requires a comprehensive understanding of how the population is doing in terms of size and trend, combined with an understanding of how natural and human factors drive population dynamics across its range, as well as an understanding of the landscape and how changes to the landscape affect how caribou use it. This first requires establishment of robust approaches to monitoring boreal caribou across their range. It also requires more information on those natural and human factors that affect population size and trends in the NWT.

NWT CIMP Funding Priorities

The funding priorities for Objective 2 of the Caribou Blueprint are listed below.

- 2.1 Contribute to the establishment of standardized monitoring methods that provides robust information on boreal caribou population size or trends across its range in NWT;
- 2.2 Improve understanding of boreal caribou population structure, gene flow and connectivity both within the NWT range and with neighbouring ranges;
- 2.3 Contribute to the establishment of a comprehensive, regionally-based cumulative impacts monitoring approach that tracks local boreal caribou population trends and those human and natural factors that affect them;
- 2.4 Calculate and track landscape metrics in the boreal caribou range (e.g. amount of human and natural disturbance within the range, including fire, development, hunting access and other human activities);
- 2.5 Determine rates of forest regeneration following fire or human disturbance in boreal caribou range;
- 2.6 Improve and update land cover and habitat maps;
- 2.7 Improve understanding of boreal caribou behaviour, including habitat selection, foraging and movement;
- 2.8 Determine when disturbed habitat (human or natural) becomes functional again for boreal caribou and forecast future landscape condition;
- 2.9 Improve our understanding of, or project the implications of, climate change on processes affecting boreal caribou habitat supply and boreal caribou population dynamics; and

2.10 Determine the impact and relationships between a number of human and natural factors that influence boreal caribou demographics and/or habitat. For example:

- a. Fire
- b. Predation
- c. Alternative Prey
- d. Health, condition, and disease
- e. Climate change
- f. Harvest, including the impacts of increased access
- g. Range condition - habitat and forage quality and/or quantity
- h. Development within the historic range of the herd – including both physical and functional habitat loss

2.11 Synthesize existing information on boreal caribou and its range by:

- a. Collating historical monitoring data, including industry data and Traditional Knowledge, to determine if they can be used in a regional cumulative impact assessment for boreal caribou; and
- b. Identifying ways that past and current monitoring conducted by communities, industry and government can be standardized in methodology to improve population scale knowledge in the long term.