

MANAGEMENT PLAN FOR NORTHERN MOUNTAIN CARIBOU

in the Northwest Territories

Adoption of the Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada



SPECIES AT RISK (NWT) ACT

Management Plan and Recovery Strategy Series 2023

For copies of the management plan or for additional information on Northwest Territories (NWT) species at risk, please visit the NWT Species at Risk website (www.nwt-speciesatrisk.ca).

Recommended citation: Conference of Management Authorities. 2023. Management Plan for Northern Mountain Caribou in the Northwest Territories: Adoption of the Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada. Conference of Management Authorities, Yellowknife, NT.

© Government of the Northwest Territories on behalf of the Conference of Management Authorities.

All rights reserved.

ISBN: 978-0-7708-0297-4

Content (excluding the illustrations) may be used without permission, with appropriate credit to the source.

Cover illustration: Northern mountain caribou, Norman Barichello

What is the *Species at Risk (NWT) Act*?

The *Species at Risk (NWT) Act* (the Act) provides a process to identify, protect, and recover species at risk in the NWT. The Act applies to any wild animal, plant, or other species for which the Government of the Northwest Territories has management authority. It applies everywhere in the NWT, on both public and private lands, including private lands owned under a land claims agreement.

What is the Conference of Management Authorities?

The Conference of Management Authorities (CMA) was established under the Act and is made up of the wildlife co-management boards and governments in the NWT that share responsibility for the conservation and recovery of species at risk in the NWT (referred to as 'Management Authorities'). The purpose of the CMA is to build consensus among Management Authorities on the conservation of species at risk and to provide direction, coordination, and leadership with respect to the assessment, listing, conservation and recovery of species at risk while respecting the roles and responsibilities of Management Authorities under land claim and self-government agreements. The CMA develops consensus agreements on listing species at risk, conservation measures, management plans and recovery strategies. The Conference also reviews management plans and recovery strategies every five years and reports on progress toward meeting objectives. Only Management Authorities that have jurisdiction for a species are involved in making decisions.

What is a species of Special Concern?

Under the Act, a species of Special Concern is a species that may become Threatened or Endangered in the NWT because of a combination of biological characteristics and identified threats. A management plan must be completed for species of Special Concern within two years of the species being added to the NWT List of Species at Risk.

What is a management plan?

Under the Act, a management plan is a document that recommends objectives for the conservation of a species of Special Concern. It also recommends approaches to achieve those objectives. It includes a description of threats and positive influences on the species and its habitat.

Under the *Accord for the Protection of Species at Risk (1996)*, the federal, provincial and territorial governments agreed to work together on legislation, programs and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, Environment and Climate Change Canada has given permission to the Conference of Management Authorities to adopt the *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*¹ under Section 63 of the *Species at Risk (NWT) Act*. The Conference of Management Authorities has included a Northwest Territories addition (Part 1) which completes the *Species at Risk (NWT) Act* requirements for this management plan.

This management plan consists of two parts:

1. Part 1 – Northwest Territories addition to the *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*, prepared by the Conference of Management Authorities
2. Part 2 – *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*, prepared by Environment and Climate Change Canada

PREFACE

This *Management Plan for Northern Mountain Caribou in the Northwest Territories* (management plan) has been prepared by the Management Authorities responsible for northern mountain caribou (woodland caribou [northern mountain population]) (*Rangifer tarandus caribou*), in accordance with the *Species at Risk (NWT) Act*. This management plan will guide management of northern mountain caribou in the Northwest Territories (NWT).

It is important to clarify when discussing caribou “management” that for the most part, this is not a discussion about managing caribou, but rather about managing human activities to support caribou and caribou habitat.

This management plan constitutes advice to:

- Jurisdictions with management and guardianship responsibilities for northern mountain caribou and their habitats;
- All potential partners or organizations whose activities may impact northern mountain caribou or their habitats, including industry, communities, and individuals; and
- Organizations that play a role in influencing the extent to which northern mountain caribou are impacted by human activities, including community organizations, co-management boards, environmental assessment and regulatory bodies, and environmental non-government organizations.

Section 63 of the *Species at Risk (NWT) Act* allows the Conference of Management Authorities to incorporate into a management plan all or part of an existing plan prepared by any person or body. This management plan adopts the federal *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*,¹ which outlines the overall goals, objectives, and approaches for northern mountain caribou management across the NWT. This management plan also includes a Northwest Territories addition which presents additional information that is not included in the federal plan and points to the Sahtú community-led plan (*Níó Nę P'ęnę Begháré Shúhta Goęepę Nareh?á – Trails of the Mountain Caribou Management Plan*)² as an important regional initiative that gives advice on how to conserve caribou in the area of the Sahtú that is covered by the management plan.

This approach recognizes and supports the good work that has already been completed, and that is underway, to plan for northern mountain caribou conservation in the NWT. This will allow more time and resources to be focused on the implementation of northern mountain caribou conservation actions rather than developing a new management plan. This management plan applies to all northern mountain caribou subpopulations that occur either entirely or partially in the NWT.

This management plan consists of two parts:

1. Part 1 – Northwest Territories addition to the *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*, prepared by the Conference of Management Authorities
2. Part 2 – *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*, prepared by Environment and Climate Change Canada

Under subsection 61(9) of the *Species at Risk (NWT) Act*, four sections are required in an NWT management plan:

1. A description of existing and potential threats to the species and its habitat;
2. A description of existing and potential positive influences on the species and its habitat;
3. Recommendations on objectives for the management of the species; and
4. Recommended approaches to achieve those objectives.

Three out of the four required sections are found in the federal management plan. Information on threats, goals and objectives, as well as recommended approaches to achieve those goals can be found in section 1.5 and section 2 of the federal management plan. The missing requirement (description of positive influences on the species and its habitat) is included in Part 1 of this management plan. The Conference of Management Authorities also chose to add information about community-led planning and knowledge gaps, and to refer to the NWT Species at Risk Committee's 2020 *Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories*³ for updated information specific to the NWT. Adopting the federal management plan with these additions will meet the requirements under the *Species at Risk (NWT) Act*.

This management plan does not commit any party to actions or resource expenditures; implementation of this plan is subject to the appropriations, priorities and budgetary constraints of the participating Management Authorities.

Success in the management of northern mountain caribou depends on the commitment and cooperation of the many groups who will be involved in implementing the approaches set out in this plan and cannot be achieved by the Management Authorities or any other group alone. All NWT residents and others who use NWT lands and waters are encouraged to join in supporting and implementing this plan for the benefit of northern mountain caribou, communities that have traditionally relied on northern mountain caribou, and NWT society as a whole.

ACCEPTANCE STATEMENT

The Gwich'in Renewable Resources Board, ɔ́ehdzo Got'ıneᑦ Gots'ę́ Nákedı (Sahtú Renewable Resources Board) and Government of the Northwest Territories accepted Part 1 and adopted Part 2 of this management plan on April 28, 2023, through a Conference of Management Authorities consensus agreement under the *Species at Risk (NWT) Act*.

ACKNOWLEDGEMENTS

Development of the Northwest Territories Management Plan

Preparation of this plan was funded by Environment and Climate Change (ECC). We would like to thank the Species at Risk Secretariat for addressing the requirements of a management plan, as required by the *Species at Risk (NWT) Act*. The principal preparers of this management plan were Mélanie Routh and Joslyn Oosenbrug (Species at Risk Implementation Specialists) and Michele Grabke (Species at Risk Implementation Supervisor).

Background information in Part 1 of this document is summarized from the NWT Species at Risk Committee's (SARC) 2020 *Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories*.³ To avoid repetitive citations, it can be assumed that the information was taken from this report unless another reference is given. We would like to thank SARC for its work on this detailed and extensive assessment of the status of northern mountain caribou in the NWT.

We also thank the many individuals and organizations who reviewed and provided input on earlier drafts, which significantly improved the management plan:

- Gwich'in Renewable Resources Board
- Ɂehdzo Got'ıne Gots'ę Nákedı (Sahtú Renewable Resources Board)
- Wek'èezhıı Renewable Resources Board
- Government of the Northwest Territories
- Acho Dene Koe First Nation
- Everyone who provided comment through engagement and consultation

In particular, the Conference of Management Authorities would like to thank Deborah Simmons, Executive Director for Ɂehdzo Got'ıne Gots'ę Nákedı (Sahtú Renewable Resources Board), for her many contributions to the SARC status report, this management plan and to wildlife conservation in the Sahtú region. Deb was a dedicated and passionate advocate for the resurgence and revitalization of Dene Kedə (language) and Dene Ts'ııı (ways of life) and the right of Indigenous people of the Sahtú region to manage their own resources. She was integral to the development of the caribou conservation plans *Belare wıle Gots'ę Ɂekwę – Caribou for All Time* and *Nıo Ne P'ęne Begháre Shúhta GoɁepę NarehɁá – Trails of the Mountain Caribou Management Plan* and worked tirelessly to bring the Shúhtaot'ıne people together to support shúhta goɁepé/bedzih / gūdzjh hé (the health of mountain caribou) on both sides of the Yukon/NWT border.

Development of the Federal Management Plan

We are grateful to the many agencies, jurisdictions and organizations that were involved in the development of the federal management plan for northern mountain caribou:

- Environment Canada
- Parks Canada Agency
- Government of Yukon
- Government of British Columbia
- Government of the Northwest Territories
- Yukon Fish and Wildlife Management Board
- Ɂehdzo Got'ıne Gots'ę Nákedi (Sahtú Renewable Resources Board)
- Gwich'in Renewable Resources Board

The federal management plan was drafted through an inclusive process whereby the responsible agencies and jurisdictions invited participation from all governments and First Nations within the range of the northern mountain caribou. A technical team (the Technical Working Group) with expert knowledge researched and drafted the management plan while receiving guidance and assistance from a steering committee (the Steering Committee) comprised of representatives from responsible agencies, jurisdictions and governments. A subgroup of the Steering Committee (the Co-chairs Committee) was responsible for coordination, ensuring the most inclusive and timely process possible. After the draft management plan was completed, formal consultations occurred with all governments, boards and agencies within the range of northern mountain caribou. A complete list of participants in the Technical Working Group and Steering Committee is found in Appendix 1 of the federal management plan.

TABLE OF CONTENTS

PREFACE	3
ACCEPTANCE STATEMENT	5
ACKNOWLEDGEMENTS.....	6
TABLE OF CONTENTS.....	8
EXECUTIVE SUMMARY	9
PART 1 – NORTHWEST TERRITORIES ADDITION TO THE <i>MANAGEMENT PLAN FOR THE NORTHERN MOUNTAIN CARIBOU POPULATION OF WOODLAND CARIBOU (RANGIFER TARANDUS CARIBOU) IN CANADA</i>	13
1. <i>UPDATED INFORMATION FOR THE NWT</i>	13
2. <i>COMMUNITY-LED CONSERVATION</i>	13
3. <i>FACTORS THAT MAY HAVE A POSITIVE INFLUENCE</i>	14
4. <i>KNOWLEDGE GAPS</i>	17
5. <i>NEXT STEPS</i>	18
6. <i>REFERENCES</i>	20
APPENDIX A – PLANNING PARTNERS	21
APPENDIX B – GUIDING PRINCIPLES	23
PART 2 – <i>MANAGEMENT PLAN FOR THE NORTHERN MOUNTAIN POPULATION OF WOODLAND CARIBOU (RANGIFER TARANDUS CARIBOU) IN CANADA</i>.....	25

EXECUTIVE SUMMARY

Northern mountain caribou were added to the NWT List of Species at Risk as a species of Special Concern in July 2021 under the *Species at Risk (NWT) Act*, owing to their vulnerability to climate change and human disturbance. Species listed as Special Concern require a management plan within two years of listing. This *Management Plan for Northern Mountain Caribou in the Northwest Territories* was prepared by the Conference of Management Authorities and is designed to meet this requirement under the *Species at Risk (NWT) Act*. The management plan emphasizes collaboration among co-management boards, Indigenous governments and Indigenous organizations, territorial/provincial/federal governments, and communities.

This management plan adopts the federal *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada*, which outlines the overall goals, objectives and approaches for northern mountain caribou management. This management plan also includes an NWT addition which presents more information on positive influences, community-led planning and knowledge gaps that is not included in the federal plan and refers to the *2020 Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories*³ for updated information on northern mountain caribou in the NWT.

Species Information

Northern mountain caribou are a distinct population of woodland caribou. In the NWT, they are found almost exclusively in the Mackenzie Mountains (Figure 1). There are 36 subpopulations of northern mountain caribou in western Canada (in British Columbia, NWT and Yukon; referred to as *herds* in the federal Management Plan). Of these, six subpopulations reside partially or entirely in the NWT: Bonnet Plume, Redstone, Tay River, South Nahanni, Coal River and La Biche. Most individuals undergo long distance migrations up to 250 kilometres between their winter and summer ranges, while some individuals remain close to their winter ranges all year round. During calving, females are highly dispersed in the Mackenzie Mountains where they use subalpine open woodland, spruce lichen woodland, subalpine shrubland and alpine habitats. Northern mountain caribou are of cultural and subsistence importance to the Nahᓃᓴ Dehé Dene and other Dehcho First Nations, Acho Dene Koe First Nation, Shúhta Dene, Teetł'it Gwich'in and Gwichya Gwich'in—although the use of northern mountain caribou was disrupted several generations ago in the Gwich'in region. Dene tend to see themselves as part of the land and draw very strong connections between the health of people, the health of caribou, and the health of the land.

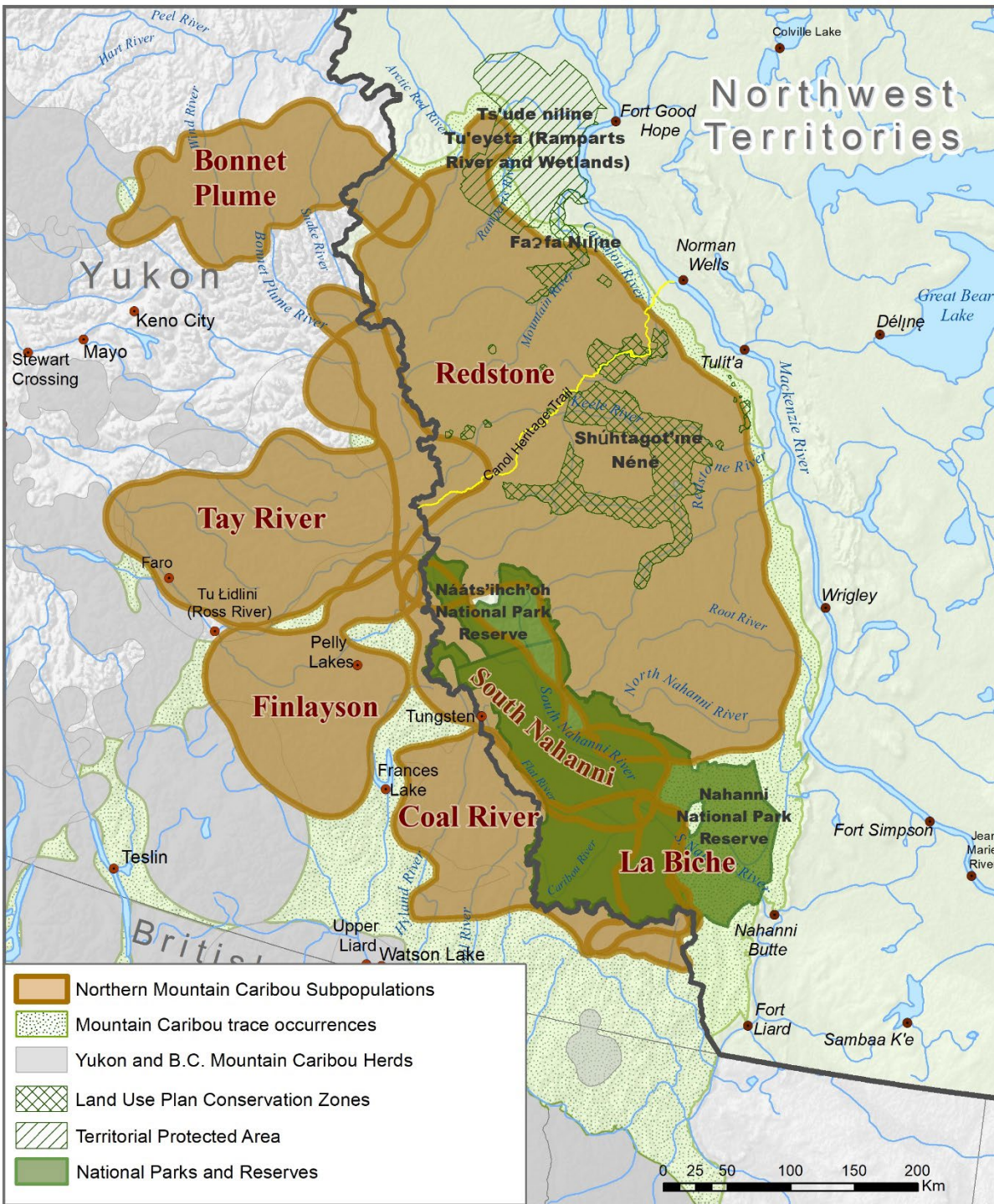


Figure 1. Distribution of northern mountain caribou in the NWT and current protected and conservation areas within their range. Caribou range data from GNWT (R. Gau, N. Larter, R. Popko), Government of Alberta (L. Neufeld, D. Hervieux, D. Cichowski), Government of BC (D. Seip, T.M. Williams), and Government of Yukon (T. Hegel, K. Russell). Map courtesy of B. Fournier/Nick Wilson, GNWT (2023).

Threats and Positive Influences

Northern mountain caribou are vulnerable to the effects of climate change. Ice patches, used to escape insects and cool down in the summer, are declining noticeably in the Mackenzie and Selwyn Mountains. These habitat areas are considered critical for northern mountain caribou. Other potential threats include overharvesting, recreation activities, resource development and disrespectful harvesting behaviour. Although most human-caused stressors are localized, they are expected to result in measurable negative impacts in some parts of the range, including within the calving and summer range of the Redstone subpopulation, the largest subpopulation in the NWT.

The remote and undisturbed nature of the Mackenzie Mountains, as well as a relatively low predation rate, are significant positive influences on northern mountain caribou in the NWT. Protected areas (Nahanni and Nááts'íhch'oh National Park Reserves and Ts'udé Niljné Tuyeta Territorial Protected Area) and conservation zones (Shúhtagot'ine Néné [Mountain Dene Land] and Faʔfa Niljne [Mountain River Extension]), which help to preserve northern mountain caribou habitat in the NWT, are another major positive influence.

Knowledge Gaps

Most subpopulation estimates for northern mountain caribou are outdated and population trend is unknown for most subpopulations and for the NWT population as a whole. Further investigation is needed for subpopulation and genetic structure of northern mountain caribou using the northern portion of the Mackenzie Mountains, range boundaries, documentation of key caribou habitats (e.g. calving and summer ranges), rate of wolf predation and wolf densities, effects of industrial development and climate change on northern mountain caribou and its habitat, as well as improved harvest information from Indigenous and non-Indigenous hunters.

Management Goals and Objectives

The overall goal of the adopted federal *Management Plan for the Northern Mountain Caribou Population of Woodland Caribou (Rangifer tarandus caribou) in Canada* is to prevent northern mountain caribou from becoming Threatened or Endangered, by having responsible agencies cooperatively work together to carefully manage these caribou and their habitat.

The management plan seeks to accomplish this goal by achieving the following results:

1. Populations of each northern mountain caribou subpopulation are maintained or recovered, such that the population operates within its natural range of variability;
2. Ecological integrity of key habitats and ecosystems required by northern mountain caribou are maintained; and
3. Stewardship of northern mountain caribou and its habitat are promoted among Indigenous governments and organizations, co-management boards, government agencies, and other interested parties.

Eight management objectives are recommended in the management plan, as well as 17 recovery measures and associated priorities and timelines. Progress toward achieving these objectives will be evaluated at least every five years.

The plan recommends the following objectives:

1. Determine subpopulation status and trends over time.
2. Manage harvest for sustainable use.
3. Assess health risks and maintain caribou health.
4. Understand the dynamics of predator-prey systems and potential competition with other herbivores.
5. Identify and assess the quality, quantity, and distribution of important habitats.
6. Manage and conserve important habitats to support caribou subpopulations.
7. Promote conservation of northern mountain caribou through environmental and cumulative effects assessments.
8. Foster opportunities to share knowledge and information, as well as develop education and stewardship programs.

Community-led and Regional Planning

In addition to the adopted management plan, community-led plans provide advice on northern mountain caribou stewardship in the Mackenzie Mountains and beyond the NWT borders in Yukon and British Columbia.

The Sahtú community-led plan (*Níó Nę P'ęnę Begháré Shúhta Go?epę Nareh?á – Trails of the Mountain Caribou Management Plan*) aims to achieve healthy communities and healthy caribou within the Shúhtaot'Inę, Métis and Tu Łidlini (Ross River) Dena territory in the Yukon and NWT. Regional land use plans in the Sahtu and Gwich'in Settlement Areas provide direction on where certain activities can take place. A land use plan is also being finalized for the Dehcho region. Where caribou management objectives are integrated into regional land use plans, land use plans may support habitat protection and conservation through the application of zoning and other development conditions.

PART 1 – NORTHWEST TERRITORIES ADDITION TO THE MANAGEMENT PLAN FOR THE NORTHERN MOUNTAIN CARIBOU POPULATION OF WOODLAND CARIBOU (RANGIFER TARANDUS CARIBOU) IN CANADA

1. UPDATED INFORMATION FOR THE NWT

Updated information on northern mountain caribou in the NWT can be found in the Species at Risk Committee's 2020 *Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories*.³ This document includes extensive information from scientific knowledge and Indigenous and community knowledge up to 2020—an additional eight years of information since the publication of the federal management plan. The status report includes information about population, distribution, habitat, biology, interactions, threats and limiting factors, positive influences, as well as the cultural and spiritual importance of northern mountain caribou to Indigenous peoples of the Mackenzie Mountains. **This NWT management plan (Part 1 and Part 2) should be consulted together with the 2020 Species Status Report for a full discussion of northern mountain caribou status and management in the NWT.**

2. COMMUNITY-LED CONSERVATION

Shúhtaot'Inę, Métis, Tu Łidlini (Ross River) Dena, Nahᓇᓴ Dehé Dene, Acho Dene Koe and other Indigenous knowledge holders in the Yukon and NWT have been drawing attention to northern mountain caribou conservation issues in the Mackenzie Mountains for many years. In 2017, a working group including delegates from Tulít'a, Norman Wells and Tu Łidlini, as well as co-management, government and non-governmental partners, drafted the *Nío Nę P'ęᓇᓇ Begháré Shúhta Goᓇᓇᓇ Narehᓇá – Trails of the Mountain Caribou Management Plan*.²

The plan provides a collaborative approach and process for caribou conservation and stewardship. Rooted in Dene values, principles and knowledge, it aims to achieve healthy communities and healthy caribou through five main program areas addressing nine objectives (Figure 2).

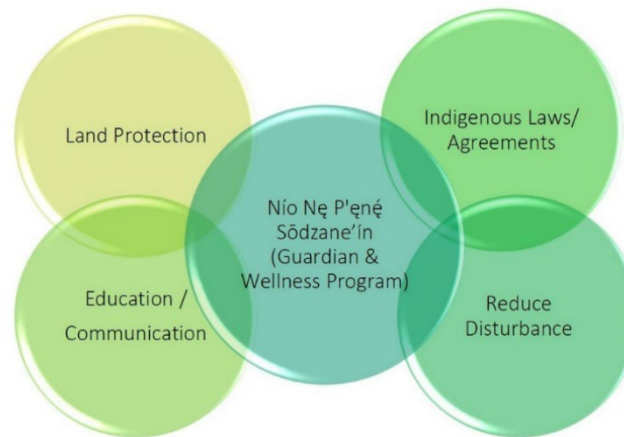


Figure 2. Five main program areas identified in the Nío Nę P'ęę Begháré Shúhta Goṛepé Narehʔá – Trails of the Mountain Caribou Management Plan.

The management plan's vision is:

- Shúhtaot'ıne, Métis and Tu Łidlini Dena continue to peacefully co-exist with shúhta goṛepé / bedzih / gūdzih (northern mountain caribou) in an ecologically diverse and healthy mountain landscape as they have for thousands of years.
- Shúhtaot'ıne, Métis, and Tu Łidlini Dena are travelling, harvesting, sharing and gathering throughout their territory, keeping Dene kədə / k'e (language), Dene ts'ılı / Dene k'e (ways of life), and Dene ʔeʔa / a' nīzīn (law / respect) strong.

Nío Nę P'ęę Begháré Shúhta Goṛepé Narehʔá – Trails of the Mountain Caribou Management Plan evolved through extensive community engagement. The current draft is being implemented through research and work towards the creation of the proposed Tu Łidlini and Nío Nę P'ęę Indigenous Protected and Conserved Area.

Community-based efforts to promote the conservation and wise use of northern mountain caribou are occurring in other parts of the range as well. For example, in Yukon, the Tu Łidlini (Ross River) Dena Council developed a harvest regulation protocol and took an educational approach to working with visiting harvesters to reduce pressure on caribou populations in their territory.⁴

3. FACTORS THAT MAY HAVE A POSITIVE INFLUENCE

The greatest positive influences on northern mountain caribou in the NWT are the remote and undisturbed nature of a large portion of its range, and the relatively low predation rate.

Although there are industrial activities in the Mackenzie Mountains, these activities are occurring or have occurred along the periphery of the northern mountain caribou range, leaving large areas of undisturbed and inaccessible land. This is in contrast to the

southern range in British Columbia, where northern mountain caribou face significant threats from altered predator-prey interactions caused by extensive habitat change from industrial activities. Large mammals such as moose and deer provide alternate prey for predators such as wolves and grizzlies, which also prey on caribou. However, there are relatively low densities of these species in northern mountain caribou range in the NWT.

Habitat Protection

Habitat protection for northern mountain caribou in the NWT is currently provided through three existing protected areas established under the NWT *Protected Areas Act* and the Canada *National Parks Act*, two larger and several smaller conservation zones established through regional land use planning that cover a total area of more than 55,000 km². These areas include much of the South Nahanni, Coal River and La Biche ranges and part of the Redstone range of northern mountain caribou (see Figure 1).

The Shúhtagot'ine Néné Conservation Zone protects important migration routes, calving grounds, and rutting/wintering grounds for the Redstone and Bonnet Plume subpopulations. The Farfa Nil̄ne Conservation Zone is along the Bonnet Plume migration path and is part of its general habitat. The entire Nááts'ı̄hch'oh National Park Reserve and most of Nahanni National Park Reserve are northern mountain caribou habitat. These National Park Reserves protect the calving grounds of the South Nahanni subpopulation and important habitat for the Redstone subpopulation. Other proposed protected or conservation areas may offer additional future protection if implemented. For example, the *Nío Nę P'ęnę Begháré Shúhta Goꝑepę Narehꝑá – Trails of the Mountain Caribou Management Plan* envisions working towards the creation of Tu Łidlini and Nío Nę P'ęnę as an Indigenous Protected and Conserved Area.

Doi T'oh Territorial Park/Canol Heritage Trail is also proposed under the NWT *Territorial Parks Act*. In 2007, the *Doi T'oh Territorial Park and CANOL Heritage Trail Management Plan*⁵ was approved by the NWT Minister of Industry, Tourism and Investment. Implementation of this management plan awaits transfer of responsibility from federal to territorial jurisdiction pending an extensive cleanup of contaminated sites.

Remediation Along the Canol Trail

Remediation activities of the CANOL Heritage Trail have been undertaken to address environmental and human health concerns, including risks to caribou. The Doi T'oh Territorial Park Corporation led a three-year wire clean-up program, funded by the Government of the Northwest Territories and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), that was completed in 2017. During the cleanup, 80 tons of copper-coated steel wire was cut, coiled and securely stored at transfer locations. Other remnants of the pipeline's construction and operation were removed or consolidated, including oil tanks, buildings and bridges in disrepair, debris, contaminated soil, and rusted machinery. By August 2019, the Canol Trail Remediation Project had cleaned up 31 additional sites of concern along the Canol Trail, from Mile 24 to the Yukon border. More information on this work can be found on the CIRNAC webpage for the [Canol Trail Remediation Project](#).

Land Use Planning

The Gwich'in and Sahtú Land Use Plans^{6,7} (established in 2003 and 2013, respectively) support northern mountain caribou conservation and contribute more broadly to the protection of this region through conformity requirements on regulators and proponents proposing land use activities. The Dehcho Land Use Planning Committee is also developing a regional land use plan for the Dehcho region.

In British Columbia, the Dena Kayeh Institute developed the *Kaska Dena Management Practices: Kaska Dena Land Use Framework*⁸ in 2010, which identifies a network of Kaska protected areas, special management areas, and site-specific features with specific management approaches for the area south of the Ross River area. This framework uses a combination of community-based natural resource development policies, management practices, and land use zoning.

Overall, these regional initiatives, combined with community-led conservation planning for caribou and their habitat, are viable conservation approaches that give advice on northern mountain caribou stewardship in the Mackenzie Mountains and beyond. Although the federal management plan provides overarching goals, objectives, and approaches to manage northern mountain caribou across its entire range (NWT, Yukon and British Columbia), all NWT residents and others who use NWT lands and waters, including the NWT public, management partners, municipalities, industry, and other organizations, are encouraged to contribute to the approaches and guidelines outlined in these community-led plans. These actions will further benefit the management of northern mountain caribou in the NWT.

Responsible Harvesting Practices

The Dene and Métis of the Mackenzie Mountains have a long and enduring relationship with northern mountain caribou. Traditional laws include many rules around the proper way to harvest and utilize important animals like caribou. These teachings have been passed down through generations and continue to be shared with younger generations today.

To support this knowledge-sharing already occurring in communities throughout the NWT, in January 2020, the Government of the Northwest Territories launched a Hunter Education program. This free course teaches hunters of all backgrounds and experience how to be respectful of wildlife, people, the environment and themselves while



Figure 3. Elders and youth work together to skin a caribou at the 2023 Caribou Summit organized by the Gwich'in Tribal Council in Fort McPherson, NWT (Photo: Tony Devlin/GTC).

hunting. Hunter Education is mandatory for all Resident and Non-resident hunters and recommended for all hunters in the NWT.

4. KNOWLEDGE GAPS

1. **Population estimates/trends:** Most subpopulation estimates are outdated and population trends are unknown for most subpopulations and for the NWT population as a whole. Knowledge holders have reported a significant decline in the Redstone subpopulation over the last 10-12 years. It is unknown whether the declines observed by knowledge holders represent a change in distribution (caribou have moved elsewhere) or population size. Enhanced monitoring and updated population estimates are needed to understand trends and detect possible declines in subpopulations.

2. **Genetics:** Ten radio-collared female caribou in the early 2000s suggest there may be three different groups within the Redstone subpopulation (two migratory groups and one sedentary [non-migratory] group). However, there is not enough evidence to confidently conclude that these groupings represent separate subpopulations. Also, a genetic study in 2012 found no distinct genetic clusters among caribou sampled in the Redstone subpopulation, indicating the subpopulation likely functions as one large diverse population. More genetic information is needed to properly understand the dynamics of the Redstone subpopulation in the NWT; this is particularly important when considering sedentary groups as they are more vulnerable to localized threats.

Additionally, Indigenous and community knowledge in the Sahtú indicates there may be extensive overlap and potential mixing between caribou ecotypes (northern mountain, boreal and barren-ground), both historically and currently. More research is required in this area to determine whether factors influencing northern mountain caribou may also be affecting other caribou and vice versa.

3. **Distribution:** Known distribution of northern mountain caribou in the NWT is based on periodic aerial surveys and radio-collared caribou studies. Radio-collared caribou in and around the Prairie Creek area in Nahanni National Park Reserve in 2015 suggest there are sedentary groups that do not fall within any of the currently delineated ranges. Increased radio-collared studies in the Yukon have resulted in an expansion of the Tay River subpopulation into the NWT. Further refinement of range boundaries is needed for northern mountain caribou management in the NWT, but also to assess whether the currently defined range differs from the historical distribution. Further scientific and Indigenous knowledge research to document critical caribou habitat, such as calving grounds, is also needed.

4. **Predation:** The primary cause of adult mortality in northern mountain caribou in the NWT is unknown, but wolf predation, with bear, wolverine, and cougar predation locally and seasonally important, is responsible for adult mortality in ranges south of the NWT. The rate of wolf predation and wolf densities within northern mountain caribou range are poorly understood, including the possible linkages between anthropogenic [human] disturbances and increased predation on caribou which have been studied south of the NWT (i.e. habitat-mediated apparent competition).

5. **Anthropogenic disturbances:** Industrial development is considered an important factor affecting northern mountain caribou; yet there is limited information about the effects of industrial activities on northern mountain caribou in the NWT, including factors such as population, trends, movements and behaviour. Mineral and hydrocarbon exploration and development can lead to habitat alteration, displacement of caribou, direct and indirect mortality associated with access roads (i.e. improved access for hunters), increased moose densities, and increased wolf travel/kill rates on linear features. Additional information is needed. It is important that communities on both sides of the Yukon-NWT border continue to participate in resource and land use decisions through existing regulatory processes.
6. **Harvesting:** Harvest has direct localized impacts on northern mountain caribou, especially for subpopulations that can be accessed by road. Resident and non-resident hunters are limited to one northern mountain caribou per year. However, there is no limit on the total number of caribou each guide-outfitter can take each year. The management plan recommends establishing population thresholds below which harvesting restrictions should be considered (Recovery Measure 2.2).

Improved harvest information from Indigenous and non-Indigenous hunters would also be helpful to guide management actions for northern mountain caribou in the NWT. Currently, outfitters are required by regulation to report their annual harvest. ECC monitors resident harvest with the NWT Resident Hunter Harvest Survey. Current Indigenous harvest information is not available for all areas. Accurate harvest data for northern mountain caribou is required to address management plan recommendations, including the development of sustainable harvest thresholds and transboundary harvest strategies.

7. **Climate change:** Climate change is already significantly reducing the amount of ice patch habitat available in the Mackenzie and Selwyn Mountains, which is important for northern mountain caribou to escape insects and cool down in the summer. Climate change may also lead to changes in vegetation composition (e.g. shrubification) and distribution of other ungulates, as well as increases in rain/freeze events, disease and parasites, and summer heat stress. Degradation of permafrost, as well as increased frequency and severity of wildfires may exacerbate these changes. Enhanced research on the effects of climate change on seasonal habitat, as well as caribou health and behaviour, is needed and should be coordinated across the range of northern mountain caribou.

5. NEXT STEPS

Co-management partners will use this management plan to help assign priorities and allocate resources to manage for northern mountain caribou in the NWT, as well as for engaging other parties (e.g. communities, industry, co-management boards, regulators and non-government organizations).

This management plan will be followed by a consensus agreement by the Conference of Management Authorities that will identify the actions that participating Management Authorities intend to implement. At least every five years, the management plan will be

reviewed and actions undertaken to implement the management plan will be reported, along with progress toward meeting its objectives. The first report will be due in 2029.

Success in the management of northern mountain caribou depends on the commitment and cooperation of various groups involved in directing this plan and cannot be achieved by any one agency alone. All NWT residents and others who use NWT lands and waters, including the NWT public, management partners, municipalities, industry, and other organizations, are encouraged to join in supporting and implementing this plan for the benefit of northern mountain caribou, communities that have traditionally relied on this species, and NWT society as a whole.

6. REFERENCES

Background information in Part 1 of this document is summarized from the NWT Species at Risk Committee's 2020 *Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (Rangifer tarandus caribou) in the Northwest Territories*.³ To avoid repetitive citations, it can be assumed that the information was taken from this report unless another reference is given.

1. Environment Canada. 2012. Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada. *Species at Risk Act Management Plan Series*. Environment Canada, Ottawa. vii + 79 pp. Website: www.sararegistry.gc.ca/virtual_sara/files/plans/mp_woodland_caribou_northern_mountain_population_e.pdf
2. Níó Nę P'ęńę Working Group. 2019. Draft Níó Nę P'ęńę Begháré Shúhta Goᵇepę Narehᵇá – Trails of the Mountain Caribou Management Plan. Níó Nę P'ęńę Working Group, Tulita, NT. Website: www.srrb.nt.ca/docman/public/public-hearings-registry/2020/3-3-relevant-documents-shu-hta-go-epe-mountain-caribou/1833-19-06-n-o-ne-p-ene-trails-of-the-mountain-caribou-plan-draft-pdf/file
3. Species at Risk Committee. 2020. Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT. Website: www.nwtspeciesatrisk.ca/sites/enr-species-at-risk/files/mountain_caribou_status_report_final_apr2020.pdf
4. Tu Łidlini (Ross River) Dena Council. 2018. Notice to Those Hoping to Hunt in the Ross River Dena Area. Tu Łidlini (Ross River) Dena Council, Ross River, YT. Website: www.srrb.nt.ca/document-repository/public/public-hearings-registry/2020/3-3-relevant-documents-shu-hta-go-epe-mountain-caribou/1826-18-ross-river-dena-council-hunting-notice-laws-permitting/file
5. Downie, B.K. and the Doi T'oh Territorial Park Committee. 2007. Doi T'oh Territorial Park and CANOL Heritage Trail Management Plan. Department of Industry, Tourism and Investment, Government of the Northwest Territories, Yellowknife, NT.
6. Gwich'in Land Use Planning Board. 2003. Nan Geenjit Gwitr'it T'agwaa'in/Working for the Land: Gwich'in Land Use Plan. Gwich'in Land Use Planning Board, Inuvik, NT. Website: www.gwichinplanning.nt.ca/publications/lupd/final%202003/Gwichin_Plan_2003.pdf
7. Sahtu Land Use Planning Board. 2013. Sahtu Land Use Plan. Sahtu Land Use Planning Board, Fort Good Hope, NT. Website: https://sahtulanduseplan.org/sites/default/files/2022-07/final_sahtu_land_use_plan_april_29_2013.pdf
8. Dena Kayeh Institute. 2010. Kaska Dena Management Practices: Kaska Dena Land Use Framework. Prepared by the Dena Kayeh Institute, Lower Post, BC. Website: <https://kaskadenacouncil.com/download/kaska-dena-management-practices-kaska-dena-land-use-framework-dena-kayeh-institute-2010/?wpdmdl=1647&masterkey=>

the Minister responsible for the Parks Canada Agency (national parks, national park reserves and national historic sites).

The traditional territory and waters of **Acho Dene Koe First Nation** span three jurisdictions: British Columbia, the Yukon Territory and the Northwest Territories. As the longstanding stewards of this land, Acho Dene Koe members have carefully maintained traditional practices that value balance, sustainability and responsibility. Acho Dene Koe plays an important role in the conservation and management of species at risk in the Northwest Territories, including northern mountain caribou.

The **Dehcho First Nations** (DFN) represents 10 First Nations and two Métis Locals of the Dehcho region based on the Dene principles and traditions of its communities. The goals of DFN are to protect and promote the Treaty and Aboriginal rights of its members, to protect Dehcho lands and maintain economic development that balances regional and community interests. By maintaining Dehcho Dene culture and traditional land use (hunting, fishing, trapping, gathering and occupancy), DFN helps to ensure its members can continue to use the land as they always have.

APPENDIX B – GUIDING PRINCIPLES

The following principles guided the development of Part 1 and the adoption of Part 2 of this management plan:

- Recognize that the biological diversity of the NWT is a legacy to be preserved, and that all NWT residents and others who use NWT lands and waters have a shared responsibility for the protection and conservation of species at risk:
 - Recognize the shared responsibility of the Management Authorities, seek collaborative partnerships, and expect that all responsible parties will contribute.
 - Respect Treaty and Aboriginal rights as well as land claim and self-government agreements.
 - Involve interested parties in developing the plan, including engagement at the community level throughout the process, especially for culturally sensitive species.
 - Promote engagement by all parties in playing a meaningful role in implementing this plan and supporting long-term management of northern mountain caribou.
- Recognize that conservation measures may have social, economic or ecological implications.
- Use adaptive management, which is a systematic approach for continually improving management policies or practices by deliberately learning from the outcomes of management actions.
- Be guided by and implement the Precautionary Principle, which states that a lack of scientific certainty will not be used as a reason to delay measures to alleviate a threat to a species at risk.
- Make full use of the best available information, including traditional, community, and scientific knowledge:
 - Recognize and respect differences and similarities in approaches to the collection and analysis of different types of knowledge.
 - Recognize and address information gaps.
- Have a clear goal and clear, measurable objectives:
 - Include only management approaches that are realistic and biologically feasible.
 - Recognize that management can take a long time; therefore long-term approaches are needed.
- Management actions will be taken at the subpopulation level to maintain population numbers, distribution, and range use of each northern mountain

caribou subpopulation, such that no subpopulation is lost and sufficient high quality habitat is maintained to allow for subpopulation recovery into historic range.

- Each northern mountain caribou subpopulation has value to one or more NWT Indigenous governments and organizations and to others outside the NWT, and should be maintained in a healthy state on the landscape.
- Collaboration among governments, co-management boards, communities, and, where needed, with neighbouring jurisdictions, is essential to ensuring successful and effective management for northern mountain caribou in the NWT.
- Public education will be necessary to promote respect for northern mountain caribou and awareness of traditional Indigenous practices so that all NWT residents and others who use NWT lands and waters know how and are encouraged to contribute to the management of northern mountain caribou.

**PART 2 – MANAGEMENT PLAN FOR THE NORTHERN
MOUNTAIN POPULATION OF WOODLAND CARIBOU
(RANGIFER TARANDUS CARIBOU) IN CANADA**

Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada

Woodland Caribou Northern Mountain Population



2012

Recommended citation:

Environment Canada. 2012 Management Plan for the Northern Mountain Population of Woodland Caribou (*Rangifer tarandus caribou*) in Canada. *Species at Risk Act Management Plan Series*. Environment Canada, Ottawa. vii + 79 pp.

Additional copies:

Additional copies can be downloaded from the Species at Risk (SAR) Public Registry (www.sararegistry.gc.ca).

Cover illustration: Nic Larter

Également disponible en français sous le titre
« Plan de gestion de la population des montagnes du Nord du caribou des bois (*Rangifer tarandus caribou*) au Canada »

© Her Majesty the Queen in Right of Canada, represented by the Minister of the Environment, 2012. All rights reserved.
ISBN 978-1-100-19216-1
Catalogue no. En3-5/25-2012E-PFD

Content (excluding the illustrations) may be used without permission, with appropriate credit to the source.

DECLARATION

This management plan has been prepared in cooperation with the jurisdictions responsible for management of woodland caribou (Northern Mountain population). Environment Canada and Parks Canada have reviewed and accept this document as their management plan for the woodland caribou (Northern Mountain population), as required under the *Species at Risk Act* (SARA). This management plan also constitutes advice to other jurisdictions and organizations that may be involved in conserving the species.

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan, and will not be achieved by Environment Canada, Parks Canada or any other jurisdiction alone. In the spirit of the Accord for the Protection of Species at Risk, the Minister of the Environment invites all responsible jurisdictions and Canadians to join Environment Canada and Parks Canada in supporting and implementing this plan for the benefit of the woodland caribou (Northern Mountain population) and Canadian society as a whole. The Minister will report on progress within five years, as required under SARA.

RESPONSIBLE AGENCIES AND JURISDICTIONS

Environment Canada
Parks Canada Agency
Government of Yukon
Government of British Columbia
Government of Northwest Territories
Yukon Fish and Wildlife Management Board
Sahtu Renewable Resources Board
Gwich'in Renewable Resources Board

CONTRIBUTORS

The following was drafted through an inclusive process whereby the responsible agencies and jurisdictions, listed above, invited participation from all governments and First Nations within the range of the Northern Mountain population of woodland caribou. A technical team (the Technical Working Group) with expert knowledge researched and drafted the document. This team received guidance and assistance from a steering committee comprised of representatives from responsible agencies, jurisdictions and governments. A subgroup of the Steering Committee (the Co-chairs Committee) was responsible for coordination, ensuring the most inclusive and timely process possible. A complete list of participants is found in Appendix 1, Terms of Reference.

ACKNOWLEDGMENTS

Special thanks to everyone who contributed to community surveys in 2007 and 2008.

STRATEGIC ENVIRONMENTAL ASSESSMENT STATEMENT

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

SARA Management Plans are intended to benefit species at risk and biodiversity in general. However, it is recognized that plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts on non-target species or habitats. The results of the SEA are incorporated directly into the plan itself, but are also summarized below.

This management plan will clearly benefit the environment by promoting the conservation of woodland caribou (Northern Mountain population). The potential for the plan to inadvertently lead to adverse effects on other species was considered. The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: description of the species' habitat and biological needs, ecological role, limiting factors and recovery measures.

PREFACE

The Northern Mountain population (NMP) of woodland caribou was assessed by the Committee on Status of Endangered Wildlife in Canada (COSEWIC) as a species of special concern in 2002 and was listed as such under the *Species at Risk Act* in 2005. Section 65 of the Act requires the competent minister to prepare management plans for species of special concern.

The Canadian Wildlife Service (Pacific and Yukon Region, Environment Canada) and Government of Yukon led the development of this management plan in cooperation with all of the jurisdictions that have responsibility for management of lands and wildlife within the range of this population of caribou, and therefore have the jurisdictional mandate to implement the plan. Two territories, one province, more than 30 First Nations and three wildlife management boards were invited to contribute to the development of this plan. The resulting Northern Mountain Caribou Management Team included a Technical Working Group, Steering Committee and a Co-Chairs committee. The Technical Working Group was formed to collectively draft the management plan and provide guidance, relevant information, and technical support. The Steering Committee assessed the adequacy of the plan in addressing jurisdictional concerns regarding status and management of the Northern Mountain population of woodland caribou. The Co-Chairs committee held meetings and discussions to coordinate activities and achieve

tasks as directed by the Steering Committee. Terms of Reference for this process are included in Appendix 1. After the draft plan was completed by the Northern Mountain Caribou Management Team, formal consultations occurred with all governments, boards and agencies within the range of NMP.

EXECUTIVE SUMMARY

The Northern Mountain population of woodland caribou (NMP; *Rangifer tarandus caribou*) was assessed by COSEWIC in 2002 and listed under the federal *Species at Risk Act* as a species of “special concern” in 2005. The purpose of this plan is to summarize the threats facing Northern Mountain caribou, set out management goals and objectives and recommend a series of recovery measures for consideration by the responsible authorities for the management of the population’s 36 herds. **This plan does not address management of individual herds but should be used as a guide for developing herd-specific plans.**

The 2008 population estimate for the NMP is approximately 45,000 animals (about one quarter of all woodland caribou in Canada). Population trends, based on data gathered since 2009, report that trends for 22 herds are unknown; seven herds are considered stable, four are increasing, and three are decreasing.¹ **The goal of the management plan is to prevent the NMP from becoming threatened or endangered, by having responsible agencies cooperatively work together to carefully manage these caribou and their habitat.**

This goal will be accomplished by achieving the following results. Progress towards achieving these results will be reevaluated every 5 years.

- Herds comprising the NMP are maintained or recovered, and populations operate within the natural range of variability;
- The ecological integrity of key habitats and ecosystems required by the NMP are maintained; and
- First Nations, local communities, government agencies and other interested parties are meaningfully involved in the stewardship of the NMP and its habitats.

The objectives and recommended recovery measures are based on a set of principles developed by the Northern Mountain Caribou Steering Committee and Technical Working Group. Recommended management objectives for the NMP are:

¹ The species assessment information from COSEWIC (Section 1.1, Thomas and Gray 2002) states that there are 39 local herds but this number divides herds that occur both in YT and BC into separate herds (e.g. Atlin, Little Rancheria).

- Objective 1: Determine herd status and trends over time.
- Objective 2: Manage harvest for sustainable use.
- Objective 3: Assess health risks and maintain caribou health.
- Objective 4: Increase understanding of the dynamics of predator-prey systems and potential competition with other herbivores.
- Objective 5: Identify and assess the quality, quantity and distribution of important habitats for the population.
- Objective 6: Manage and conserve important habitats to support caribou herds.
- Objective 7: Promote conservation of the NMP through environmental and cumulative effects assessments.
- Objective 8: Foster opportunities to share knowledge and information and develop education and stewardship programs.

The implementation schedule (Section 3.1) outlines the priorities (High, Medium and Low) and recommended timelines (year initiated) to complete the recovery measures based on four possible herd scenarios. These scenarios are: herds of small size (<200), declining population trends, stable/increasing population trends or herds where the size and population trend is unknown.

TABLE OF CONTENTS

DECLARATION	I
RESPONSIBLE AGENCIES AND JURISDICTIONS	I
CONTRIBUTORS	I
ACKNOWLEDGMENTS	I
STRATEGIC ENVIRONMENTAL ASSESSMENT STATEMENT.....	II
PREFACE.....	II
EXECUTIVE SUMMARY	IV
1. SPECIES INFORMATION	1
1.1 Species Assessment Information from COSEWIC	1
1.2 Description of the Species	2
1.3 Population and Distribution.....	2
1.4 Needs of the Woodland Caribou, Northern Mountain Population	7
1.4.1 Habitat and biological needs	7
1.4.2 Ecological role	9
1.4.3 Limiting factors	9
1.5 Threats	9
1.5.1 Description of threats.....	9
1.6 Recovery measures already completed or underway	13
2. MANAGEMENT	19
2.1 Management Principles	19
2.2 Management Goal	20
2.3 Management Objectives	21
2.4 Recovery Measures.....	21
2.4.1 Population Management.....	24
2.4.2 Habitat Management	25
2.4.3 Communication and Involvement	25
2.5 Measuring Progress	26
3. IMPLEMENTATION.....	27
3.1 Implementation Schedule	28
3.1.1 Population Management.....	28
3.1.2 Habitat Management	32
3.1.3 Communication and Involvement	35
3.1.4 Responsible Agencies.....	36
3.2 Transboundary Coordination	39
4. REFERENCES	40
5. PERSONAL COMMUNICATIONS.....	47
6. CONTACTS	48
7. APPENDICES.....	49
Appendix 1: Terms of Reference for Steering Committee and Technical Working Group	50
Appendix 2: Population and Trend Estimates for Northern Mountain Population Herds as of 2009.	55

Appendix 3: Herd Specific Details and Known Potential Threats58

Appendix 4: Monitoring and Management History of Northern Mountain
Caribou Herds in British Columbia, Yukon and Northwest Territories up to
2009.65

Appendix 5: Summary of Survey Results of Northern Mountain Caribou
Herds in British Columbia, Yukon and Northwest Territories.....68

Appendix 6: Glossary72

Appendix 7: Toolbox to Conserve Habitat74

Appendix 8: Stewardship Toolbox75

Appendix 9: Suggested Research to Support Management Plan
Implementation using Traditional Ecological Knowledge or Science-based
Techniques.....76

Appendix 10: Acronyms78

1. SPECIES INFORMATION

1.1 Species Assessment Information from COSEWIC

Date of Assessment: May 2002

Common Name (population): Woodland Caribou (Northern Mountain population)

Scientific Name: *Rangifer tarandus caribou*

COSEWIC Status: Special Concern

Reason for Designation: Forestry, roads and other developments in the range of this population are beginning to affect some herds, through habitat modification and increased human access. Most of the habitat is currently remote and has changed little. Most of the population of over 35,000 adults appears stable but is particularly dependent on conservation actions, such as management plans. Two of the 39 herds within this population are declining and may be at risk from changing predator-prey relationships and greater motor vehicle access.

Canadian Occurrence: Yukon Territory, Northwest Territories, British Columbia

COSEWIC Status History: The Northern Mountain population was designated *Not at Risk* in May 2000. This population was formerly designated as part of the "Western population" (now de-activated). Status re-examined and designated *Special Concern* in May 2002.

1.2 Description of the Species

COSEWIC identified five ‘populations’ of woodland caribou in Canada for the purpose of assessing conservation status: Boreal, Atlantic-Gaspésie, Newfoundland, Southern Mountain and Northern Mountain. The NMP is generally found in areas of moderate snow depths where they make seasonal altitudinal migrations and forage on terrestrial lichens (Heard and Vagt 1998).

Caribou are an ancient member of the deer family (*Cervidae*) and are broadly distributed across Canada (Banfield 1974). The woodland subspecies (*R. t. caribou*) ranges from 1.0 to 1.2 meters high at the shoulder. Mature females and males of woodland caribou weigh 110-150 and 160-210 kg., respectively. Their coat is mostly brown in summer with more grey in winter, but the neck, mane, shoulder stripe, underbelly, underside of tail, and patch just above each hoof are creamy white.

Unique among species of deer, both sexes bear antlers, although up to five percent of females have only one antler and less than one percent lack antlers all together (Bergerud 1971; Reimers 1993). Another distinctive characteristic of all caribou is large, rounded hooves that reduce sinking in snow and wetlands and act as shovels when digging for food under snow. The ‘dew claws’ are large, widely spaced, and set back on the foot, which greatly increases their weight-bearing area and reduces ‘foot loads’.

Female caribou produce a single calf and these calves may suffer from high neonatal mortality rates. Woodland caribou produce about 70-74 calves per 100 females with only 30-50% of calves surviving their first year (Thomas and Gray 2002). The mortality rate of adult female woodland caribou (>1 year old) ranges from 5 to 15% (Thomas and Gray 2002). Although there may be some localized differences between NMP and Boreal ecotypes of woodland caribou, this combination of single calves, high calf mortality and variable adult female mortality limits the ability of a woodland caribou to recover from population declines. For more information on the physical description and general biology of woodland caribou, see Banfield (1961, 1974), Miller (2003), Kelsall (1984), Geist (1991) and Bergerud (2000).

1.3 Population and Distribution

The NMP is comprised of 36 local herds in Yukon (YT), western Northwest Territories (NT), and northwestern British Columbia (BC; Figure 1).² Three of these herds may be considered a “herd complex” or meta-population (i.e. Nahanni Complex). The species assessment information from COSEWIC (Section 1.1, Thomas and Gray 2002) states that there are 39 local herds but this figure divides herds that occur both in YT and BC into

² The COSEWIC designation of the Northern Mountain Population of woodland caribou follows National Ecological Areas to define its boundaries. BC divides caribou based on ecotype (Southern and Northern Mountain populations), therefore BC herd naming conventions may not correspond to COSEWIC designations in this document.

separate herds (e.g. Atlin, Little Rancheria). In 2002 the NMP was considered stable and over 35,000 adults. The 2008 population estimate for the NMP is approximately 45,000 animals (about one quarter of all woodland caribou in Canada). While the COSEWIC status continues to be “special concern”, overall the population is stable or increasing. The NMP of woodland caribou are ranked as Vulnerable/Apparently Secure (S3S4) in BC, Vulnerable (S3) in YT and not ranked in NT (NatureServe Explorer 2010). They are ranked as Apparently Secure at a global scale (G5T4Q; NatureServe Explorer 2010).

Individual herd assessments, completed since 2009, indicate that seven herds are stable, four are increasing and three are decreasing (Appendix 2). The trend status of 22 herds (two-thirds of the population) is unknown due to lack of long-term estimates. Herd sizes vary considerably: the Finlay herd may currently consist of fewer than 30 animals while the Bonnet Plume herd may have more than 5,000 animals. These differences may be due to differential hunting pressures, remoteness, predation pressures, habitat quality and differing herd delineation systems among jurisdictions.

There is little information about historical populations of woodland caribou but the range of the NMP has not decreased significantly over time (Thomas and Gray 2002). Herds probably occupied a continuous geographic range (within suitable habitat) throughout northern BC, western NT and the southern two thirds of YT. Suitable habitat for the NMP is generally found in areas of moderate snow depths where they make seasonal altitudinal migrations and forage on terrestrial lichens (Heard and Vagt 1998).

The current area of occurrence and extent of occupancy is approximately 308,000 km². Within the range of NMP the effects of human activity and disturbance vary by jurisdiction. The current range of the NMP spans the traditional territories and “statement of intent” boundaries of 33 First Nations in BC, YT and NT (Figures 2 and 3). The NMP overlaps with other populations of caribou including barren-ground and woodland caribou (Boreal and Southern Mountain). The Chisana herd also straddles an international border between YT and Alaska (Farnell et al. 1998). Jurisdictions delineate herds differently: BC’s definition is based on where the caribou calve while the YT and NT’s base their definition on where the caribou spend the winter. Both conventions are used within this management plan.



Figure 1: Annual herd ranges of the Northern Mountain population of woodland caribou (NMP).

The South Nahanni, Coal River and La Biche herds are grouped into the Nahanni Complex. Different line conventions are used to differentiate overlapping herds. Gaps shown between herds may have low densities of caribou seasonally or lack survey information but are still considered within the overall range of NMP.

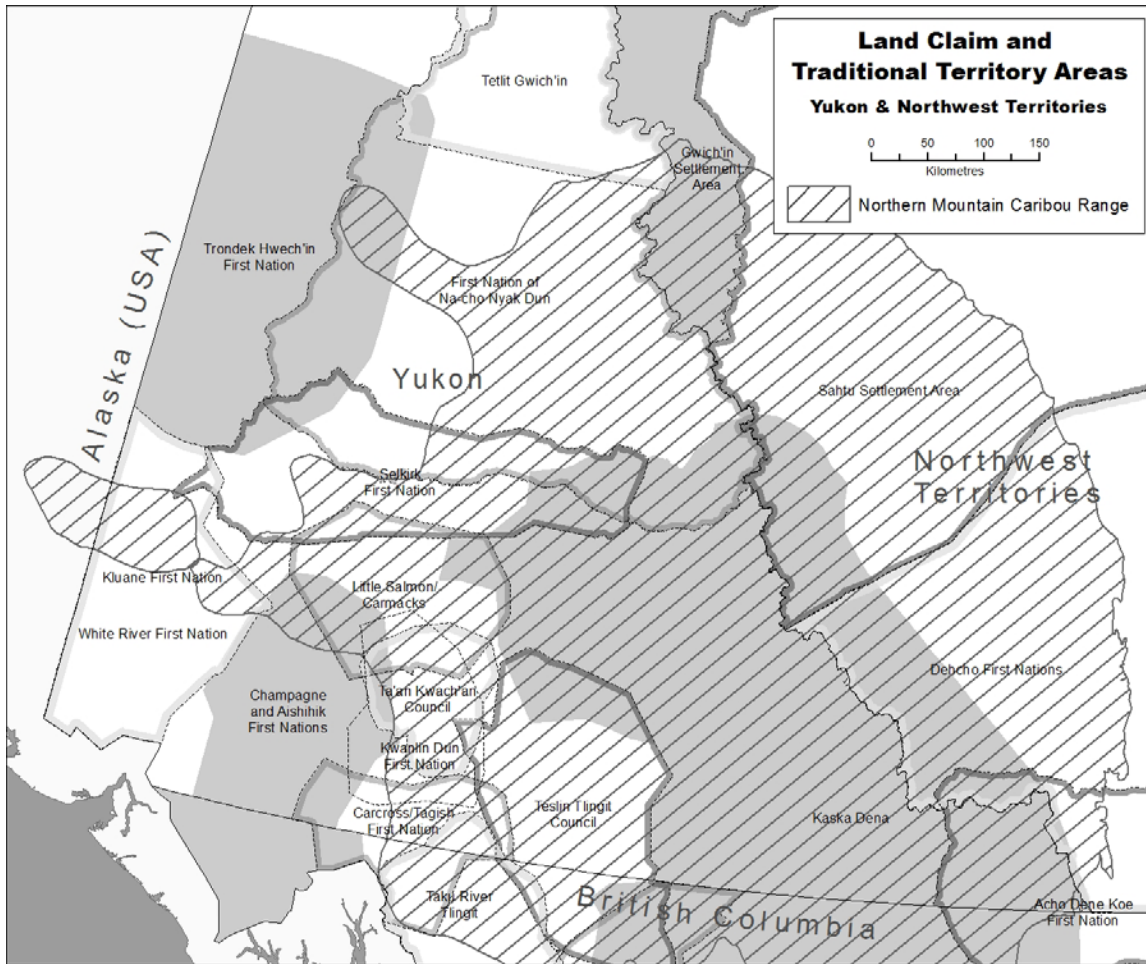


Figure 2: Yukon and Northwest Territories First Nation land claim and traditional territory areas in the range of the Northern Mountain population of woodland caribou.³ Shaded portions and different line patterns are used to more easily distinguish among the different areas.

³ The lines on this map illustrate in a general way the areas under land, resources and/or self-government negotiations. In some cases, the lines show where Interim Measures Agreements apply for these negotiations. Publication of this map does not imply that the First Nation, the Government of the Northwest Territories, the Government of Yukon, the Government of British Columbia or the Government of Canada have agreed to the boundaries shown. This map also shows the approximate boundaries established by final agreements.

This map is intended for general information only. It is not a technical reference tool, nor is it a legal document. The publishers will not be held liable for any errors or inaccuracies.

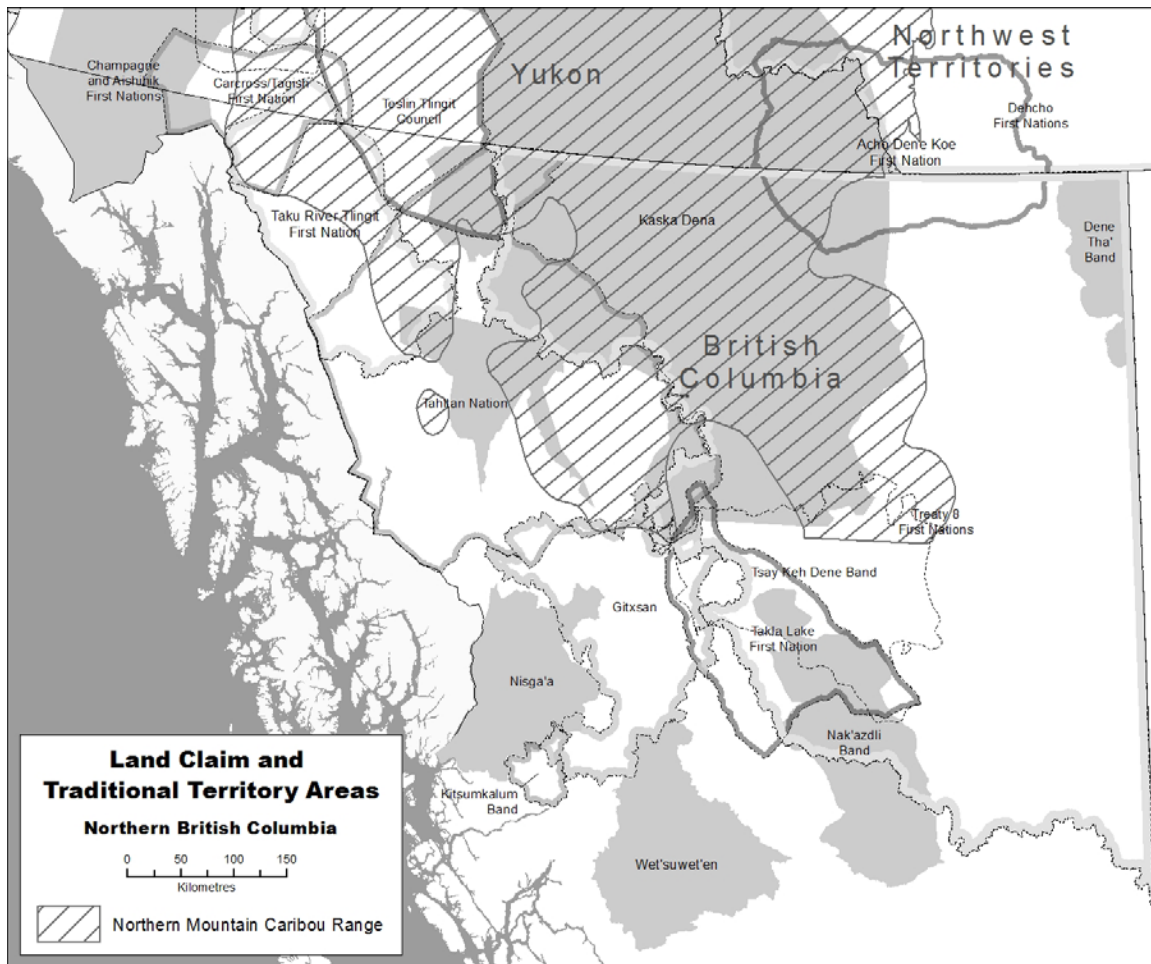


Figure 3: British Columbia First Nation land claim and traditional territory areas in the range of the Northern Mountain population of woodland caribou.⁴ Shaded portions and different line patterns are used to more easily distinguish among the different areas.

⁴ The lines on this map illustrate in a general way the areas under land, resources and/or self-government negotiations. In some cases, the lines show where Interim Measures Agreements apply for these negotiations. Publication of this map does not imply that the First Nation, the Government of the Northwest Territories, the Government of Yukon, the Government of British Columbia or the Government of Canada have agreed to the boundaries shown.

This map is intended for general information only. It is not a technical reference tool, nor is it a legal document. The publishers will not be held liable for any errors or inaccuracies.

1.4 Needs of the Woodland Caribou, Northern Mountain Population

1.4.1 Habitat and biological needs

All populations of woodland caribou have complex movement patterns. Herds within the NMP may spend much of the summer on alpine and upper subalpine range. In winter some herds move down to coniferous forest and lower subalpine, although others herds winter in the alpine. Seasonal movements provide increased forage availability and quality, as well as enhanced security. The ability for all populations of woodland caribou to move between seasonal ranges is vitally important. Barriers restricting these seasonal movements (e.g. roads, fences, pipelines, settlements, unsuitable habitat) may adversely affect their access to seasonally important food sources and areas used as refugia from predators and insects.

Woodland caribou may use different habitat types in winter, but generally the NMP choose areas where snow cover is relatively shallow (Bergerud 1978, Heard and Vagt 1998). Generally, winter ranges are often in areas where a divide or high mountain ridge acts as a snow and rain shadow, leaving the far side of the divide with reduced snow and rain. In addition, these areas tend to have soils and fire regimes that are suitable for substantial ground cover of lichens. For example, seven NMP herds in eastern YT, use low elevation, mature lodgepole pine (*Pinus contortus*) or spruce (*Picea glauca*) forests. These mature forests have relatively abundant terrestrial and arboreal lichens and shallower snow depths due to snow interception by the forest canopy (Kuzyk et al. 1999a). The NMP of woodland caribou depend on terrestrial lichens when snow depths are less than 50-100 cm and arboreal lichens when snow depths exceed those depths. Within the NMP, the Chisana, Kluane, Aishihik, Ibex, and Klaza herds reside on arid, lee slopes and winter in alpine areas. Wind scour on high slopes in alpine areas reduces snow cover and allows access to terrestrial lichens (Bergerud 1978; Heard and Vagt 1998; Kuzyk et al. 1999a).

The NMP of woodland caribou favour birch-sedge communities and gradually switch to sedge meadow and *Dryas*-sedge meadow communities as the season progresses from summer to fall (e.g. Kluane Ranges, YT; Oosenbrug and Theberge 1980). Important food sources in summer include the leaves of willow and sedges (Oosenbrug and Theberge 1980), with lesser amounts of grasses, forbs, lichens and fungi (Thomas and Gray 2002).

For all populations of woodland caribou, forage quality and availability directly affects the body condition of female caribou and in turn calf survivorship (Reimers 1983). This has the potential to influence the population dynamics of caribou through effects on their food supply. Monitoring trends in quantity and quality of available food in a particular habitat is important, but very difficult to obtain. It is generally assumed that food favoured by woodland caribou is plentiful year-round (e.g. Boreal caribou; Weclaw and

Hudson 2004), but caribou may not have access to all of it. A number of abiotic and biotic factors may limit access to this food for woodland caribou. For example, human disturbance (e.g. snowmobiles, off-road vehicles, backcountry recreation) and barriers to movement (e.g. roads, pipelines, habitat fragmentation) may displace caribou from critical feeding areas (Wolfe et al. 2000; Dyer et al. 2001; Nellemann et al. 2001; Powell 2004; Seip 2007). In addition, snow conditions such as snow depth, density, and hardness may limit access to lichen (Johnson et al. 2001).

Fire and forest succession are natural processes that can have direct and indirect effects on woodland caribou. Wildfires can directly affect caribou by altering habitat distribution and quality while indirectly affecting caribou by changing habitat use and movement patterns of other ungulate species and predators. This may cause increases in competition and predation. Woodland caribou in Alaska avoid areas affected by fires for up to 60 years (Joly et al. 2003). Avoidance may be due to the destruction of slow-growing terrestrial and arboreal lichens that caribou depend on in the winter. Deadfall and unfavourable snow conditions within burns may affect caribou movement, alter habitat connectivity, and increase predation risk (James et al. 2004). However, woodland caribou have been shown to expand their ranges to compensate for burned portions or successional vegetative shifts within forested winter range. Recently burned areas may also provide short-term access to vegetative forage. Woodland caribou occasionally feed in young stands immediately following fire and logging (Schaefer and Pruitt 1991; Thomas and Armbruster 1996). Fire can be destructive in the short-term, but is necessary to reduce moss competition and regenerate pine and lichen species (Klein 1982; Schaefer and Pruitt 1991). Therefore, the average fire-return cycle is an important parameter of caribou habitat. In BC, the fire-return cycle within the range of the NMP averages 125-275 years (British Columbia Forest Service 1990) while in YT and NT it is 150-300 years (D. Milne, pers. comm., 2008).

Refuge from insects, predators and thermal stress while foraging, calving and recovering from calving is important and may be hard to find (James and Stuart-Smith 2000). Permanent alpine snow patches provide refuge from insects and heat in the summer months (Ion and Kershaw 1989). Evidence suggests that these snow patches have been used by woodland caribou for thousands of years (Kuzyk et al. 1999b).

During calving (late May to early June), pregnant female woodland caribou may disperse into high mountainous terrain away from predators and other sources of prey (e.g. moose [*Alces americanus*]; Oosenbrug and Theberge 1980; Bergerud et al. 1984; Seip 1992). Since wolves (*Canis lupus*) generally prey on moose and incidentally encounter and prey upon caribou, caribou can avoid wolves by moving to upland areas. Pregnant caribou may also avoid grizzly bears (*Ursus arctos*) by choosing even higher elevation sites (Gustine et al. 2006), resulting in increased neonatal survival (<1 month old). However, dispersing into high mountainous areas may reduce the amount and quality of forage available to female caribou during calving (Bergerud et al. 1984).

1.4.2 Ecological role

Woodland caribou are an important prey species for a multitude of predators and scavengers. However, the relative importance of woodland caribou as a prey species for particular predators varies geographically and seasonally. Wolves and grizzly bears are the key predators of woodland caribou (Bergerud and Elliot 1986; Seip 1992; Gustine et al. 2006). Other carnivores that may occasionally kill woodland caribou include coyote (*Canis latrans*; Crete and Desrochiers 1995), black bear (*Ursus americanus*; Rettie and Messier 1998), wolverine (*Gulo gulo*; Gustine et al. 2006), cougar (*Puma concolor*; Kinley and Apps 2001), Canada lynx (*Lynx canadensis*; Stephenson et al. 1991) and Golden Eagle (*Aquila chrysaetos*; Valkenburg et al. 2004). Numerous vertebrate and invertebrate species are also likely to scavenge on caribou remains. The loss of woodland caribou from some landscapes may have detrimental impacts on their key predators (i.e. wolves and grizzly bears), scavengers (e.g. wolverine) and other prey species that may also be at risk. This may be particularly true in the case of the NMP where the landscape supports a lower abundance of alternate prey species.

1.4.3 Limiting factors

Limiting factors are characteristics of a natural system that act to regulate population size or distribution. For the NMP of woodland caribou these are factors such as forage availability, weather and predation. Within a balanced natural system, caribou populations fluctuate but remain viable. However, human activity, such as hunting and disturbance, may compound the effects of these factors and eventually compromise the persistence of herds and populations.

1.5 Threats

Each herd in the NMP faces a different suite of threats; therefore, threat descriptions in this section are listed by alphabetical order and not in order of importance. While these threats are listed separately, it is assumed that many of these factors interact creating greater management challenges. Herd-specific and known potential threats for the NMP are listed in Appendix 3.

1.5.1 Description of threats

Disturbance

Disturbance resulting from noise, infrastructure development, and linear features may result in increased stress, changes to activity budgets, physical injury or death of adults, unborn fetuses or calves and changes in movement patterns resulting in functional habitat loss through avoidance behaviour. Studies show that aircraft overhead flights may result in physical injury or death, increased energy expenditures or long term behavioural changes (Calef 1976; Maier 1998). Recreational activities (e.g. snowmobiles, ATV's,

skiing) may change foraging behaviour, cause displacement from suitable habitat, or increase access for wolves along packed trails in winter (Wolfe et al. 2000; Reimers et al. 2003; Powell 2004; Seip et al. 2007). Increased access to caribou ranges may increase predation rates on caribou. Pipelines and associated roads paralleling pipelines may result in delays in crossing or failure to cross linear structures, resulting in increased time spent moving and less time feeding. These associated roads may also contribute to increased vehicle collisions. Caribou group size, insect harassment, and pipeline layout (e.g. buried, elevated, parallel road) may interact to affect crossing success by caribou (Curatolo and Murphy 1986; Wolfe et al. 2000).

Habitat alteration

Caribou cannot exist without habitat of adequate quantity, quality and configuration. Loss, degradation and fragmentation of habitat may be caused by factors both natural and of human origin, and are often exacerbated by the cumulative effects of these factors. The extent of habitat alteration that woodland caribou herds can tolerate depends on minimum viable herd size, the area, quality and connectivity of the habitat mosaic that is sustained, the ability of caribou to accommodate human activities, harvest rates and the level of predation.

Habitat alteration within the range of NMP due to forest harvesting and fire management can affect forage availability. Within the range of NMP, forage availability is most affected by forest harvesting and fire management. Combinations of rain/snow shadow effects on ground lichens may also influence the availability forage availability in localized areas. Forest harvesting converts mature forests to an earlier successional stage which is generally avoided by woodland caribou (Chubbs et al. 1993; Smith et al. 2000; Courtois et al. 2007; Schaefer and Mahoney 2007; Vors et al. 2007). Excessive amounts of early seral habitat on caribou ranges due to industrial activity and wildfire have been associated with declining Boreal caribou populations (Sorenson et al. 2008). Although forestry was listed as the first reason given by COSEWIC for the NMP's designation this may not apply to a significant portion of the NMP range. There has been relatively limited forestry activity in the NT and the YT since the mid-1990's due to limited marketable timber, substantial distance to market and low market prices.

Increased fire suppression, timber harvesting practices and warmer winters have increased the prevalence of insect outbreaks in portions of the range of the NMP. Insect outbreaks have affected 14.5 million hectares in BC (mountain pine beetle; British Columbia Ministry of Forest and Range 2008) and over 350,000 hectares in southwest YT (spruce beetle; Garbutt et al. 2006). Insect outbreaks can change species composition of forests and standing and fallen dead trees can change caribou movement patterns and increase the amount of fuel available during wildfires possibly increasing fire intensity and fire spread rates (Harrington 1996; Page and Jenkins 2007).

Hunting

The ability of caribou herds to sustain harvest depends to a large extent on population size, calf recruitment, adult female survival and harvest rate. Recruitment rates are affected by environmental factors such as climate, habitat quality and predation levels. Recruitment rates can vary from excellent (>35 calves:100 cows at end of winter), to good (25-35 calves:100 cows at end of winter) to poor (<25 calves:100 cows), indicating populations that are increasing, stable to increasing or declining respectively (Appendix 2).

In YT, a harvest rate of two to three percent (adults) is generally considered to be sustainable given a relatively stable, naturally regulated caribou population (Environment Yukon 1996; Hayes et al. 2003). Harvest in excess of three percent generally leads to a decline (Bergerud 1980). Herds in decline (recruiting fewer than 25 calves/100 cows for more than three years) may not be able to sustain any level of harvest. Small herds (<200) are more vulnerable to stresses and less likely to withstand harvest (based on professional opinion or local knowledge). In YT, herds with populations of less than 200 animals are recommended to be closed to licensed hunting (Environment Yukon 1996). For some small populations, BC restricts the licensed harvest to bulls-only, either through limited entry hunting or a 5-point bull only season. In many areas First Nations harvest is not reported, making sustainable harvest rates difficult to calculate for wildlife managers.

The influence of hunting on the NMP has implications for the management of both the caribou population and habitat (Bergerud 1978; Calef 1981; Valkenburg *et al.*; 1994, Farnell et al. 1998). If herds are managed for sustainable harvest, their habitat must be managed to support healthy populations that are able to withstand harvest pressures. New road development and subsequent off-road trails often accompany industrial activity and facilitate hunting access. If access to a given herd increases for any reason, management initiatives must meet the challenge of a potential increase in hunting pressure. Access management is therefore integral to harvest management.

Weather and impacts of climate change

Global climate change is raising average temperatures and altering precipitation patterns, resulting in greater climatic variability with extreme events becoming more common. Higher latitudes of North America are expected to experience the effects of global climate change sooner and more severely than many other areas of the world (Christensen et al. 2007; Ruckstuhl et al. 2008). Research on climate change in the boreal region predicts increased summer temperatures and growing season length (Ruckstuhl et al. 2008). These predicted changes in climate can influence habitat conditions, forage availability, and predator-prey relationships for caribou within the NMP.

Habitat conditions and distribution across the range of the NMP may be affected by increased summer temperatures, growing season length and overall warming. These predicted climate changes may cause increased tree growth, tree recruitment and

advancement of the treeline in some tree species (Ruckstuhl et al. 2008). However, the positive effects of warming could be reversed without comparable increases in precipitation (D'Arrigo et al. 2004). Therefore, long-term warming temperatures may result in large-scale tree mortality or browning of some species in the northern forests due to drought stress (D'Arrigo et al. 2004; Wilmking et al. 2004). Critical forested winter range (mature spruce and pine forests) may be lost with more frequent or intense fires as well as intensified insect outbreaks (Logan et al. 2003; Flannigan et al. 2009). Warming temperatures may also reduce the mean age of forest and change species composition altering critical caribou habitat (Fauria and Johnson 2008; Ruckstuhl et al. 2008). Alpine snow patches are being reduced in size (Kuzyk et al. 1999b), which could lead to increased physiological stress on caribou during summer.

Increased snowfall may reduce winter survival of caribou by increasing energetic demands or by reducing forage availability (Pettorelli et al. 2005). Increased snowfall may limit the ability of females to disperse in spring to higher elevations away from predators, thus reducing neonatal survival. Warmer spring temperatures may result in more rapid snow melt with earlier vegetation emergence. This could mean that availability of high quality forage does not coincide with the peak of calving (Post and Forchhammer 2008).

Climate-induced changes in populations of other species, such as moose, bears, deer (white-tailed [*Odocoileus virginianus*], mule deer [*Odocoileus hemionus*]) or wolves may further affect woodland caribou (Post and Forchhammer 2001). Changes in demographic patterns of some barren-ground caribou in Alaska have been linked to a combination of wolf predation and adverse weather conditions (Adams et al. 1995; Boertje et al. 1996; Valkenburg et al. 1996; Mech et al. 1998). Variations in weather can also decrease forage quality and availability or extend the duration or intensity of periods of insect harassment. The result may be a general decline in physical condition, reduced pregnancy rates and neonatal calf survival rates, or may predispose animals to predation.

Predation

Woodland caribou are naturally predator-limited (Bergerud 1978; Bergerud 1980; Gasaway et al. 1983; Bergerud 1988; Miller et al. 1988; Seip 1991; Bergerud and Elliot 1998; Adams et al. 1995; Thomas 1995; Valkenburg et al. 1996; Mech et al. 1998). Nearly all of the range of the NMP is an intact multi-predator, multi-prey system. The NMP has co-existed with predators for millennia, as components of healthy, intact ecosystems. The natural balance that develops between predators and woodland caribou is generally characterized by relatively low but stable numbers of caribou (Seip 1991; Hayes et al. 2003; Bergerud et al. 2008).

Wolf control activities on both the Finlayson (Farnell and McDonald 1987) and Aishihik (Hayes et al. 2003) herds where in both cases, human harvest *and* predation were viewed as factors which caused the herds to decline, were initiated because of predation concerns. Wolf control was successful, in the short term, in increasing caribou recruitment (although not adult survival) in the Aishihik herd when combined with

reduced hunting (Hayes et al. 2003) and in increasing the growth rate of Alaska's Delta caribou herd (Boertje et al. 1996). However, wolf control measures did not increase calf survival in the Delta caribou herd in 1993-1994 due to the influence of other predators, the limited extent of wolf control, shifts in calving areas, and concurrent decline in caribou health (Valkenburg et al. 2004). Limited success of wolf control was also documented in the Nelchina herd in south-central Alaska from 1950-1981 (Van Ballenberghe 1985). Documented cases of predation causing a herd's long-term decline or extirpation in the absence of any anthropogenic activity are rare, but there are numerous cases in which human activities can be shown to exacerbate predation pressures and precipitate population declines.

Woodland caribou are often a secondary prey species of wolves where they co-occur with moose. Activities on the landscape, such as clearcut logging or forest fires, which increase the population of other species such as moose, may increase predator populations, thereby increasing predation on caribou (Bergerud and Elliot 1986; Wittmer *et al.*, 2005). Seismic lines and roads can increase movement rate and travel efficiency of predators (Musiani et al. 1998; James 1999), thus increasing predation risk on caribou (James and Stuart Smith 2000). Industrial development can also improve access into caribou ranges providing greater harvest opportunities for hunters, although this may be accompanied by stricter hunting restrictions.

Climate and development also need to be considered in the context of predation. Snow conditions play a large role in the ability of cows with calves to disperse away from predators as is seen with newborn boreal caribou (Bergerud and Page 1987). In years where there is an earlier spring resulting in larger snow-free areas females have more space to disperse themselves, are less aggregated and blend in with brown snow-free substrates resulting in higher calf survival (Bergerud and Page 1987). Climate is likely a factor influencing the predator - prey balance for this population as well. Furthermore, a changing climate will make the effects of climate on predation more variable and difficult to predict.

1.6 Recovery measures already completed or underway

Monitoring and management history for each herd is summarized in Appendix 4. Herd boundaries within each jurisdiction are illustrated in Figure 1.

Yukon

The NMP of woodland caribou continues to be a high priority species for the Government of Yukon. Currently, the Government of Yukon monitors eight individual herds on an annual basis. While anthropogenic and environmental influences vary from herd to herd, this work provides the opportunity for comparing features and characteristics of herds over time.

Demographic monitoring of many herds began in the early 1980s. The large number of herds and the geographic remoteness of many of them make it infeasible to monitor every herd annually; representative herds from each region are monitored regularly while the remaining ones are surveyed on a rotating basis.

As of 2008, there had been over 200 fall composition surveys completed on YT herds. A program of VHF radio-collaring began in the late 1970s. As part of this program, individuals from most herds have been collared and tracked using radio telemetry to determine home range distribution and seasonal movements. Over 1,200 animals have been fitted with radio-collars in YT since this program began. Combined with collaring efforts, periodic surveys are used to determine herd composition, estimate population size and monitor population trends. In recent years, satellite and GPS collars have been deployed on several herds to gather finer scale data on movement and habitat use.

There have been four intensive recovery and maintenance programs directed towards increasing and stabilizing NMP herds in YT. Monitoring of the Finlayson, Aishihik, Carcross, Ibex, Atlin (often referred to as the Southern Lakes caribou) and Chisana herds revealed that they were unstable and declining. In each case, a management program was initiated to stabilize and recover the herd. The Aishihik and Finlayson programs involved a combination of increased monitoring, reduced or suspended harvesting and wolf control. The Southern Lakes Caribou Recovery Program involved increased monitoring, a hunting moratorium and changes to the agricultural and industrial land disposition processes in their range. The Chisana herd was listed as a Specially Protected Species in the Yukon *Wildlife Act*, followed by a four-year captive rearing program, a hunting ban, extensive collaring, and greatly increased monitoring. Each recovery program was successful in stabilizing the targeted herd in the short-term. Conservation and management efforts dealing with the Chisana herd were developed in collaboration with the many agencies and partners in Alaska and Yukon (Chisana Caribou Herd Working Group 2010).

All licensed hunter harvest of caribou has been monitored since 1979 through compulsory reporting. Biological submissions are collected from hunters so animals can be aged and tested for contaminants and disease.

British Columbia

The BC Conservation Framework ranks the NMP as a priority 2 under goal 2: to prevent the species from becoming increasingly at risk (BC Ministry of Environment 2009). However, caribou management priorities for BC government agencies within the range of the NMP are low, relative to Boreal and Southern Mountain woodland caribou populations. Boreal caribou woodland population is ranked a priority 1, under goal 3: maintain the diversity of native species and ecosystems and the Southern Mountain woodland population is ranked a priority 2, under both goal 1: contribute to global efforts for species and ecosystem conservation and goal 3 (BC Environment 2009). These populations also have an increased risk assessment (threatened) by COSEWIC. As a result, the majority of research and monitoring in BC is focused on the Boreal and Southern Mountain woodland caribou populations. The majority of the NMP

herds in BC occupy relatively remote areas making access for research and monitoring expensive. The following summarizes the major monitoring efforts on NMP herds in BC. Information on herds in BC were provided by BC Ministry of Natural Resources Operations staff (C. Theissen pers. comm., 2008; M. Williams pers. comm., 2008). Additional inventory and survey information for BC herds is summarized in Appendix 2.

The Finlay herd was the subject of a recent GPS collaring study that has helped define the herd range. Regular inventory of this herd has not occurred. The Pink Mountain herd has been frequently inventoried and recently was the subject of detailed mortality and habitat-use studies. The Muskwa herd has been infrequently surveyed, but was the subject of an extensive habitat-use study in the mid-2000s. It was subject to wolf control in the early 1980s. The Rabbit herd has received little attention in terms of monitoring, but was subject to wolf control from 1982 to 1985. The Frog herd has had little monitoring or management. Aerial surveys were conducted in 2009 to determine the extent of caribou use in an area east of the Spatsizi herd and west of the Frog herd (S. McNay pers. comm., 2010; Figure 1). This area is currently recognized as having only a “trace occurrence” of caribou, but survey efforts are continuing to validate these findings. Radio collars were put on caribou in the Gataga herd in the early 2000s to examine herd range and seasonal habitat use. The Liard Plateau herd had been monitored only through harvest records until 2002 when the Government of Yukon put three satellite collars on cows. A fall 2002 composition survey showed less than 200 caribou in the herd and very few large bulls.

The Swan Lake herd was the subject of an intensive three-year study to determine herd size, survival, and distribution relative to nearby herds. The Atlin and Carcross herds were intensively monitored as part of the Southern Lakes Caribou Recovery Program. The Little Rancheria and Horseranch herds were studied intensively from 1997 to 1999 to determine herd size, survival rates, and movements relative to adjacent herds. The Spatsizi herd was studied fairly intensively in the early 1990s and the Level-Kawdy and Edziza herds have each been inventoried once.

The range of the Atlin herd was evaluated for potential impacts from mining developments. Significant work has been undertaken by the Taku River Tlingit First Nation (TRTFN), in partnership with BC Ministry of Environment and others that includes an on-going three-year effort to improve habitat modeling, complete a cumulative effects analysis, examine pregnancy rates and evaluate predator diets during the spring and early summer months. Additionally, TRTFN and BC jointly developed a harvest management plan for the herd, which included an intensive evaluation of all existing data and the development of a population model to understand likely future population trends under differing management scenarios. Finally, TRTFN and BC are currently engaged in land use planning which will consider the habitat requirements for caribou. They are committed to undertaking a strategic wildlife management planning effort that will include additional focus on population management for all caribou within the TRTFN traditional territory.

Predator control has a long history in BC, and although the NMP were rarely the ungulate targeted for protection, they did benefit from reductions in predators designed to benefit other species such as wild sheep. Government-sanctioned predator control to increase the number of NMP caribou has not occurred in the province within the last 10 years. Since 1976, all licensed caribou harvest in BC has been reported through compulsory inspections or surveys of hunter effort and harvest rates.

Northwest Territories

Caribou are the most important game species in the NT. Within the range of the NMP in the NT, there is relatively low harvest by First Nation or resident license holders (approximately 300-350 NMP/year). However, local hunters have recently reported that the number of First Nation and resident hunters has increased the hunting pressure in the MacMillan Pass, NT. Regardless, the NMP remain ranked as “secure” in the NT and there is no immediate cause for concern in-part because roads and access into all NMP ranges in the NT remain very limited (Working Group on General Status of NWT Species *in press*). Increased access (roads) into the range of NMP in the NT would make harvest management a significant issue.

There has been strict monitoring of the harvest of NMP by NT outfitters since 1991. Annual public reports on outfitted harvest levels are produced (see Larter and Allaire 2009 for example) and DNA tissue samples have been collected as much as possible from the outfitter harvest since 2002. There is mandatory reporting of resident harvest of the NMP.

The Bonnet Plume and Redstone herds range between the NT and YT. They are thought to be substantial in size (Veitch *et al* 2000; Olesen *et al* 2001), although they have not been recently surveyed (Appendix 2). Wildlife observation data have been collected and used to provide estimates of the fall (August-September) ratios of calves per 100 adult females and of adult females to adult males for years 1991 to 2009 for NMP in the NT (Appendix 5; GNWT unpublished data). Over the past 19 years there is no indication of increase or decrease in the estimates which strongly suggests that the Bonnet Plume and Redstone herds are stable. It should also be noted that some studies have suggested that the Redstone herd might be a complex of herds (Collin 1983; Creighton 2006). However, these interpretations are based on data from 10 collars and further work would be needed to clarify their status.

The most intensive studies on NMP in the NT have been on the Nahanni complex, where cooperative work has been conducted by the Parks Canada Agency (PCA), YT and NT governments since the mid-1990s. The most recent survey in this region was a census completed in fall 2009. Currently, there are NMP collared in the Nahanni Complex to look at movements and herd delineations. Preliminary results indicate that the collared individuals that wintered together actually calved with a number of different herds, including ones outside the complex.

The recent announcement of the expansion of Nahanni National Park Reserve (30,000 sq km), the ongoing Nááts'ihch'oh National Park initiative (7,600 sq km), the proposed Shúhtagot'ine Néné Protected Area (candidate National Wildlife Area, Canadian Wildlife Service; 25,500 sq km), the Conservation Zones in the mountains in the Sahtu Land Use Plan (Sahtu Land Use Planning Board 2010), and the proposed Ts'ude niline Tu'eyeta Protected Area (candidate National Wildlife Area, CWS; 15,000 sq km but only ca. 1000 sq km in Mackenzie Mountains), in combination with a lack of a timber industry, are all helping to keep the habitat for the NMP in the NT stable and secure in the Mackenzie Mountains.

Alaska

Alaska is a range jurisdiction for the Chisana herd and manages the herd in collaboration with other governments and affected First Nations and Tribes on both sides of the Alaska/Yukon border.

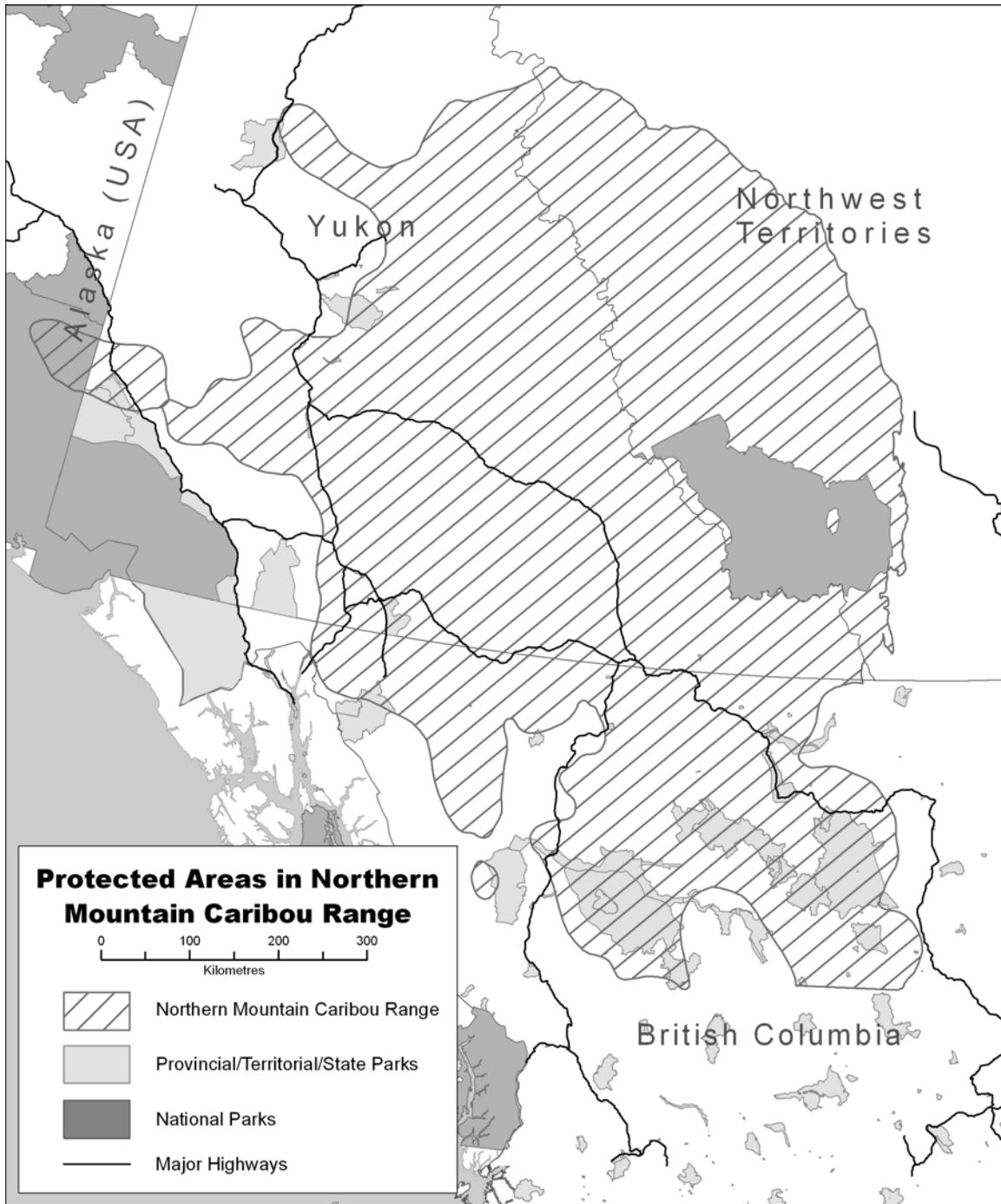


Figure 4: Protected areas within the range of the Northern Mountain population of woodland caribou.⁵

⁵ Protected areas designations within Provincial/Territorial/State Parks grouping includes: Habitat Protection Areas, Ecological Reserves, Territorial and Provincial Parks, Natural Environment Parks, Wildlife Sanctuaries Wilderness Preserves and Special Management Areas.

2. MANAGEMENT

Management of woodland caribou herds comprising the NMP is dependent on the following recommended management principles, goals, objectives and recovery measures. It is anticipated that, if needed, herd-specific objectives and recovery measures will be developed in regional or herd specific management plans that are consistent with this plan. These herd-specific management plans will be developed in conjunction with affected First Nations, local communities and relevant wildlife management boards and councils. It is recognized that the implementation of all of the recovery measures identified in this plan would not be required for each herd; rather, select measures will be utilized to achieve herd-specific interests. Implementation of herd-specific management objectives and goals are subject to the priorities and budgetary constraints of local management authorities.

The range of the NMP spans the traditional territories and “statement of intent” boundaries of 33 First Nations in BC, YT and NT (Figures 2 and 3). Management of the NMP must recognize that these caribou have been harvested for thousands of years by First Nations hunters. Therefore, First Nations are key partners in developing and implementing a successful management plan. However, it must also recognize that, in the past 200 years, access to once-remote caribou ranges has increased dramatically and hunting technology has made great advances. The management principles below are intended to be an aid in the local development of regional and herd specific plans. Careful management and stewardship can facilitate the maintenance of the NMP for future generations.

2.1 Management Principles

1. It is recognized that the NMP has long-standing cultural value, is an important food resource for First Nations’ peoples and northern communities within its range, and is valued by all Canadians.
2. Plan implementation must recognize and respect the government to government relationships that exist between First Nations’ peoples (those with or without final Land Claim Agreements), and federal, territorial, provincial and state governments; as well as the responsibilities of wildlife management boards as provided for in the land claim agreements.
3. Harvest management must reflect priorities as set out in Land Claim Agreements, First Nation Treaties and the inherent rights of non-treaty First Nation communities and individuals.
4. Management of the NMP must use the best available information sources (i.e. traditional knowledge, local knowledge, science), respecting First Nation systems of wildlife management and traditional laws, and adapt to include new knowledge, research and management approaches.

5. NMP rely on intact, healthy ecosystems.
6. Consistent with the precautionary principle, required recovery measures should not be delayed even though detailed information is limited or lacking.
7. Caution must be exercised to avoid unanticipated effects of human activities to the NMP and their habitat.
8. Management of the NMP and their key habitat will depend on the ability of responsible authorities to develop and implement cost-effective and timely programs and approaches.
9. Methods to manage and conserve the NMP must pose the least possible risk to individual animals. When intensive management is considered, relative costs and benefits must be carefully assessed before proceeding.
10. Successful management of the NMP will require the commitment, collaboration and cooperation among management authorities, First Nations, wildlife management boards, local communities, landowners, industry and other interested parties.

2.2 Management Goal

The management goal for the NMP recognizes that caribou, like other wildlife, have ecological, cultural and spiritual values along with consumptive uses. **The goal of the management plan is to prevent the NMP from becoming threatened or endangered, by having responsible agencies cooperatively work together to care for caribou and their habitat.**

This goal will be accomplished by achieving the following results. Progress towards achieving these results will be reevaluated every 5 years.

- Herds comprising the NMP are maintained or recovered, and populations operate within the natural range of variability;
- The ecological integrity of key habitats and ecosystems required by the NMP are maintained; and
- First Nations, local communities, government agencies and other interested parties are meaningfully involved in the stewardship of the NMP and its habitats.

2.3 Management Objectives

The following potential management objectives and considerations are meant to serve as guidance to provinces and territories, as well as local management planning teams. In most cases, implementation of these objectives and management considerations would need to be determined through the local development of herd-specific management plans, and are subject to competing management priorities and fiscal constraints.

- Objective 1:** Determine herd status and trends over time.
- Objective 2:** Manage harvest for sustainable use.
- Objective 3:** Assess health risks and maintain caribou health.
- Objective 4:** Increase understanding of the dynamics of predator-prey systems and potential competition with other herbivores.
- Objective 5:** Identify and assess the quality, quantity and distribution of important habitats.
- Objective 6:** Manage and conserve important habitats to support healthy caribou herds.
- Objective 7:** Promote caribou conservation of the NMP through environmental and cumulative effects assessments.
- Objective 8:** Foster opportunities to share knowledge, information and develop education and stewardship programs.

These management objectives are covered in three broad sections: Population Management, Habitat Management, and Communication and Involvement. The Population Management objectives (#1-4) deal with monitoring, harvest, health, and species interactions. Habitat Management objectives (#5-7) cover the identification and conservation of habitat for the continued use by the NMP to support healthy caribou populations. The sharing of knowledge and promotion of stewardship are contained in the Communication and Involvement objective (#8). Proposed recovery measures for each of these Objectives are presented in Section 2.4.1; priorities and timelines for implementing recovery measures are presented in Section 3.1.

2.4 Recovery Measures

For management purposes, caribou herds have been divided into five types based on herd size or performance in the short-term (3-5 years):

1. Small, isolated

Herds that have <200 adults and are geographically isolated from other herds. Geographic isolation results when there is no emigration or immigration among adjacent herds. An estimate of two hundred adults is based on previous experience in YT; however, this number may be updated when new information becomes available. Despite the trend, these herds require special consideration as they are inherently vulnerable due to their small population size. It is important to recognize, however, that some herds may occur naturally at low numbers which are not the result of a historic or current decline.

2. Stable

Herds where loss due to mortality and emigration equals increases due to recruitment and immigration resulting in no appreciable increase or decrease over the short-term (3-5 years) in herd size or demographic indices.

3. Increasing

Herds where increase due to recruitment and immigration exceeds losses due to mortality and emigration such that overall herd size or demographic indices show an increasing trend over the short-term (3-5 years).

4. Decreasing

Herds where loss due to mortality and emigration exceeds increases due to recruitment and immigration such that the overall herd size or demographic indices show a decreasing trend over the short-term (3-5 years).

5. Unknown

Herds where information on size, trend or demographics is lacking. This lack of data may be due to remoteness of herd, cost and logistics of sampling and differing research priorities.

Figure 5 is a decision key that was developed to determine the need for recovery measures, monitoring and research for a herd where information is lacking or there is a conservation concern. "Population" in this decision key refers to the adult population of an individual herd. See sections 2.4.1, 2.4.2 and 2.4.3 for specific recovery measures.

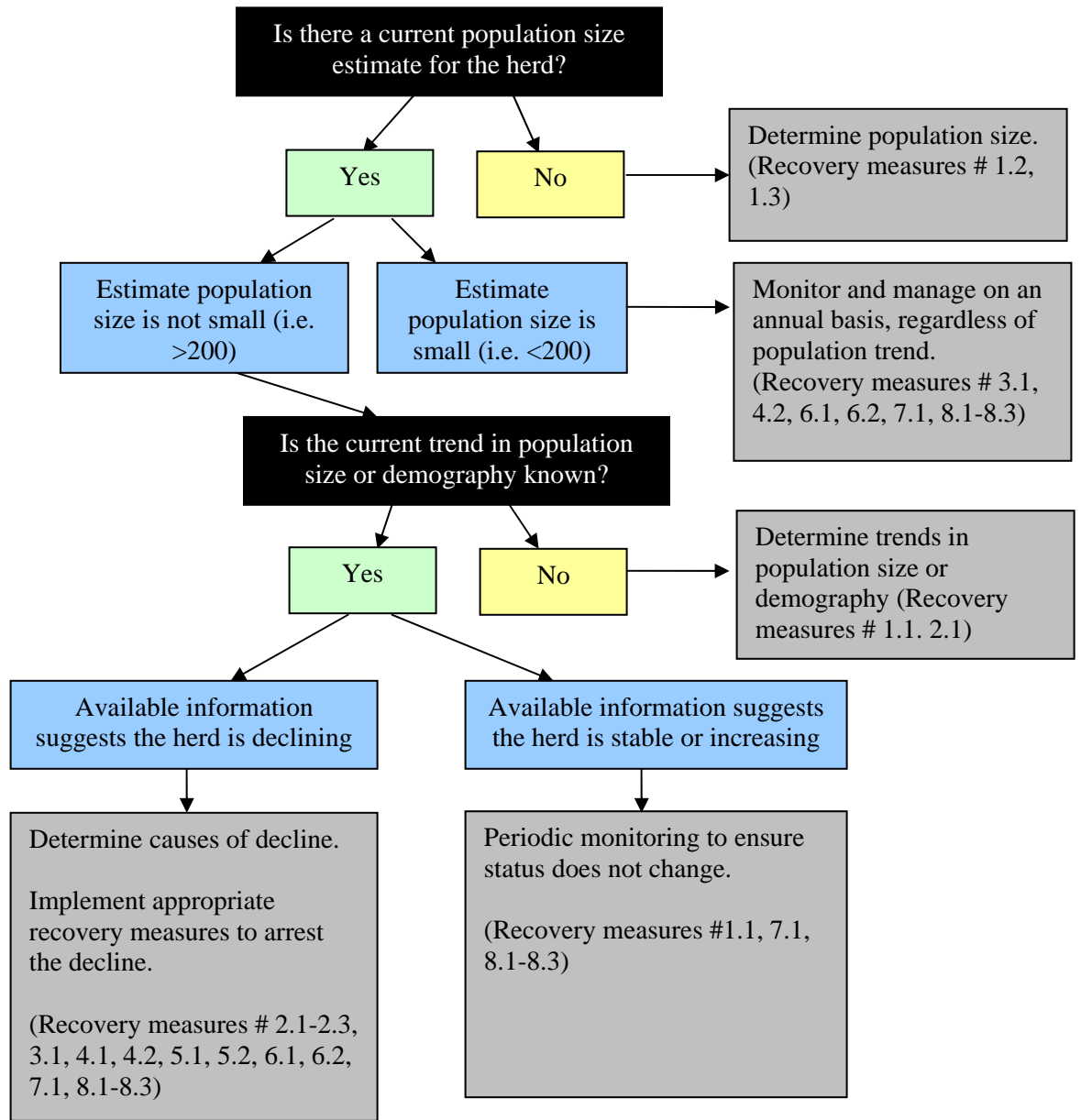


Figure 5. Decision tree to guide what potential recovery measures may be useful for a herd, depending on its population size and trend. “Population” in this decision key refers to the adult population of an individual herd. Gray shaded boxes are final outcomes.

2.4.1 Population Management

Objective 1: Determine herd status and trends over time.

Recovery measures:

- 1.1 Conduct monitoring to track herd distributions, trends and composition.
- 1.2 Collect baseline information (numbers and map distribution).
- 1.3 Based on priorities, conduct census of herd.

Objective 2: Manage harvest for sustainable use.

Recovery measures:

- 2.1 Track harvest data to provide information on age and composition of herd.
- 2.2 Use population modelling to develop sustainable harvest rates and thresholds below which harvesting restrictions should be considered.
- 2.3 Develop harvest strategies within and among jurisdictions, particularly for transboundary herds (adhere to Management Principle 3.).

Objective 3: Assess health risks and maintain caribou health.

Recovery measures:

- 3.1 Assess natural and human-caused health risks that limit or influence the population (disease and parasites, contaminants, genetic composition and climate change).

Objective 4: Increase understanding of the dynamics of predator-prey systems and potential competition with other herbivores.

Recovery measures:

- 4.1 Map distribution and conduct census of predators and other large herbivores.
- 4.2 Assess the relative importance of predators and/or competitors when identified as a possible limiting factor (e.g. determine if intensive management of other species applicable to the NMP).

2.4.2 Habitat Management

Objective 5: Identify and assess the quality, quantity and distribution of important habitats.

Recovery measures:

- 5.1 Delineate key habitats (e.g. winter range, calving grounds, post-calving summer range, rutting range, insect avoidance areas, travel/movement corridors, mineral licks, predator avoidance sites or other locally important sites).
- 5.2 Map and evaluate current habitat availability in relation to human footprint, hunting activity, connectivity, fire, forest disease outbreaks, access and development (including seasonal shifts, barriers to movement and overlaps).

Objective 6: Manage and conserve important habitats to support healthy caribou herds.

Recovery measures:

- 6.1 Conserve key habitats utilizing existing land designation tools (Appendix 7).
- 6.2 Manage human disturbances of caribou and their habitat including mechanized (e.g. off-road vehicles, snowmobiles) and non-mechanized access.

Objective 7: Promote conservation of the NMP of woodland caribou through environmental and cumulative effects assessments.

Recovery measures:

- 7.1 Provide input into land and resource use planning forums (e.g. Environmental Assessment/Land Use Planning), including cumulative effects, to maintain caribou populations.

2.4.3 Communication and Involvement

Objective 8: Foster opportunities to share knowledge, information and develop education and stewardship programs.

Recovery measures:

- 8.1 Develop products (e.g. print, web-based) to disseminate information about the NMP and management plan implementation.
- 8.2 Develop educational programs (or existing programs) about caribou.
- 8.3 Support and develop stewardship programs and projects (Appendix 8).

2.5 Measuring Progress

To meet the goal and objectives of this management plan, it is essential to measure progress on the implementation of the plan. Performance measures are necessary for measuring progress in conserving caribou and their habitat in a manner recommended by this plan. Under SARA, the competent Minister must monitor the implementation of the management plan and assess its implementation every five years and every subsequent five-year period until its objectives have been achieved. COSEWIC reviews the classification of each species at risk at least once every 10 years or at any time if it has reason to believe that the status of the species has changed significantly. Based on these schedules, the timeline for measuring progress for this management plan is once every five years.

Caribou herd sizes and trends, the conservation of habitat and the reduction in threats affecting herds should be used as the main performance measures to gauge success of caribou conservation in addition to progress made in implementing recovery measures. **The ultimate performance measure of the management plan is that the NMP do not become further at-risk (i.e. threatened or endangered) when reassessed by COSEWIC.** Specific performance measures to gauge successful implementation of the plan include:

Conservation of the caribou

1. All 36 caribou herds in the NMP remain extant.
2. Knowledge of the distribution and status of all herds is improved.
3. The distribution of caribou on the landscape does not decrease.
4. Declines in herd size or other demographic indices are stabilized and, where feasible, reversed.
5. Anthropogenic threats to the herds are reduced or eliminated.

Conservation of caribou habitat

1. Key caribou habitats are identified and mapped.
2. Measures are in place that effectively protect key caribou habitat.

Cooperative management of caribou and their habitat

1. Small herds and those needing special attention (e.g. declining herds) have herd-specific management plans developed collaboratively with affected First Nations, local communities and other relevant agencies and organizations.
2. Affected First Nations and local communities are engaged in caribou monitoring, management, and recovery efforts.

3. IMPLEMENTATION

The management objectives and recovery measures presented above are to be used as guidelines when developing herd-specific management plans. The extent of herd-specific recovery measures will depend on threats identified by local management authorities. Implementation is subject to the priorities and resource constraints of local responsible authorities (See section 3.2).

In the early stage of plan implementation, agencies working on multi-jurisdiction herds should coordinate their respective approaches and methods for monitoring populations and apply the decision key that has been developed for this plan (Figure 5). In all instances efforts should be made to coordinate monitoring and sampling methods among jurisdictions and incorporate traditional ecological knowledge into the decision-making processes. Herd-level management strategies should also recognize that with increasing climatic variability, ecological complexity will increase. Caribou management should account for and include mechanisms to deal with this uncertainty.

Notes on the Implementation Schedule:

- Scenarios – Recovery measures may differ based on the status of each herd. Therefore, priorities are divided up into four scenarios; small herd size (<200), declining population trend, stable/increasing population trend or herds where the size and population trend is unknown. Stable/increasing population trend designations are combined in the plan because they require similar priority levels and recovery measures.
- Priority – Each recovery measure is assigned a high, medium and low priority for implementation. These designations are designed to be relative to each other and to other recovery measures within the plan.
- Herd-specific – Some recovery measures are focused at the individual herd level using management plan objectives to provide overall guidance and direction.
- Timeline – The year that the recovery measure should be initiated once the herd is identified as a conservation concern. Timeline is defined as ‘ongoing’ for herds where recovery measures should be conducted on a yearly basis. The timeline is based on a 5-year implementation schedule.

3.1 Implementation Schedule

3.1.1 Population Management

Objective 1: Determine herd status and trends over time.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
1.1	Conduct monitoring to track herd distributions, trends and composition	High	High	Medium	Low	Low numbers	Yes	2
1.2	Collect baseline information (numbers and map distribution)	Medium	Medium	Low	High	Low numbers	Yes	1
1.3	Based on priorities, conduct census of herd.	High	Medium	Low	High	Low numbers	Yes	1

These recovery measures should be conducted on herds where information is lacking or there is a conservation concern. Survey and monitoring techniques should be coordinated among jurisdictions to aid in comparisons among herds within the NMP. In addition to science-based techniques, TEK and community information could be used to determine and track changes and trends in distribution (e.g. where have people observed concentrations of caribou in the past). When trends are known, further research should be conducted to discover potential cause of change (Appendix 9).

Objective 2: Manage harvest for sustainable use.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
2.1	Track harvest data to provide information on age and composition of herd.	High	High	High	High	Hunting	Yes	Ongoing
2.2	Use population modelling to develop sustainable harvest rates and thresholds below which harvesting restrictions should be considered.	High	High	Medium	Low	Hunting	Yes	4
2.3	Develop harvest strategies within and among jurisdictions, particularly for transboundary herds. (Adhere to Management Principle 3.)	High	High	High	High	Hunting	Yes	3

Objective 3: Assess health risks and maintain caribou health.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
3.1	Assess natural and human-caused health risks that limit or influence the population (body condition, disease and parasites, contaminants, and genetic composition, climate change).	Medium	High	Low	Medium	Disease, Parasites	No	4

There are a number of emerging threats to the health of the NMP (e.g. game farming, climate change). These recovery measures are important to document, monitor and track changes in health risks to caribou. Jurisdictions should coordinate development and implementation of standardized protocols for monitoring caribou health (e.g. CARMA). This data could lead to a better understanding of the natural and human-caused health risks that limit or influence the population under different climate change scenarios. First Nations and communities can contribute to the assessment of health risks to caribou by working with hunters to monitor and/or determine body condition, disease and parasites, contaminants and genetic composition.

Objective 4: Increase understanding of the dynamics of predator-prey systems and potential competition with other herbivores.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
4.1	Map distribution and census of predators and other large herbivores	High	High	Low	Low	Predation	Yes	5
4.2	Assess the relative importance of predators and/or competitors when identified as a possible limiting factor (e.g. determine if intensive management of other species applicable to the NMP).	Medium	High	Low	Low	Predation	Yes	3

Woodland caribou are often a secondary prey species of wolves and bears where they co-occur with moose. Increasing diversity and abundance of other prey species from reintroductions (e.g. elk and bison) and climate change (e.g. deer) may also increase predation risk to caribou. Competition for food between caribou and other herbivores may also occur if food is a limiting factor. Other ungulates may also transmit disease to caribou populations if habitat overlap occurs. Therefore, it is important to understand the dynamics of this multiple predator-prey system.

3.1.2 Habitat Management

Objective 5: Identify and assess the quality, quantity, and distribution of important habitats.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
5.1	Delineate key habitats (e.g. winter range, calving grounds, post-calving summer range, rutting range, insect avoidance areas, travel/movement corridors, mineral licks, predator avoidance sites or other locally important sites).	High	High	High	High	Habitat loss, degradation and fragmentation	Yes	3
5.2	Map and evaluate current habitat availability in relation to human footprint, hunting activity, connectivity, fire, forest disease outbreaks, access and development (including seasonal shifts, barriers to movement and overlaps).	Medium	Medium	Low	Low	Habitat loss, degradation and fragmentation	Yes	4

Objective 6: Manage and conserve habitat to support healthy caribou herds.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-Specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
6.1	Conserve key habitats utilizing existing land designation tools (Appendix 7)	Medium	High	Medium	Medium	Habitat loss, degradation and fragmentation	Yes	3
6.2	Manage human disturbances on caribou and their habitat including mechanized (e.g. off-road vehicles, snowmobiles) and non-mechanized access.	Medium	High	Medium	Medium	Access and disturbance, Habitat loss, degradation and/or fragmentation	Yes	3

Refer to Appendix 7 for techniques that could be used to conserve caribou habitat.

Objective 7: Promote conservation of the NMP of woodland caribou through environmental and cumulative effects assessment.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
7.1	Provide input into land and resource use planning forums (e.g. Environmental Assessments /Land Use Planning), including cumulative effects, to maintain caribou populations	Medium	High	Medium	Medium	Habitat loss, degradation and fragmentation	No	Ongoing

3.1.3 Communication and Involvement

Objective 8: Foster opportunities to share knowledge, information and develop education and stewardship programs.

Recovery measure		Priority based on scenarios				Threats or concerns addressed	Herd-specific	Recommended Timeline (year initiated)
		small	declining	stable/increasing	unknown			
8.1	Develop products (e.g. print, web-based) to disseminate information about the NMP and management plan implementation.	Medium	High	Low	Low	Lack of engagement	No	Ongoing
8.2	Develop educational programs (or the adaptation of existing) about caribou.	Medium	High	Low	Low	Lack of engagement	No	Ongoing
8.3	Support and develop stewardship programs and projects (See Appendix 8)	High	High	Low	Low	Lack of engagement	Yes	Ongoing

Refer to Appendix 8 for techniques that could be utilized to promote greater stewardship of caribou.

3.1.4 Responsible Agencies

Table 1. The agencies, governments, boards and councils responsible for each herd comprising the Northern Mountain population of woodland caribou in Canada.

Herd	Federal/ International	Provincial/ Territorial	Boards/Councils	First Nation Governments
Aishihik		YT ¹	YFWMB, ARRC, CRRC	CAFN, LSCFN, KFN, WRFN
Atlin		BC/YT	TRRC, YFWMB	TRTFN, TTC, CTFN
Bonnet Plume		YT/NT	GRRB, DDRRC, MDRRC, YFWMB	TH, NND, Tetlit Gwich'in
Carcross	PCA	BC/YT	YFWMB, TRRC, LRRC, KTC	TTC, TRTFN, CTFN, KDFN, TKC
Chisana	EC/AK	YT	YFWMB, ARRC, DKRRC	WRFN, KFN
Clear Creek		YT	YFWMB, DDRRC	NND, TH
Coal River (Nahanni Complex)	PCA	YT/NT	YFWMB	Dehcho First Nation, Acho Dene Koe Band, LFN
Edziza		BC	KTC, KDC, TCC	Tahltan, Kaska Dena
Ethel Lake		YT	YFWMB, MDRRC, SRRC	SFN, NND
Finlay		BC	YFWMB, KDC	Tsay Keh Dene Band, Kaska Dena, TLFN, Treaty 8 First Nations, Nak'azdli Band
Finlayson		YT	TRRC, KTC, KDC, YFWMB	Kaska Dena, TTC
Frog		BC	KTC, KDC, TCC	Kaska Dena, Tahltan, TLFN, Treaty 8 First Nations
Gataga		BC	KTC, KDC	Kaska Dena, Treaty 8 First Nations

Herd	Federal/ International	Provincial/ Territorial	Boards/Councils	First Nation Governments
Hart River		YT	DDRRC, MDRRC	NND, TH
Horseranch		BC	KTC, KDC	LFN, Kaska Dena, TLFN, Treaty 8 First Nations
Ibex		YT	YFWMB	CTFN, KDFN
Klaza		YT	YFWMB, CRRC, SRRC	SFN, LSCFN
Kluane	PCA	YT	YFWMB, ARRC, DKRRC	KFN, WRFN
La Biche (Nahanni Complex)	PCA	YT/NT	YFWMB	Dehcho First Nation, Acho Dene Koe Band, LFN
Laberge		YT	YFWMB, LRRC, TKC	KDFN, TKC, TTC, CTFN
Level-Kawdy		BC	YFWMB, TRRC, KTC, KDC, TCC	Tahltn, TRTFN, TTC, Kaska Dena
Liard Plateau (Crow River)		BC/YT	YFWMB, KTC, KDC	LFN, Treaty 8 First Nations, Kaska Dena
Little Rancheria		BC/YT	TRRC, KTC, KDC, YFWMB	LFN, Kaska Dena, TTC, Treaty 8 First Nations
Moose Lake		YT	MDRRC, SRRC, KDC	Kaska Dena, NND, SFN
Muskwa		BC	KTC, KDC	Treaty 8 First Nations, Kaska Dena,
S. Nahanni (Nahanni Complex)	PCA	YT/NT	SRRB, SDC, KDC, YFWMB	Dehcho First Nation, Acho Dene Koe Band, LFN, Sahtu, Kaska Dena
Pelly		YT	CRRC, KTC, KDC, TKC	LSCFN, Kaska Dena, TKC
Pink Mountain		BC	KTC, KDC	Tsay Keh Dene Band, Kaska Dena, Treaty 8 First Nations
Rabbit		BC	KTC, KDC	Kaska Dena, TLFN, Treaty 8 First Nations
Redstone	PCA	YT/NT	YFWMB, GRRB, SRRB,	NND, Sahtu, Tetlit Gwitch'in, Dehcho

Herd	Federal/ International	Provincial/ Territorial	Boards/Councils	First Nation Governments
			KTC, KDC, MDRRC	First Nation, Kaska Dena
Spatsizi		BC	KTC, KDC, TCC	Tahltan, Tsay Keh Dene, TLFN, Gitksan, Kaska Dena, Treaty 8 First Nations
Swan Lake (Jennings)		BC	TRRC, KTC, KDC	TTC, Kaska Dena, Tahltan
Tatchun		YT	CRRC, SRRC, KTC, KDC	LSCFN, SFN, Kaska Dena
Tay River		YT	MDRRC, SRRC, KDC	Kaska Dena, NND, SFN
Tsenaglode		BC	KTC, KDC, TCC	Tahltan, Kaska Dena, Treaty 8 First Nations
Wolf Lake		YT	KTC, KDC, TRRC	Kaska Dena, TTC

¹ See Appendix 10 for a list of acronyms.

3.2 Transboundary Coordination

A number of the NMP herds range across the YT-BC, YT-NT, and the YT-Alaska borders, across multiple First Nation traditional territories and onto lands managed by Parks Canada Agency (Table 1). Effective management and conservation will be most readily achieved if jurisdictions coordinate efforts.

Harvest management must consider the potential for varying rates of harvest in accessible populations, where management approaches may not be consistent across jurisdictional boundaries. When herd numbers are lower than what would be expected within the range of natural variation or declining, responsible agencies should discuss, coordinate and monitor the entire harvest and if needed, jointly allocate a sustainable number of permits through government-to-government agreements or a memorandum of understanding.

The relative management priority of the NMP herds between the YT, NT and BC jurisdictions varies. The NMP and Porcupine Caribou herds are both high priorities for all land managers due to their importance to First Nations' peoples and substantial population declines. In the NT, Boreal and Peary caribou are listed as threatened and endangered by SARA and therefore represent a generally higher conservation priority for the territorial government. In BC, woodland caribou management in recent years has been directed more at Boreal caribou and Southern Mountain caribou recovery because these populations are listed as "threatened" by SARA. Different First Nation governments place different priorities on the management of caribou herds that range within their traditional territories. This difference in focus complicates management significantly, but all agencies, jurisdictions and First Nation governments have agreed to establish baseline monitoring for herd size, population trend and seasonal range use, paying particular attention to herds that are road-accessible. In addition, increased cooperation, data sharing, standardization of survey and other monitoring methods, and coordination across borders will ensure that herds can be easily compared to one another.

Northern landscapes are experiencing increasing development pressures and the status of land claims, protected areas planning and land management processes vary across the NT, BC, and YT. Northern BC has unsettled land claims, as do southeast YT and the Dehcho region in the NT. Much of the rest of YT and all other portions of NT (within the range of the NMP) have settled land claims and wildlife management structures (e.g. wildlife management boards, renewable resources councils) are in place. In addition, NT has an active Protected Areas Strategy where YT does not, and BC has a provincial Land Use and Protected Areas planning regime.

Land managers in BC and YT are the provincial, First Nations and territorial governments. In the NT, the federal Department of Indian and Northern Affairs along with the corporations for privately held First Nation lands and Land and Water Boards established under lands claims are the primary land managers for the majority of lands within the range of NMP. Parks Canada Agency manages lands used by NMP that occur within Nahanni National Park Reserve in the NT, Kluane National Park and Reserve and Chilkoot Trail National Historic site in the YT. These varying conditions influence the ways in which trans-border caribou herds can be managed. All agencies and jurisdictions should work cooperatively for the benefit of the NMP and seek ways to use land management tools in complementary ways across their borders.

4. REFERENCES

- Adams, L.G., B.W. Dale, and L.D. Mech. 1995. Wolf predation on caribou calves in Denali National Park, Alaska. Pages 245-260 in: Carbyn, L.N., S.H. Fritts, and D.R. Seip. Editors. 1995. Ecology and Conservation of Wolves in a Changing World. Canadian Circumpolar Institute, Occasional Publication No. 35, Edmonton, Alberta.
- Banfield, A.W.F. 1961. A revision of the reindeer and caribou, genus Rangifer. National Museum of Canada, Bulletin No. 177. Queen's Printer, Ottawa. 137 pp.
- Banfield, A.W.F. 1974. Mammals of Canada. National Museum of Canada. The University of Toronto Press. 438 pp.
- Bergerud, A.T. 1971. The population dynamics of Newfoundland caribou. Wildlife Society. Wildlife Monographs no. 025. Washington, USA. 55 pp.
- Bergerud, A.T. 1978. The Status and Management of Caribou in B.C.. B.C. Fish and Wildlife Branch Report. 150 pp.
- Bergerud, A.T. 1980. A review of population dynamics of caribou and wild reindeer in North America. Pages 556-581 in Proceedings 2nd International Reindeer/Caribou Symposium. E. Reimers, E. Gaare, and S. Skjennberg (eds). Direktoratet for vilt og ferskvannsfisk, Trondheim, Norway.
- Bergerud, A.T. 1988. Caribou, wolves and man. Trends in Ecological Evolution 3:68-72.
- Bergerud, A.T. 2000. Caribou. Page 778 in S. Demarais and P. R. Krausman, editors. Ecology and Management of Large Mammals in North America. Prentice Hall, New Jersey.
- Bergerud, A.T., H.E. Butler and D.R. Miller. 1984. Antipredator tactics of calving caribou: dispersion in mountains. Canadian Journal of Zoology 62:1566-1575.
- Bergerud, A.T., and J.P. Elliot. 1986. Dynamics of caribou and wolves in northern British-Columbia. Canadian Journal of Zoology 64:1515-1529.
- Bergerud, A.T., and R. E. Page. 1987. Displacement and dispersion of parturient caribou at calving as antipredator tactics. Canadian Journal of Zoology 65:1597-1606.
- Bergerud, A.T., and J.P. Elliot. 1998. Wolf predation in a multiple-ungulate system in northern British Columbia. Canadian Journal of Zoology 76:1551-1569.
- Bergerud, A.T., S.N. Luttich, and L. Camps. 2008. The return of caribou to Ungava. McGill-Queen's University Press, London & Ithaca. 586 pp.
- Boertje, R.D., P. Valkenburg, and M.E. McNay. 1996. Increases in moose, caribou, and wolves following wolf control in Alaska. Journal of Wildlife Management 60(3):474-489.

- British Columbia Forest Service. 1990. Old growth forests: problem analysis. B.C. Ministry of Forests, Victoria.
- British Columbia Ministry of Forest and Range (BCMOFR). 2008. Facts about BC's mountain pine beetle. Available:
http://www.for.gov.bc.ca/hfp/mountain_pine_beetle/MPB_Facts.pdf. (accessed Nov. 17, 2009)
- British Columbia Ministry of Environment. Conservation Framework. 2009.
<http://www.env.gov.bc.ca/conservationframework/whatis.html>. (accessed Nov. 12, 2009).
- Calef, G.W., E.A. Debock and G.M. Lortie. 1976. Reaction of barren-ground caribou to aircraft. *Arctic* 29:201-212.
- Calef, G. 1981. Caribou and the Barren-lands. Firefly Books Ltd., Toronto, Canada.
- Chisana Caribou Herd Working Group. 2010. Management Plan for the Chisana Caribou Herd: 2010-2015. Government of Yukon, Department of Environment, Whitehorse, YT. 30pp.
- Christensen, J. H., Hewitson, B., Busuioc, A., Chen, A., Gao, X., Held, R., Jones, R., Kolli, R.K., Kwon, W.K., Laprise, R., Magana Rueda, V., Mearns, L., Menendez, C.G., Räisänen, J., Rinke, A., Sarr, A., Whetton, P., Arritt, R., Benestad, R., Beniston, M., Bromwich, D., Caya, D., Comiso, J., de Elia, R., Dethloff, K. et al. 2007. Regional climate projections, *Climate Change, 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, University Press, Cambridge, Chapter 11, 847-940.
- Chubbs, T. E., L. B. Keith, S. P. Mahoney, and M. J. McGrath. 1993. Responses of woodland caribou (*Rangifer tarandus caribou*) to clear-cutting in east-central Newfoundland. *Canadian Journal of Zoology* 71:487-493.
- Collin, G. 1983. Developing a management plan for the Moose Horn River Caribou Herd, Mackenzie Mountains, N.W.T. MSc. Thesis, University of Calgary. 166 pp.
- Courtois, R., J. P. Ouellet, L. Breton, A. Gingras, and C. Dussault. 2007. Effects of forest disturbance on density, space use, and mortality of woodland caribou. *Ecoscience* 14:491-498.
- Creighton, T. B. 2006. Predicting mountain woodland caribou habitat in the Mackenzie Mountains through correlations of ARGOS collar locations and MODIS spectral reflectance. MSc. Thesis, Birbeck College, University of London. 112 pp.
- Crete, M., and A. Desrosiers. 1995. Range expansion of coyotes, *Canis latrans*, threatens a remnant herd of caribou, *Rangifer tarandus* in southeastern Quebec. *Canadian Field-Naturalist* 109:227-235.
- Curatolo, J.A., and S.M. Murphy. 1986. The effects of pipelines, roads and traffic on the movement of caribou, *Rangifer tarandus*. *Canadian Field-Naturalist* 100:218-225.

- D'Arrigo, R.D., R.K. Kaufmann, N. Davi, G.C. Jacoby, C. Laskowski, R.B. Myneni and P. Cherubini. 2004. Thresholds for warming-induced growth decline at elevational tree line in the Yukon Territory, Canada. *Global Biochemical Cycles* 18.
- Dyer, S.J., J.P. O'Neill, S.M. Wasel, and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. *Journal of Wildlife Management* 65:531-542.
- Environment Yukon. 1996. Woodland caribou management decision guidelines. Available: <http://www.yfwcm.ca/species/caribou/guidelines.php> (accessed Nov. 17, 2009)
- Farnell, R., R. Florkiewicz, G. Kuzyk, and K. Egli. 1998. The status of *Rangifer tarandus* caribou in Yukon, Canada. *Rangifer*:131-137.
- Farnell, R., and J. McDonald. 1987. The influence of wolf predation on caribou mortality in Yukon's Finlayson caribou herd. *Proceedings of the North American Caribou Workshop* 3:52-70.
- Fauria, M.M., and E.A. Johnson. 2008. Climate and wildfires in the North American boreal forest. *Philosophical Transactions of the Royal Society Biological Sciences* 363:2317-2329.
- Flannigan, M.D., Krawchuck, M.A. and W.J. de Groot. 2009. Implications of changing climate for global wildland fire. *International Journal of Wildland Fire* 18:483-507.
- Garbutt, R. B. Hawkes, and E. Allen. 2006. Spruce beetle and the forests of the southwest Yukon. Available: http://dsp-psd.pwgsc.gc.ca/collection_2007/nrcan-rncan/Fo143-2-406E.pdf (accessed November 17, 2009)
- Gasaway, W.C., Stephenson, R.O., Davis, J.L., Shepherd, P.E.K., and Burris, O.E. 1983. Interrelationships of wolves, prey, and man in interior Alaska. *Wildl. Monogr.* No. 84.
- Geist, V. 1991. On an objective definition of subspecies, taxa as legal entities, and its application to *Rangifer tarandus* Lin. 1758. Pages 1-76 in Butler, C.E. and Mahoney, S.P. (eds.). *Proceedings 4th North American Caribou Workshop*, St. John's, Newfoundland, 1989.
- Gustine, D.D., K.L. Parker, R.J. Lay, M.P. Gillingham, and D.C. Heard. 2006. Calf survival of woodland caribou in a multi-predator ecosystem. *Wildlife Monographs* 165:1-32.
- Harrington, M.G. 1996. Fall rate of prescribed fir-killed ponderosa pin. *USDA Forest Service Intermountain Research Station Research Paper* 489:1-&.
- Hayes, R.D., R.S. Farnell, R.M.P. Ward, J. Carey, M.M. Dehn, G.W. Kuzyk, A.M. Baer, C.L. Gardner and M. O'Donoghue. 2003. Experimental reduction of wolves in the Yukon: ungulate responses and management implications. *Wildlife Monographs*: 152: 35 pp.
- Heard, D., and K. Vagt. 1998. Caribou in British Columbia: A 1996 status report. *Rangifer*, Special Issue No. 10:117-123.

- Ion, P.G., and G.P. Kershaw. 1989. The selection of snowpatches as relief habitat by woodland caribou (*Rangifer tarandus caribou*), Macmillan Pass, Selwyn/Mackenzie Mountains, Northwest Territories, Canada. *Arctic and Alpine Research* 21: 203-211.
- James, A.R.C. 1999. Effects of Industrial Development on the Predator-Prey Relationship Between Wolves and Caribou in Northeastern Alberta. Dissertation, University of Alberta, Edmonton, AB.
- James, A.R.C., and A.K. Stuart-Smith. 2000. Distribution of caribou and wolves in relation to linear corridors. *Journal of Wildlife Management* 64:154-159.
- James, A.R.C., S. Boutin, D.M. Hebert and A.B. Rippin. 2004. Spatial separation of caribou from moose and its relation to predation by wolves. *Journal of Wildlife Management* 68:799-809.
- Johnson, C.J., K.L. Parker, and D.C. Heard. 2001. Foraging across a variable landscape: behavioral decisions made by woodland caribou at multiple spatial scales. *Oecologia* 127:590-602.
- Joly K. B.W. Dale, W.B. Collins, and L.G. Adams. 2003. Winter habitat use by female caribou in relation to wildland fires in Interior Alaska. *Canadian Journal of Zoology* 81:1192-2001.
- Kelsall, J.P. 1984. Status Report on the Woodland Caribou *Rangifer tarandus dawsoni* and *Rangifer tarandus caribou*. COSEWIC, Ottawa. 99 pp.
- Kinley, T.A., and C.D. Apps. 2001. Mortality patterns in a subpopulation of endangered mountain caribou. *Wildlife Society Bulletin* 29:158-164.
- Klein, D.R. 1982. Fire, lichens, and caribou. *Journal of Range Management*. 35:390-395.
- Kuzyk G.W., M.M. Dehn and R. S. Farnell. 1999a. Body size comparisons of alpine and forest wintering woodland caribou in Yukon. *Canadian Journal of Zoology* 77:1017-1024.
- Kuzyk, G.W., D.E. Russell, R.S. Farnell, R.M. Gotthardt, P.G. Hare, and E. Blake. 1999b. In pursuit of prehistoric caribou on Thandlät, southern Yukon. *Arctic* 52:214-219.
- Larter, N.C., and D.G. Allaire. 2009. Mackenzie Mountain non-resident and non-resident alien hunter harvest summary, 2008. Department of Environment and Natural Resources, Government of the Northwest Territories Manuscript Report No. 195.
- Logan, J.A., J. Regniere, and J.A. Powell. 2003. Assessing the impacts of global warming on forest pest dynamics. *Frontiers in Ecology and Environment* 1:130-137.
- Maier, J.A.K., S.M. Murphy, and R.G. White. 1998. Response of caribou to overflights by low-altitude jet aircraft. *Journal of Wildlife Management* 62:752-766.
- Mech, L.D., Adams. L.G., Meier, T.J., Burch, J.W., and Dale, B.W. 1998. *The wolves of Denali*. University of Minnesota Press, Minneapolis.

- Miller, F.L. 2003. Caribou (*Rangifer tarandus*). Chapter 47, pages 923-959 in Wild Mammals of North America. Biology, Management and Economics. G.A. Feldhamer, B.C. Thompson and J.A. Chapman (editors). The John Hopkins University press, Baltimore and London.
- Miller, F.L., Broughton E., and Gunn, A. 1988. Mortality of migratory barren-ground caribou on the calving grounds of the Beverly herd, Northwest Territories, 1981-83. Canadian Wildlife Service Occasional Paper No. 66.
- Musiani, M., H. Okarma, and W. Jedrzejewski. 1998. Speed and actual distances travelled by radiocollared wolves in Bialowieza Primeval Forest (Poland). *Acta Theriologica* 43:409-416.
- NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available: <http://www.natureserve.org/explorer>. (accessed October 7, 2010).
- Nellemann C., I. Vistnes, P. Jordhoy, and O. Strand. 2001. Winter distribution of wild reindeer in relation to power lines, roads and resorts. *Biological Conservation* 101:351-360.
- Oosenbrug, S.M., and J.B. Theberge. 1980. Preferences of woodland caribou in the Kluane Ranges, Yukon Territory. *Arctic* 33:59-72.
- Olsen, B., Macdonald, M., and Zimmer, A. 2001. Co-management of Woodland Caribou in the Sahtu Settlement Area: Workshop on Research, Traditional Knowledge, Conservation and Cumulative Impacts, 4-5 December 2000. Tulita, NT: Sahtu Renewable Resource Board. Available: www.srrb.nt.ca/publications/reports/wcaribou-co-mgmt.pdf. (accessed March 1, 2006).
- Page, W.G., and M.J. Jenkins. 2007. Mountain pine beetle-induced changes to selected lodgepole pine fuel complexes within the intermountain region. *Forest Science* 53:507-518.
- Pettorelli, N., J.O. Vik, A. Mysterud, J.M. Gaillard, C. J. Tucker, and N. C. Stenseth. 2005. Using the satellite derived NDVI to assess ecological responses to environmental change. *Trends in Ecology and Evolution* 20:503-510.
- Post, E., and M.C. Forchhammer. 2001. Pervasive influence of large-scale climate in the dynamics of a terrestrial vertebrate community. *BMC Ecology* 1:1472-6785.
- Post, E., and M.C. Forchhammer. 2008. Climate change reduces reproductive success of an Arctic herbivore through trophic mismatch. *Philosophical Transactions of the Royal Society of London, Series B* 363:2369-2375.
- Powell, T. 2004. Behavioural response of woodland caribou (*Rangifer tarandus caribou*) to snowmobile disturbance in an alpine environment. M.Sc thesis. Faculty of Sciences, Universite de Sherbrooke, Sherbrook, Quebec.

- Reimers, E. 1983. Growth rate and body size differences in *Rangifer*: a study of cause and effect. *Rangifer* 3:3-15.
- Reimers, E. 1993. Antlerless females among reindeer and caribou. *Canadian Journal of Zoology* Vol. 71, no. 7:1319-1325.
- Reimers, E., S. Eftestol, and J.E. Colman. 2003. Behavior responses of wild reindeer to direct provocation by a snowmobile or skier. *Journal of Wildlife Management* 67:747-754
- Rettie, W.J., and F. Messier. 1998. Dynamics of woodland caribou populations at the southern limit of their range in Saskatchewan. *Canadian Journal of Zoology* 76:251-259.
- Ruckstuhl, K.E., E.A. Johnson and K. Miyanishi. 2008. Introduction. The boreal forest and global change. *Philosophical Transactions of the Royal Society Biological Sciences* 363:2243-2247.
- Sahtu Land Use Planning Board. 2010. Sahtu Land Use Plan; Draft 3. Available: www.sahtulanduseplan.org. (accessed October 12, 2010).
- Schaefer, J.A., and W.O. Pruitt. 1991. Fire and Woodland Caribou in southeastern Manitoba. *Wildlife Monographs* 116:1-39.
- Schaefer, J.A., and S. P. Mahoney. 2007. Effects of Progressive Clearcut Logging on Newfoundland Caribou *Journal of Wildlife Management* pp. 1753–1757.
- Seip, D.R. 1991. Predation and caribou populations. *Rangifer Special Issue* 7:46-52.
- Seip, D.R. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British-Columbia. *Canadian Journal of Zoology* 70:1494-1503.
- Seip, D.R. 2007. Displacement of mountain caribou from winter habitat by snowmobiles. *Journal of Wildlife Management* 71:1539-1544.
- Smith, K. G., E. J. Ficht, D. Hobson, T. C. Sorensen, and D. Hervieux. 2000. Winter distribution of woodland caribou in relation to clear-cut logging in west-central Alberta. *Canadian Journal of Zoology* 78:1433-1440.
- Sorensen, T., P.D. McLoughlin, D. Hervieux, E. Dzus, J. Nolan, B. Wynes, and S. Boutin. 2008. Determining sustainable levels of cumulative effects for boreal caribou. *Journal of Wildlife Management* 72:900-905.
- Stephanson, R.T., D.V. Graaangaard, and J. Burch. 1991. Lynx, *Felis lynx*, predation on red foxes, *Vulpes vulpes*, caribou, *Rangifer tarandus* and Dall sheep, *Ovis dalli* in Alaska. *Canadian Field-Naturalist* 105:255-262.

- Taku River Tlingit First Nation and British Columbia. 2009. Draft Interim Collaborative Harvest Management Plans for Atlin Caribou, Atlin East Sheep and Moose and Lower Taku Grizzly Bear, Draft for Public Review, 14 April 2009. 62 pp.
- Thomas, D.C. 1995. A review of wolf-caribou relationships and conservation implications in Canada. Pages 261-273 in: Carbyn, L.N., S.H. Fritts, and D.R. Seip. Editors. 1995. Ecology and Conservation of Wolves in a Changing World. Canadian Circumpolar Institute, Occasional Publication No. 35, Edmonton, Alberta.
- Thomas, D.C., and H.J. Armbruster. 1996. Woodland caribou habitat studies in Saskatchewan: second annual report and some preliminary recommendations. Unpublished report, Canadian Wildlife Service, Environment Canada, Edmonton, AB T6B 2X3. 46 pp.
- Thomas, D.C., and D.R. Gray. 2002. Update COSEWIC status report on the woodland caribou *Rangifer tarandus* caribou in Canada, in COSEWIC assessment and update status report on the Woodland Caribou *Rangifer tarandus* caribou in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-98 pp.
- Van Ballenberghe, V. 1985. Wolf predation on caribou: the Nelchina herd case history. *Journal of Wildlife Management* 49:711-720.
- Valkenburg, P. Kellyhouse, D.G. Davis, J.L and Ver Hof, J.M. 1994. Case history of the Fortymile caribou herd, 1920-1990. *Rangifer Special Issue No. 14* (1):11-22.
- Valkenburg, P., J.L. Davis, J.M. Ver Hoef, R.D. Boertje, M.E. McNay, R.M Eagan, D.J. Reed, C.L. Gardner, and R.W. Tobey. 1996. Population decline of the Delta caribou herd. *Rangifer Special Issue No. 9*:53-62.
- Valkenburg, P., McNay, M. E. and B. W. Dale. 2004. Calf mortality and population growth in the Delta caribou herd after wolf control. *Wildlife Society Bulletin* 32:746-756.
- Veitch, A., Popko, R., and Whiteman, N. 2000. Classification of woodland caribou in the central Mackenzie Mountains, Northwest Territories, August 1999. Department of Resources, Wildlife and Economic Development, Sahtu Region, Government of the Northwest Territories Manuscript Report No. 122.
- Vors, L. S., J. A. Schaefer, B. A. Pond, A. R. Rodgers, and B. R. Patterson. 2007. Woodland caribou extirpation and anthropogenic landscape disturbance in Ontario. *Journal of Wildlife Management* 71:1249-1256.
- Weclaw, P., and R.J. Hudson. 2004. Simulation of conservation and management of woodland caribou. *Ecological Modeling* 177:75-94.
- Wilmking, M, G.P. Juday, V.A. Barber and H.S. J. Zald. 2004. Recent climate warming forces contrasting growth responses of white spruce at treeline in Alaska through temperature thresholds. *Global Change Biology* 10:1724–1736.

Wittmer, H.U., A.R.E. Sinclair, B.N. McLellan. 2005. The role of predation in the decline and extirpation of woodland caribou. *Oecologia* 144:257-267.

Wolfe, S.A., B. Griffith, C.A.G. Wolfe. 2000. Response of reindeer and caribou to human activities. *Polar Research* 19:63-73.

Working Group on General Status of NWT Species. In Press. NWT Species 2011-2015 - General Status Ranks of Wild Species in the Northwest Territories, Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT.

5. PERSONAL COMMUNICATIONS

D. Milne, pers. comm. 2008. Planning and Science Supervisor, Wildland Fire Management, Community Services Department, Yukon Government.

S. McNay, pers. comm. 2010. Project manager, Ecologist, Wildlife Infometrics Inc. Mackenzie, British Columbia.

C. Theissen, pers. comm. 2008. Wildlife Biologist, British Columbia Ministry of Natural Resource Operations. Fort St. John, BC.

M. Williams, pers. comm. 2008. Wildlife Biologist, British Columbia Ministry of Natural Resource Operations. Smithers, BC.

6. CONTACTS

Federal

Head, Species at Risk
Northern Conservation Division
Canadian Wildlife Service
Environment Canada
91780 Alaska Highway
Whitehorse, YT Y1A 5X7
Phone 867-393-6700
Fax 867-393-7970

Species at Risk Coordinator
Resource Conservation
Western and Northern Service Centre
Parks Canada Agency
13th floor - 635 8th Avenue SW
Calgary, AB T2P 3M3
Phone 403-292-4691
Fax 403-292-4404

Territorial

Manager, Habitat Programs
Department of Environment
Government of Yukon
10 Burns Road
Whitehorse, Yukon Y1A 4Y9
Phone 867-667-5652
Fax 867-393-6405

Wildlife Biologist (Species at Risk)
Wildlife Division
Department of Environment & Natural
Resources
Government of the Northwest Territories
P.O. Box 1320
Yellowknife, NT X1A 2L9
Phone: 867-873-7588
Fax: 867-873-0293

Provincial

Ungulate Specialist
Wildlife Science Section
British Columbia Ministry of
Environment
PO Box 9338 STN PROV GOVT
Victoria, BC V8W 9M1
Phone 250-387-5842
Fax 250-356-9145

7. APPENDICES

Appendix 1: Terms of Reference for Steering Committee and Technical Working Group

Adopted January 10, 2008

Background:

The Northern Mountain population of woodland caribou was listed as a species of special concern under the federal *Species at Risk Act* (SARA) in January 2005. The Draft Management Plan for the Northern Mountain caribou in Canada will summarize the “state of knowledge” for these herds, including current and historic status, monitoring history, and threats to herds and their habitats. The Draft Management Plan will set out population and habitat goals and objectives, and identify general research/monitoring needs. This overarching plan will be used to guide development of various regional or herd specific plans by the jurisdictions. Some herd specific plans have been previously implemented (e.g. recovery of Yukon Southern Lakes herds), but these were not developed within the context of a management plan for the broader population of Northern Mountain caribou. A formal consultation process will take place once the Draft Management Plan has been posted on the SARA registry.

Mandate:

Under the federal SARA, the Minister of Environment is responsible for preparing a management plan for Northern Mountain population of woodland caribou species, in cooperation with partners that have responsibility for management of lands and wildlife within the range of this population of caribou, and will therefore have a key role in implementing the plan. These partners include Provincial, First Nation and Territorial governments, wildlife Co-management Boards, the Treaty 8 Tribal Association and the Northern Nations Alliance.

The Steering Committee and Technical Working Groups are mandated to collectively develop the content and draft text and of the Draft Management Plan, and provide guidance, relevant information and technical support. In addition, the Steering Committee will assess the adequacy of the Draft Management Plan or interim products developed by the Technical Working Group, in reflecting and addressing concerns regarding status and management of the Northern Mountain population of woodland caribou.

The primary functions:

Steering Committee

- Guide the development of a draft national management plan for the Northern Mountain population of woodland caribou, including overseeing the work of one or more technical working groups established to assist in the development of the Draft Management Plan
- Develop recommendations for the scope and topics to be covered by the Management Plan
- Oversee and guide the technical work required to develop the Management Plan
- Engage in discussions on plan development and provide review and comment on draft components of the Plan as they are developed
- Provide guidance and advice on First Nation and community participation in the plan development, including consistency with policy related to Traditional Knowledge, and on application of Traditional Knowledge where policies are not yet in place

Technical Working Group

- Develop the content of the Draft Management Plan for the Northern Mountain population of woodland caribou in Canada, as directed by the Steering Committee
 - Review relevant, available information and assess the information with respect to area covered, span of time, and level of detail
 - Identify specific tasks and request direction on those tasks from the working group
 - Review and report on threats to and stressors of the population
 - Summarize information gaps
 - Incorporate comments and suggested changes from the Steering Committee in a timely fashion
 - Consult with other interested parties as directed by the Steering Committee
 - Facilitate the exchange of information concerning the status and use of the Northern Mountain caribou population and associated habitat
 - Other activities as directed by the Steering Committee
 - Develop management recovery measures in collaboration with the Steering Committee

General Statements:

- The work of the Steering Committee, Technical Working Group and this Terms of Reference is without prejudice to any party's involvement in treaty negotiations and does not change the rights or responsibilities of any party.
- Participation on the Steering Committee and Technical Working Group does not change the rights, titles or interests of the parties.
- Participation on the Steering Committee and Technical Working Group does not alter the minister's obligation to consult on the draft management plan, once the draft has been posted on the SARA Registry.
- Any Party may withdraw from the Steering Committee or Technical Working Group by giving 2 weeks written notice to the EC Co-chair.
- These terms of reference will apply until the draft plan is submitted.

Structure and Composition:

Membership:

The Steering Committee and Technical Working Group include representatives from co-management boards, First Nation governments, and federal, territorial and provincial governments. The Steering Committee will function as a government-to-government forum to ensure the interests of all represented governments are addressed. Moreover, members can make or bring about decisions and commitments on behalf of their governments.

Steering Committee

Gwich'in Renewable Resource Board
 Champagne and Aishihik First Nations
 Taku River Tlingit First Nation
 Tr'ondëk Hwëch'in
 Kwanlin Dun First Nation
 Carcross Tagish First Nation
 Little Salmon Carmacks First Nation
 Treaty 8 Tribal Association
 Northern Nations Alliance
 Liard First Nation
 White River First Nation
 Teslin Tlingit Council
 Ross River Dena Council
 Environment Canada
 Parks Canada Agency
 Government of Yukon
 Yukon Fish and Wildlife Management Board
 Government of the Northwest Territories
 Government of British Columbia
 Ross River Dena Council
 Ta'an Kwäch'an Council

Technical Working Group

Taku River Tlingit First Nation
 First Nation of Na-cho Nyäk Dun
 Gwich'in Renewable Resource Board
 Sahtu Renewable Resource Board
 Yukon Fish and Wildlife Management Board
 Carcross Tagish First Nation
 Treaty 8 Tribal Association
 Northern Nations Alliance
 Environment Canada– NWT
 Environment Canada– Yukon
 Parks Canada Agency
 Government of Yukon
 Government of the Northwest Territories
 Government of British Columbia

Co-chairs:

The Steering Committee will have 6 Co-chairs, who would be tasked with leading/ coordinating different aspects of the plan (e.g. one chair focusing on goals and objectives, one on communications planning etc.). This structure will ensure the time input from committee members is applied in the most efficient manner. The Technical Working Group will have 2 Co-chairs, who will coordinate input from working group members.

The Co-chairs are:

Brian Pelchat - Environment Canada
 Dan Cresswell - Northern Nations Alliance
 Gerry Kuzyk - Government of British Columbia
 Graham Van Tighem - Yukon Fish and Wildlife Management Board
 Jason Lee - Treaty 8 Tribal Association

Karen Clyde - Government of Yukon
 Tom Jung - Government of Yukon
 Wendy Nixon - Environment Canada

Responsibilities of Co-chairs:

The Co-chairs of the Steering Committee and Technical Working Group will encourage all members of their respective working groups to engage in development of the Draft Management Plan. The Co-chairs will facilitate the activities of the Steering Committee and Technical Working Group through the following activities for each group respectively:

- Set a schedule of conference calls
- Collaboratively develop the topics and agendas for meetings
- Chair the meetings
- Ensure that tasks and recovery measures identified are completed
- Engage members in focus groups
- Be responsible for the timely distribution of information to members.
- Be responsible for ensuring notes of all meetings are recorded and distributed to members for comment prior to providing a finalized record of the meeting

The Co-chairs will hold meetings and discussions as needed to coordinate activities and achieve tasks as directed by the Steering Committee.

Responsibilities of Members:

Steering Committee

- Members will make a concerted effort to attend all meetings of the Steering Committee and review and comment on materials in a timely manner, as well as contribute to the work of the broad Steering Committee and specific focus groups
- If an alternate is identified, the member is responsible for exchange of information between herself/himself and the alternate, both prior to and following a meeting
- The members of the Steering Committee will be responsible to inform their respective governments (First Nation, Federal, Provincial or Territorial) on the Steering Committee activities, provide independent assessment of the Management Plan progress and content to their decision-makers and constituents, and seek direction as representatives of their respective Governments on the Steering Committee

Technical Working Group

- Members will make a concerted effort to attend all meetings of the Technical Working Group and review and comment on materials in a timely manner, and contribute to the work of the Technical Working Group
- Members will confer with Steering Committee Members and/or their respective managers/directors on an ongoing basis to keep them informed of the draft plan progress

Operating Procedures:

Meetings will be primarily by conference call. Each jurisdiction is responsible for providing the support necessary for the participation of its representative at meetings. Members may seek options to supplement available funds to support the planning process, and an effort will be made to assist First Nations that do not have funding through land claims agreements, to ensure their effective participation. If funding is obtained, face to face meetings will be scheduled in northern B.C. and in Yukon.

Decision Making:

The Steering Committee and Technical Working Group will make decisions through consensus by those attending the meetings, and will focus on the goal to “Maintain self-sustaining healthy populations in historic range, and ensure continued use and appreciation of caribou, and maintain habitat in a healthy state to support these populations”. If consensus cannot be reached, the Steering Committee will use its best efforts to resolve any dispute, and will be guided by a spirit of cooperation and mutual respect and by an understanding of each other’s objectives with respect to this Terms of Reference. If points arise that the Steering Committee and Technical Working Group cannot agree on, then senior level managers or executives will be engaged to address these points.

Timelines/Workplan:

Environment Canada has indicated the goal is to complete the Draft Management Plan by spring, 2008. The Steering Committee and Technical Working Group will endeavour to meet this timeline, but will not compromise the integrity of the process or the product to do so.

The Steering Committee and Technical Working Group will develop a workplan by November 30, 2007 that sets out the tasks for developing the Draft Management Plan.

Revisions to the workplan can be proposed by any member for consideration of the Steering Committee or Technical Working Group, and a consensus will be sought on the proposed revisions.

Appendix 2: Population and Trend Estimates for Northern Mountain Population Herds as of 2009.¹

Herd	Jurisdiction	Traditional Territory	Population Estimate	Last surveyed	Previous Survey Year	Confidence in Estimate²	Survey technique³	Trend	Confidence in Trend⁴
Aishihik	YT	CAFN, LSCFN, KFN, WRFN	2044	2009	1998	High	Mark/resight	Increasing	High
Atlin	BC/YT	TRTFN, TTC, CTFN	800	2007	1999	High	SRQ	Stable ⁵	Moderate
Bonnet Plume	YT/NT	TH, NND, Tetlit Gwich'in	5000	1982	None	Low	Estimate	Unknown	N/A
Carcross	BC/YT/PCA	TTC, TRTFN, CTFN, KDFN, TKC	775	2008	2003	High	SRQ	Stable	High
Chisana	YT/AK/EC	WRFN, KFN	766	2007	2005	High	Mark/resight	Stable	High
Clear Creek	YT	NND, TH	900	2001	None	High	SRQ	Unknown	N/A
Coal River (Nahanni Complex)	YT/NT/PCA	Dehcho First Nation, Acho Dene Koe Band, LFN	450	1997	N/A	Low	Estimate	Unknown	N/A
Edziza	BC	Tahltan, Kaska Dena	175	2005	N/A	Moderate	TC	Unknown	N/A
Ethel Lake	YT	SFN, NND	300	1993	None	High	SRQ	Stable	Moderate
Finlay	BC	Tsay Keh Dene Band, Kaska Dena, Treaty 8 First Nations, Nak'azdli Band	26	2002	2001	Low	SRQ	Decreasing	High
Finlayson	YT	Kaska Dena, TTC	3100	2007	1986, 1991, 1996, 1999	High	SRQ	Decreasing	High
Frog	BC	Tahltan, Kaska Dena, Treaty 8 First Nations	150	2000	Unknown	Low	Estimate	Unknown	N/A
Gataga	BC	Kaska Dena, Treaty 8 First Nations	338	2001	Unknown	Low	Estimate	Unknown	N/A
Hart River	YT	NND, TH	2133	2006	None	High	Mark/resight	Unknown	N/A
Horseranch	BC	LFN, Kaska Dena, Treaty 8 First Nations	600	1999	1998	High	SRQ	Unknown	N/A

Herd	Jurisdiction	Traditional Territory	Population Estimate	Last surveyed	Previous Survey Year	Confidence in Estimate²	Survey technique³	Trend	Confidence in Trend⁴
Ibex	YT	CTFN, KDFN	850	2008	2003	High	SRQ	Increasing	High
Klaza	YT	SFN, LSCFN	650	2000	1996	Moderate	TC	Increasing	Moderate
Kluane	YT/PCA	KFN, WRFN	180	2009	2003	Moderate	TC	Decreasing	Moderate
La Biche (Nahanni Complex)	YT/NT/PCA	Dehcho First Nation, Acho Dene Koe Band, LFN	400	1993	N/A	Low	Estimate	Unknown	N/A
Laberge	YT	KDFN, TKC, TTC, CTFN	200	2003	ND	High	SRQ	Unknown	N/A
Level-Kawdy	BC	Tahltan, TRTFN, TTC, Kaska Dena	1500	1999	1998	Moderate	TC	Unknown	N/A
Liard Plateau (Crow River)	BC/YT	LFN, Treaty 8 First Nations, Kaska Dena	150	2005	none	Low	TC	Unknown	N/A
Little Rancheria	BC/YT	LFN, Kaska Dena, TTC, Treaty 8 First Nations	1000	1999	1988	High	SRQ	Increasing	High
Moose Lake	YT	Kaska Dena, TTC, Tahltan	200	1991	none	Moderate	TC	Unknown	N/A
Muskwa	BC	Treaty 8 First Nations, Kaska Dena,	1250	2000	Unknown	Low	Estimate	Unknown	N/A
S. Nahanni (Nahanni Complex)	YT/NT/PCA	Dehcho First Nation, Acho Dene Koe Band, LFN, Sahtu, Kaska Dena	2105	2009	2001	High	Mark/resight	Unknown	N/A
Pelly	YT	LSCFN, Kaska Dena, TKC	500	2002	Unknown	Low	Estimate	Unknown	N/A
Pink Mountain	BC	Tsay Keh Dene Band, Kaska Dena, Treaty 8 First Nations	850	2000	1996	High	SRQ	Unknown	N/A
Rabbit	BC	Kaska Dena, Treaty 8 First Nations	1300	2007	N/A	Moderate	TC	Unknown	N/A

Herd	Jurisdiction	Traditional Territory	Population Estimate	Last surveyed	Previous Survey Year	Confidence in Estimate²	Survey technique³	Trend	Confidence in Trend⁴
Redstone	YT/NT/PCA	NND, Sahtu, Tetlit Gwitch'in, Dehcho First Nation, Kaska Dena	5-10,000	1997	N/A	Low	Estimate	Unknown	N/A
Spatsizi	BC	Tahltan, Tsay Keh Dene, Takla Lake, Gitksan, Kaska Dena, Treaty 8 First Nations	3000	1996	N/A	Moderate	TC	Unknown	N/A
Swan Lake (Jennings)	BC	TTC, Kaska Dena, Tahltan	400	2005	N/A	Moderate	TC	Unknown	N/A
Tatchun	YT	LSCFN, SFN, NND, Kaska Dena	500	2000	None	Moderate	TC	Stable	Moderate
Tay River	YT	Kaska Dena, NND, SFN	3750	1991	none	High	SRQ	Stable	Low
Tsenaglode	BC	Tahltan, Kaska Dena, Treaty 8 First Nations	200	1999	N/A	Moderate	Estimate	Unknown	N/A
Wolf Lake	YT	Kaska Dena, TTC	1400	1998	1993	High	SRQ	Stable	Moderate

¹ See Appendix 10 for list of acronyms.

² The degree of confidence in these population estimates is based on estimation methodology. Confidence is "low" for estimates based on educated guesses, because they are subjective and not based on a quantitative analytical framework. Confidence is "moderate" for estimates based on total counts, because they are based on empirical observations but are not founded on an objective quantitative framework. Confidence is "high" for population estimates based on objective statistical models (adjusted counts, stratified random quadrats), because they are objective, repeatable, and based on quantitative data.

³ AC = adjusted count, SRQ = stratified random quadrat, TC = total count, N/A = not applicable, Estimate = based on best available knowledge.

⁴ Confidence in trend is based on the degree of confidence in the most recent population estimate as well as previous estimates; clear trends are difficult to ascertain and only exist when several sequential high quality population estimates are available. Confidence designations (high, moderate and low) are subjective classifications only. If the trend is unknown, then a measure of confidence is not applicable.

⁵ The TRTFN and BC Ministry of Environment estimate that the Atlin herd is in "probable decline" due to chronic low calf recruitment and large confidence intervals around 2007 population estimate (Taku River Tlingit First Nation and British Columbia 2009).

Appendix 3: Herd Specific Details and Known Potential Threats

The following is a summary of perceived threats and stressors to individual NMP herds. Threats and stressors for the NMP herds were obtained by surveying hunters, managers, First Nations' peoples, community members, biologists, and others within the range of this population. Approximately 300 people were contacted and more than 180 people were surveyed in 2008. Information on mineral exploration, oil and gas, and placer mining were also updated to reflect activity up to December 2009. This section was informed by that research.

Although good information exists about government regulated harvest, little or no information is available for subsistence harvest and poaching. Survey respondents identified predation as an issue across the range of the NMP so it was included as one of the overall limiting factors for the NMP (see Section 1.4.3). As some of the threats and stressors may be mitigated through habitat protection, this section also notes if a significant amount of the herd's range is within a protected area.

Aishihik (YT)

The hunting of bison (*Bison bison*) in winter has brought an increase in the number of people and snow machines to an otherwise relatively undisturbed landscape. There is potential for snow machine trails to increase the travel and hunting efficiency of wolves. A widespread spruce bark beetle (*Dendroctonus rufipennis*) infestation may have altered habitat and raises the possibility of widespread fire. Winter ticks have recently been found on elk (*Cervus elaphus*) in the area, and the elk may act as a dispersal mechanism for ticks to adjacent caribou herds. There has been little mineral exploration in recent years.

Atlin/ Atlin East (BC)

The Taku River Tlingit First Nation (TRTFN) have enacted a voluntary ban on harvesting Atlin caribou as part of their involvement in the Southern Lakes Caribou Recovery Program. The BC Ministry of Environment offers a limited entry hunt for resident hunters and a quota system for non-resident hunters on the herd (bulls only). The number of hunting licenses has been reduced in recent years and an allowable annual harvest has been determined for the herd in cooperation with the TRTFN. There is easy access into the alpine and other parts of the winter range via mining roads, which are being used increasingly by snowmobilers. Other potential threats include predation, recreation, industry, and habitat loss (both direct and indirect). Increased road access due to mine exploration and development remains a potential concern. The development of an open-pit molybdenum mine in Ruby Creek (24 km northeast of Atlin), owned by Adanac Molybdenum Corporation, has been suspended since 2010.

Bonnet Plume (YT/NT)

A census has not been conducted on this herd but biologists believe that it may be one of the largest within the NMP. Mineral exploration has taken place within the YT portion of the herd's range near mapped key habitats. There was a one-year interim moratorium

on new mineral staking (2010-2011) until the Peel land use planning process was completed. While there have been acquisitions of oil and gas rights in the Peel Plateau, north of the Bonnet Plume herd area, there has been no exploration in the area of the herd. The closest exploration activities have been at Eagle Plains, more than 150 km away from the northern boundary of the herd.

Carcross/ Atlin West (YT/BC)

The herd is under constant pressure as it ranges in areas of high human density that are frequently interrupted and fragmented by residential, recreational and industrial developments and associated access. The herd has been intensively managed (subject to more than a decade of recovery efforts) and is considered stable. There is a possibility of natural gas pipeline development through this range. There is sporadic mineral exploration in the area. The Skukum Gold property had underground exploration and was shut down in 2008. Decades of fire suppression have increased the possibility of an intense fire that would alter habitat. The continued high density of human activity within this herd's range may necessitate continued intensive management. Some of the herd's range is protected within the Chilkoot Trail National Historic Site.

Chisana (YT/AK)

With very low recruitment, this internationally ranging herd experienced a long and steady decline from 1990 to 2003. Intensive management, initiated by White River First Nation, that included a four-year captive rearing program as well as legislated and voluntary harvest ban, has brought population numbers up to approximately 700-750. There is little harvesting or human influence on this herd as it ranges mostly inside Kluane Wildlife Sanctuary and the Wrangell-St. Elias National Park and Preserve in Alaska. However, forage conditions, predation, and road kill (data for Canada only) may have contributed to the herd's decline.

Clear Creek (YT)

The herd is deemed to be relatively secure as human harvest is thought to be small and there has been strong community support for management. However, the herd is easily accessible, there is potential for future industrial development. There are active placer mining claims and mineral exploration in the herd's range.

Edziza (BC)

There are thought to be few human-based threats as there is limited access to the herd and its range is within Mount Edziza Provincial Park. Natural stressors and the small size of the herd may be cause for concern.

Ethel Lake (YT)

This herd has had persistently low recruitment for the past decade and is a relatively small herd (~300). For these reasons the herd has had a voluntary hunting closure. A large part of the winter range was affected by fire in 2005, with associated loss of forage and habitat. It will be some time before caribou use these burned areas in winter.

Finlay (BC)

The Finlay herd experienced a steep decline largely due to human caused habitat change related to the Williston Dam, encroachment of industry, recreation activities and associated access. Predation may also have contributed to the decline of the herd but has become less of a factor in recent years.

Finlayson (YT)

The Robert Campbell Highway and associated access roads have resulted in easy access to winter range and summer/fall range, with resulting increase in harvest pressure. Hunting quotas and limits have been in effect for resident hunters and outfitters since 1998. There is First Nation harvesting of the herd. It is expected this herd will require ongoing harvest management. There are a number of substantial mineral exploration projects in the herd's range (including the Mac Tung project). The Wolverine mine and access road is anticipated to be active for five to seven years, with reclamation of site and access afterwards.

Frog (BC)

The herd is in a remote location, within the Muskwa-Kechika Management Area. It likely experiences few human-caused threats although there is potential for oil and gas development. A change in the extent of deep winter freezing and the subsequent northward extension of mountain pine beetle (*Dendroctonus ponderosae*) could change habitat.

Gataga (BC)

The herd is found in a remote location, within the Muskwa-Kechika Management Area. Human-based threats are likely minimal, although there is a limited annual harvest and potential for oil and gas development. A change in the extent of deep winter freezing and the subsequent northward extension of mountain pine beetle could change habitat.

Hart River (YT)

Winter harvest may be an issue. It is of particular concern if hunting regulations for Porcupine caribou persist. The range of the Porcupine caribou herd (Grant's caribou) overlaps with the Hart River (NMP) herd in some years. When this occurs the Hart River herd is exposed to an incidental harvest by those hunting the more liberally regulated Porcupine caribou herd. Ingress from the Porcupine caribou herd needs to be determined and annual adjustment of hunting seasons based on monitoring of collared animals needs to be continued. Recreational activity has increased in the last few years and there is potential for industrial development.

Horseranch (BC)

The herd is accessible for harvesting on its winter range. There is some logging on the eastern side of the range with mineral development, increasing road access, and use of off-road vehicles occurring in the fall range. Frequent small fires constitute a natural disturbance regime that is maintaining the forest habitat. There is a possibility of natural gas pipeline development through this range.

Ibex (YT)

There have been 13 years of a voluntary harvest ban, supported by the Southern Lakes Caribou Recovery Program's Game Guardian initiative. However, this program has only been funded in winter/spring. The herd's range has been reduced by the activities and developments (e.g. housing, road building and agriculture) associated with Whitehorse's significant human population. Recently, off-road vehicle traffic and recreational activity (e.g. snowmobile and dog mushing activities) have increased within the range.

Klaza (YT)

Activity associated with winter bison hunting may be a source of disturbance to this herd. There is very active seasonal mineral exploration and placer mining activity in the area. The hard rock Minto mine and Carmacks Copper exploration project are near or adjacent to the herd's range. There is also an extensive access network associated with these developments. If the Casino Mine is developed, a new year-round road would bisect the herd's range. Fire has altered traditional winter range but there is still much intact winter habitat.

Kluane/Burwash (YT)

There is very low harvest pressure here, but the Alaska Highway and numerous access roads related to mineral exploration intersect its range. Only a small portion of their range has been impacted by spruce bark beetle (*Dendroctonus rufipennis*) over the last decade; however, these areas represent an increased fire risk associated with standing dead spruce. Some of the range is within Kluane National Park and Reserve.

Laberge (YT)

The herd is relatively isolated. However, there are a few off-road vehicle trails and there is modest hunting pressure in parts of the range. There is some concern that a growing elk herd may displace caribou. A large recent burn has altered much of the range of this herd.

Level-Kawdy (BC)

There may be some overlap with the Atlin herd in the fall. Overlap also occurs with the Horseranch and Little Rancheria herds. It is an isolated herd so human-caused threats are few, however there is potential for coalbed methane development around Tuya Lake. This may pose a potential threat if development occurs.

Liard Plateau/Crow River (BC)

An average of 4.3 bulls per year were harvested by licensed hunters from the herd between 2004 and 2006 (2.9 percent of the total surveyed population). Low numbers of large bulls seen during the 2005 survey may suggest the harvest rate is too high. This herd is in a remote area but there is potential for oil and gas development and associated access issues. There is an active gas plant close by. This herd is considered vulnerable to disturbance since its range appears to be restricted to a very small plateau.

Little Rancheria (BC/YT)

The Alaska Highway goes through the herd's winter range and as many as 12 to 15 caribou are killed annually on the road. In the past, there has been some logging in key winter range; however, there has been no commercial forest harvesting in this area since the late 1990's. Currently, a proposed forest harvest plan, prepared by the Kaska Forest Resources Stewardship Council for 2003-2007, zones the ranges of the Rancheria, Finlayson and Tay River herds as special management areas. This plan includes limits on forestry activities in winter ranges and in migration corridors. Surveys results suggest recreation may also be a concern. There is a possibility of natural gas pipeline development through this range.

Moose Lake (YT)

This herd overlaps the range of the Tay Lake herd, although there is likely little interchange of animals. Harvest is minimal, but the herd may be vulnerable due to its small size.

Muskwa (BC)

The Muskwa herd ranges within the Muskwa-Kechika Management Area. Human threats are probably minimal although there is an annual licensed harvest of 20 (population estimate = 1250). There is a history of wolf control which is no longer active. Prescribed burning in the area may have reduced available forage for caribou while increasing the moose population and thereby increasing predator presence. There is some potential for recreation and access to become issues.

Nahanni Complex (NT/YT)

There is uncertainty about the designation of the Coal River, La Biche and South Nahanni herds and there is discussion about managing these herds together as the Nahanni herd complex.

Coal River

The Nahanni Range Road which provides access to Tungsten and Howard's Pass, NT, intersects the range of this herd. There is potential for industrial disturbance and associated access issues such as increased harvest. The herd's winter range is primarily within the boundaries of Nahanni National Park Reserve. Additional stressors could include activities associated with the Prairie Creek Mine, which is located at the northeast edge of the herd's winter distribution.

La Biche

There are two producing natural gas wells, a gas plant and an existing pipeline in the area. There is potential for further petroleum exploration in the range of the La Biche herd. Further development may result in increased access in the range of the herd. Harvest is assumed to be low. The herd's winter range is primarily within the boundaries of the Nahanni National Park Reserve. Additional stressors could include activities associated with the Prairie Creek Mine, which is located at the northeast edge of the herd's winter distribution.

South Nahanni

There is considerable access to the herd via the Nahanni Range Road to Tungsten, NT, and the associated road network towards Howard's Pass, Lenid Creek and trails along the YT/NT border.

The possibility of overharvest in the South Nahanni has prompted a multi-year study on the herd. The herd's summer/fall range is divided into two groups: a southern group in and around Nahanni National Park Reserve, and a northern group north of the Cantung mine along the YT/NT border. There is an increasing amount of mineral exploration activity occurring in this area that may further increase access and disturbance to the herd. Survey respondents identified concerns regarding potential development increasing hunting access and the potential of habitat loss.

The Cantung mine located at Tungsten, NT, became active in the fall of 2010, and advanced exploration with a proposed operation mine for 2014 at Howard's Pass has recently activated the Howard's Pass Road from Tungsten. Both developments occur within the herds range. Most of the herd's winter range is currently protected by Nahanni National Park Reserve.

Pelly (YT)

This relatively isolated group is thought to be a conglomeration of herds including animals near Laberge, throughout the Livingstone area, at Quiet and Little Salmon-Magundy Lakes. There has been no census of this herd. Survey results identified concerns about potential industrial development and increased access.

Pink Mountain (BC)

Industrial development has reduced range use on the east foothills and may be a future concern throughout the range. Prescribed burning has increased moose numbers, which has likely increased incidental wolf predation on caribou. Wolves rebounded following control in the 1980s and there is high caribou calf predation by wolverine. Interactions with other large herbivores and associated predators are not well understood.

Rabbit (BC)

The herd is in a remote location, within the Muskwa-Kechika Management Area. Human-based threats are probably minimal, although there is a limited annual harvest and some potential for oil and gas development. A change in the extent of deep winter freezing and the subsequent northward extension of mountain pine beetle could change habitat.

Redstone (NT/YT)

The North Canol Road provides limited access with some associated hunting pressure. About 300 caribou per year are harvested in the NT and about 100-200 per year in YT. There is concern that this may be too much hunting pressure given that population size and trends are unknown. Local knowledge suggests hunting pressure may be increasing due to decreasing barren-ground caribou populations. There has also been increased seismic exploration in NT and there are mineral interests at MacMillan Pass. The

development plan for the MacTung property at MacMillan Pass aims for mine production in 2012, although delays are likely. Plans to upgrade the Canol Road in YT may lead to increased harvest pressures and disturbance due to construction and transportation of ore. Survey respondents identified concerns about habitat destruction and overhunting on the Canol Road. Additionally, caribou in proximity to the Prairie Creek mine in NT are thought to be part of the Redstone herd. The mine is surrounded by the expanded Nahanni National Park Reserve. It is currently permitted for exploration and development of zinc, lead and silver, but permits for mine operations are pending. Amendments to the Canada National Parks Act allow for a mining access road, storage sites and other facilities connected with that road to be built within the national park to the Prairie Creek Area. As once-remote areas become less remote, increased monitoring and management will be needed for the herds found in both the NT and YT regions of the Mackenzie Mountains. Some of the herd's range is protected by the new Nahanni National Park Reserve boundary. The proposed Naats'ihch'cho National Park will protect an additional part.

Spatsizi (BC)

Hunting is managed conservatively under a limited entry hunt. There are few threats to this herd because most of its range of the Spatsizi herd is protected within Spatsizi Plateau Wilderness Provincial Park.

Swan Lake/ Jennings (BC)

Vehicle collisions may be an issue when the herd winters close to the Alaska Highway. The herd is subject to some human disturbance such as recreational snow machining.

Tatchun (YT)

High harvest is a concern. Currently, there is little industrial activity in the range of this herd. More than 70 percent of the winter range was burned with major fires in 1958, 1969, 1995, 1998 and 2005. Caribou are using new areas as a result. This herd would benefit from fire management in the Frenchman and Tatchun Lakes area.

Tay River (YT/NT)

There are few human-based threats to the herd because its range is in a remote location with little access. However, it is likely to experience increased access due to mineral interests at YT/NT border.

Tsenaglode (BC)

From November to March the herd is accessible along Highway 37 and all-terrain vehicles are accessing alpine areas which facilitates hunting. There is some mineral exploration in the winter range.

Wolf Lake (YT)

This herd is relatively isolated and is considered to be naturally regulated. Some people are concerned about potential industrial development creating access. Increased access would likely result in increasing harvest pressure and the need for additional harvest management.

Appendix 4: Monitoring and Management History of Northern Mountain Caribou Herds in British Columbia, Yukon and Northwest Territories up to 2009.

Herd (other known/historical names in brackets)	Previous Recovery Measures	Total Number of Females Radio- collared Over the Past 20 Years	Number of Females Radio- collared	Total Number of Bulls Radio- collared Over the Past 20 Years	Number of Bulls Radio- collared	Total Number of Calves Radio- collared Over the Past 20 Years	Overall Confidence in the Knowledge of the Herd¹ (1 - Low; 5 - Strong)
Aishihik	Wolf control (1993-1997)	77	0	13	0	Not specified	4
Atlin (Atlin East)	No	40 (?)	0	0	0	0	4
Bonnet Plume	No	0	0	0	0	0	2
Carcross (Atlin West)	Licensed harvest ban 1994-2007; Voluntary harvest ban 1992-2007	48	6 GPS, 2 VHF	2	0	0	5
Chisana	Captive rearing (2001-2004)	264	120-VHF	0	0	95	4
Clear Creek	No	22	0	0	0	0	4
Coal River (Nahanni Complex)	No	20	7 satellite	0	0	0	2
Edziza	No	2	0	0	0	0	2
Ethel Lake	No	8	0	4	0	0	5
Finlay	No	27	Unknown	19	0	11	3
Finlayson	Wolf control (1983-1989)	51	2 satellite	4	0	0	5
Frog	Wolf control 1980s	55 total for Frog and Gataga	0	0	0	Not specified	2

Herd (other known/historical names in brackets)	Previous Recovery Measures	Total Number of Females Radio- collared Over the Past 20 Years	Number of Females Radio- collared	Total Number of Bulls Radio- collared Over the Past 20 Years	Number of Bulls Radio- collared	Total Number of Calves Radio- collared Over the Past 20 Years	Overall Confidence in the Knowledge of the Herd¹ (1 - Low; 5 - Strong)
Gataga	Wolf control 1980s	55 total for Frog and Gataga	0	0	0	Not specified	2
Hart River	No	77	37 VHF	2	0	0	5
Horseranch	No	42	0	1	0	0	3
Ibex	Licensed harvest ban 1994-2007; Voluntary harvest ban 1992-2007	21	9 VHF	2	0	0	4
Klaza	Wolf control (1993- 1997 mainly Aishihik)	42	0	1	0	0	4
Kluane (Burwash)	Wolf Control (1993- 1997; mainly Aishihik)	35	0	1	0	Not specified	3
La Biche (Nahanni Complex)	No	4	1 satellite	0	0	0	2
Laberge	Licensed harvest ban 1994-2007; Voluntary harvest ban 1992-2007	11	4 VHF	0	0	0	2
Level-Kawdy	No	3	0	0	0	0	2
Liard Plateau (Crow River)	Wolf control 1970's; satellite collars on 3 cows 2002	3	0	0	0	0	3
Little Rancheria	No	11 in 1980s (YT); ca 30 in late 1990s (BC)	0	0	0	0	4
Moose Lake	No	4	0	0	0	0	2

Herd (other known/historical names in brackets)	Previous Recovery Measures	Total Number of Females Radio- collared Over the Past 20 Years	Number of Females Radio- collared	Total Number of Bulls Radio- collared Over the Past 20 Years	Number of Bulls Radio- collared	Total Number of Calves Radio- collared Over the Past 20 Years	Overall Confidence in the Knowledge of the Herd¹ (1 - Low; 5 - Strong)
Muskwa	Wolf control 1980s	46	0	0	0	Not specified	3
Pelly	No	52	0	0	0	0	2
Pink Mountain	Wolf control 1980s	80	0	0	0	50	4
Rabbit	Wolf control 1980s	0	0	0	0	Not specified	2
Redstone	No	10	0	0	0	0	1
South Nahanni (Nahanni Complex)	No	100	30 satellite ²	0	0	0	3
Spatsizi	No	0	0	0	0	0	2
Swan Lake (Jennings)	No	28	16 VHF	0	0	0	3
Tatchun	No	24	0	0	0	0	4
Tay River	No	23	0	0	0	0	3
Tsenaglode	No	0	0	0	0	0	1
Wolf Lake	No	67	0	6	0	0	3

¹The overall confidence in the knowledge of the herd was determined by local experts/biologists based on quality and quantity of applicable data.

²30 collars were put on what was believed to be caribou from the South Nahanni herd but the animals went on to calve with other herds.

Appendix 5: Summary of Survey Results of Northern Mountain Caribou Herds in British Columbia, Yukon and Northwest Territories.

Herd (other known/historical names in brackets)	Number of Surveys Conducted Over the Past 20 Years	20 Year Population Trend	General Risk to the Population due to Small Size and/or Geographic Isolation ²	Maximum Recruitment Rate over the Past 5 Years (calf/100 cows; season)	Number of Annual Recruitment Rates Estimated Over the Past 20 Years	Average Adult Sex Ratio Over the Past 5 Years (#females per male)	Average % Females in Total Known Harvest Over the Past 5 Years ⁵	Average Reported Harvest Level Over the Past 5 years (#harvested/yr)
Aishihik	3	Increasing	Low	32.9 Fall	17	2.16	0	12
Atlin (Atlin East)	5	Stable ¹	Low	25 Late winter	3	Unknown	0	29
Bonnet Plume	0 ³	Stable ⁶	Low	37.8 Fall	19	1.17	0	42
Carcross (Atlin West)	3	Stable	Medium	29.7 Fall	14	1.98	0	2
Chisana	4	Stable	Medium	25.5 Fall	17	3.178	0	0
Clear Creek	1	Unknown	Low	48.9 Fall	4	2.303	Unknown	11
Coal River (Nahanni Complex)	0	Unknown	Unknown	12 Fall	2 fall composition counts	2.94	Unknown	11
Edziza	1	Unknown	Low	Unknown	0	Unknown	Unknown	2
Ethel Lake	1	Stable ⁴	Medium	25.5 Fall	13	2.54	0	<1
Finlay	5	Decreasing	Low	Unknown	0	Unknown	50%	2-5

Herd (other known/historical names in brackets)	Number of Surveys Conducted Over the Past 20 Years	20 Year Population Trend	General Risk to the Population due to Small Size and/or Geographic Isolation²	Maximum Recruitment Rate over the Past 5 Years (calf/100 cows; season)	Number of Annual Recruitment Rates Estimated Over the Past 20 Years	Average Adult Sex Ratio Over the Past 5 Years (#females per male)	Average % Females in Total Known Harvest Over the Past 5 Years⁵	Average Reported Harvest Level Over the Past 5 years (#harvested/yr)
Finlayson	4	Decreasing	Medium	30.5 Fall	24 fall classification counts	2.26	>50%	60-90
Frog	1	Unknown	Medium	Unknown	1	Unknown	0	Unknown
Gataga	1	Unknown	Medium	Unknown	1	Unknown	0	Unknown
Hart River	1	Unknown	Low	29.4 Fall	2	2.424	Unknown	34
Horseranch	3	Unknown	Low	33 Late winter	6	Unknown	Unknown	15
Ibex	3	Increasing	Medium	39.7 Fall	17	2	0	2
Klaza	2	Increasing	Low	30 Fall	12	2.479	Unknown	5
Kluane (Burwash)	2	Unknown	Medium	36 Fall	17	2.34	0	0
La Biche (Nahanni Complex)	0	Unknown	Unknown	Unknown	1 fall composition count	Unknown	0	<1
Laberge	1	Unknown	Medium	21.8 Fall	4	2.76 (1 year)	0	0
Level-Kawdy	2	Unknown	Low	Unknown	0	Unknown	Unknown	65

Herd (other known/historical names in brackets)	Number of Surveys Conducted Over the Past 20 Years	20 Year Population Trend	General Risk to the Population due to Small Size and/or Geographic Isolation²	Maximum Recruitment Rate over the Past 5 Years (calf/100 cows; season)	Number of Annual Recruitment Rates Estimated Over the Past 20 Years	Average Adult Sex Ratio Over the Past 5 Years (#females per male)	Average % Females in Total Known Harvest Over the Past 5 Years⁵	Average Reported Harvest Level Over the Past 5 years (#harvested/yr)
Liard Plateau (Crow River)	0	Unknown	High	19.6 Fall	1 fall classification count	3.88 (1 year)	0	5
Little Rancheria	2	Increasing	Low	41 Fall	8 fall classification counts	2.63 (2 yrs)	<30%	50
Moose Lake	1	Unknown	Medium	No surveys past in 5 years	1	no surveys in past 5 yrs	Estimate <20%	Unknown
Muskwa	2	Unknown	Low	Unknown	2	Unknown	0	Unknown
Pelly	2	Unknown	Medium	21.5 Fall	2	2.52 (1 year)	Unknown	12
Pink Mountain	5	Unknown	Medium	Unknown	5	Unknown	0	8
Rabbit	1	Unknown	Low	Unknown	0	Unknown	0	Unknown
Redstone	0	Stable ⁷	Low	60.9 Fall	19	3.73	Estimate 30%	260
South Nahanni (Nahanni Complex)	1	Unknown	Unknown	17.4 Fall	7 fall composition counts	Unknown	Unknown	13
Spatsizi	1	Unknown	Low	Unknown	0	Unknown	Unknown	44
Swan Lake (Jennings)	1	Unknown	Low	42 Late winter	1	2.78	Unknown	10

Herd (other known/historical names in brackets)	Number of Surveys Conducted Over the Past 20 Years	20 Year Population Trend	General Risk to the Population due to Small Size and/or Geographic Isolation²	Maximum Recruitment Rate over the Past 5 Years (calf/100 cows; season)	Number of Annual Recruitment Rates Estimated Over the Past 20 Years	Average Adult Sex Ratio Over the Past 5 Years (#females per male)	Average % Females in Total Known Harvest Over the Past 5 Years⁵	Average Reported Harvest Level Over the Past 5 years (#harvested/yr)
Tatchun	1	Stable ⁴	Medium	29.3 Fall	13	2.437	Unknown	10
Tay River	1	Stable	Low	No surveys in past 5 years	0	no surveys in past 5 yrs	<20%	35-50
Tsenaglode	0	Unknown	Low	Unknown	0	Unknown	Unknown	6
Wolf Lake	3	Stable	Low	Unknown	9	Unknown	Unknown	5

¹The TRTFN and B.C. Ministry of Environment estimate that the Atlin herd is in “probable decline” due to chronic low calf recruitment and large confidence intervals around 2007 population estimate (Taku River Tlingit First Nation and British Columbia. 2009).

²The degree of geographic isolation was determined by local experts/biologists.

³Population estimates were completed in 1982-1983; however, wildlife observation data were used to provide estimates of the fall ratios of calves per 100 adult females and of adult females to adult males for years 1991 to 2009 (GNWT unpublished data).

⁴When only one population survey was conducted, the assessment of the twenty-year population trend is based on results of the population survey and composition counts.

⁵First Nation harvest of female caribou is permitted and exact numbers may or may not be reported. Herds that have no female caribou harvested are either in very remote locations or have voluntary First Nation and restricted resident harvest bans in effect.

⁶ Suspect stable based upon 19 years time series classification data showing mean fall calf/100 adult female of 34.8.

⁷ Suspect stable based upon 19 years time series classification data showing mean fall calf/100 adult female of 47.4 regardless of lower M:F.

Appendix 6: Glossary

Adaptive management: An approach that applies the best available information (including science, local and traditional knowledge) to improve management incrementally as we learn from experience, and as information and social changes demand. Adaptive management requires monitoring and adjustment.

Best management practices: Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on wildlife.

CircumArctic Rangifer Monitoring and Assessment Network (CARMA): CARMA is a network of researchers, managers and community people who share information on the status of the world's wild Rangifer (reindeer and caribou) populations, and how they are affected by global changes, such as climate change and industrial development.

Ecological integrity: A state that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rate of change and supporting processes.

Ecosystem: A dynamic complex of plants, animals and micro-organisms and their non-living environment interacting as a functional unit.

Extirpated: A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.

Harvesting: hunting

Herd: A subset or locally-occurring caribou population that interbreeds and normally does not interbreed with another herd or overlap its range (year round) with another herd.

Management authority: The legal entity (e.g. government) which has been assigned with a mandate to perform certain specified wildlife management functions.

Natural range of variability: The naturally occurring variation in the size or structure of a population over time.

Placer: a place where a placer deposit (glacial or alluvial deposit of sand or gravel containing eroded particle of valuable materials) is washed to extract its mineral content.

Population: A group of individual caribou of the same species adapted to an environment, as expressed primarily by their movements and feeding behavior (e.g. NMP relies on moderate snow depths that allow forage on terrestrial lichens).

Precautionary principle: Implementation of cost-effective measures shall not be postponed for lack of full scientific certainty.

Self-sustaining: The ability of a population or species to sustain itself without human intervention.

Seral community: an intermediate stage found in ecological succession in an ecosystem advancing towards its climax community.

Species of special concern: A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Sustainable harvest rate: The level of harvest that will not compromise the long-term viability of the herd. By not exceeding the sustainable harvest rate, herds can continue to provide ongoing benefits to current and future generations.

Sustainable use: The conservative use of a resource in such a way that it may be used in the present and by future generations.

Traditional ecological knowledge (TEK): The knowledge base acquired by indigenous and local peoples over many hundreds of years through direct contact with the environment. This knowledge includes an intimate and detailed knowledge of plants, animals, and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture, and forestry, and a holistic knowledge or "world view" that parallels the scientific discipline of ecology.

Winter range: A range, usually at lower elevation, used by Northern Mountain population of woodland caribou during the winter months; usually better defined and smaller than summer ranges.

Appendix 7: Toolbox to Conserve Habitat

1. Utilize existing land designation tools to protect habitat where appropriate (e.g. Wildlife Preserves, Habitat Protection Areas, Special Management Areas, National/Provincial/ Territorial Parks).
2. Develop and implement caribou habitat recovery plans where needed (e.g. restoration of habitat damaged by exploration and development, recreational activity).
3. Collaborate and contribute to Land and Resource Use Planning and Environmental Assessment/Land Use permitting processes to maintain caribou habitat requirements.
4. Where land use activities are deemed to be compatible with conservation of caribou habitat, apply best management practices and adaptive management approach incorporating conditions in Land Use permits as appropriate.
5. Where needed, collaborate with fire management authorities in the development of fire management plans that strive to conserve key caribou winter ranges.
6. Manage human disturbance including regulating seasonal trails, area closures and managing back-country recreation. Utilize a number of regulatory avenues, best management practices, permits, licensing terms and conditions.
7. To reduce human disturbance on caribou, follow best practices guidelines for flying within caribou ranges to reduce displacement of caribou from high quality habitats (e.g. guidelines for provincial and national parks, Provincial/Territorial guidelines).
8. Where and when required (e.g. for rapidly declining herds), establish no-hunt corridors or limited harvest zones to minimize disturbance and displacement of caribou.

Appendix 8: Stewardship Toolbox

1. Identify specific research and monitoring needs (e.g. ground-based monitoring of changes in caribou distribution, habitat and health). Communicate and coordinate with resident and First Nation's hunters, researchers and the public to meet those needs.
2. Develop and implement recognition programs to encourage stewardship among land and resource managers, First Nations and other users.
3. Educate and encourage people to protect or maintain caribou habitat (e.g. limit ATVs and snow machines to travel corridors to reduce damage to lichen cover).
4. Identify methods for stakeholders, communities and First Nations to track activities on the landscape (e.g. game guardian programs, Turn in Poachers [TIPS]).
5. Communicate and coordinate with resident and First Nation's hunters, researchers and the public to foster understanding, support and engagement in meeting in research and monitoring needs.

Appendix 9: Suggested Research to Support Management Plan Implementation using Traditional Ecological Knowledge or Science-based Techniques

1. Assess potential for habitat competition between caribou and other large herbivores.
2. Model population dynamics of multi-predator – multi-prey systems to determine the role of other large ungulates in population dynamics of caribou predators.
3. Determine relative importance of predator-prey relationships on caribou population trends in areas of concern.
4. Identify factors that define complex predator-prey systems and options for managing predator-prey systems at the appropriate scale.
5. Determine the role of disease and parasites in limiting or influencing the Northern Mountain population of woodland caribou.
6. Determine the contributing factors behind changing competition and/or overlap between ungulates (e.g. climate change, introduced species, creation of travel corridors, natural disturbances such as fire, etc).
7. Assess the natural range of habitat variability and describe and compile regional changes in climate and associated ecological changes (i.e. snow conditions, fire susceptibility natural recovery rates), and changes to key habitat (i.e. loss of snow patches for summer insect relief).
8. Assess the potential impact of fire disturbance on key winter range under climate warming scenarios.
9. Identify knowledge gaps in assessing the direct and indirect effects of access and associated human activity on caribou and caribou habitat.
10. Assess cumulative effects of environmental change on the population (e.g. climate change, habitat change, increased access and human activity).
11. Review assessment processes to determine how effective they are at dealing with cumulative effects on caribou.
12. Look at changes and trends in distribution over time and space and relate to potential causes of change (e.g. weather influences, herd health).
13. Using harvest data, assess the effects of harvest rates on population trends.

14. Identify the timing and location if important road crossing areas for caribou if road mortality is an issue within the range.
15. Identify possible road crossing deterrents or alternatives to the application of road salts (e.g. lithium chloride) to reduce amount of time caribou spend on major roadways.

Appendix 10: Acronyms

AC	adjusted count
ARRC	Alsek Renewable Resources Council
BC	British Columbia
CAFN	Champagne and Aishihik First Nations
CARMA	CircumArctic Rangifer Monitoring and Assessment Network
COSEWIC	Committee on Status of Endangered Wildlife in Canada
CRRC	Carmacks Renewable Resources Council
CTFN	Carcross Tagish First Nation
DKRRC	Dan Keyi Renewable Resource Council
DNA	deoxyribonucleic acid
DDRRC	Dawson District Renewable Resources Council
EC	Environment Canada
GPS	Global Positioning Systems
GRRB	Gwich'in Renewable Resources Board
GTC	Gwich'in Tribal Council
KDC	Kaska Dena Council
KDFN	Kwanlin Dun First Nation
kg	kilogram
km	kilometre
KTC	Kaska Tribal Council
LFN	Liard First Nation
LRRC	Laberge Renewable Resources Council
LSCFN	Little Salmon Carmacks First Nation
MDRRC	Mayo District Renewable Resources Council
N/A	not applicable
NMP	Northern Mountain population
NND	First Nation of Na-Cho Nyak Dun
NT	Northwest Territories
PCA	Parks Canada Agency
SARA	<i>Species at Risk Act</i>
SDC	Sahtu Dene Council
SEA	Strategic Environment Assessment
SFN	Selkirk First Nation
SRQ	stratified random quadrat
SRRB	Sahtu Renewable Resources Board
SRRC	Selkirk Renewable Resources Council
TC	total count
TCC	Tahltan Central Council
TEK	Traditional Ecological Knowledge
TH	Tr'ondëk Hwëch'in
TIPS	Turn in Poachers
TKC	Ta'an Kwäch'än Council
TRRC	Teslin Renewable Resources Council
TLFN	Takla Lake First Nation

TRTFN	Taku River Tlingit First Nation
TTC	Teslin Tlingit Council
VHF	very high frequency
WRFN	White River First Nation
YFWMB	Yukon Fish and Wildlife Management Board
YT	Yukon Territory