



Recovery Strategy for the Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories



Species at Risk (NWT) Act
Management Plan and Recovery Strategy Series
2017



For copies of the recovery strategy or for additional information on NWT species at risk, please visit the NWT Species at Risk website (www.nwt-species-at-risk.ca).

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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 Northwest Territories (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 in most areas of the NWT, on both public and private lands, including private lands owned under a land claim agreement.

What is the Conference of Management Authorities?

The Conference of Management Authorities (the Conference) 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 Conference 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 Conference develops consensus agreements on listing species at risk, conservation measures, management strategies and recovery plans. Only Management Authorities that have jurisdiction for that species are involved in making the decisions.

What is a threatened species?

Under the Act, a threatened species is a species that is likely to become endangered in the Northwest Territories if nothing is done to reverse the factors leading to its extirpation or extinction.

What is a recovery strategy?

Under the Act, a recovery strategy is a document that recommends objectives for the conservation and recovery of a threatened species. 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 Act, a recovery strategy must be done for threatened species, within two years after the species is added to the NWT List of Species at Risk.

PREFACE

Under the *Species at Risk (NWT) Act*, the Minister of Environment and Natural Resources is ultimately responsible for the preparation and completion of recovery strategies for listed threatened species. This recovery strategy has been prepared in cooperation with the Management Authorities responsible for boreal caribou: the Government of the Northwest Territories, Tłı̨chǫ Government, Wek'èezhìi Renewable Resources Board, Sahtú Renewable Resources Board, Gwich'in Renewable Resources Board, and Wildlife Management Advisory Council (NWT). This recovery strategy also constitutes advice to other jurisdictions and organizations that may be involved in conserving the species.

Success in the conservation and recovery of this species depends on the commitment and cooperation of many different groups that will be involved in implementing the directions set out in this strategy and cannot be achieved by the Government of the Northwest Territories, Tłı̨chǫ Government, Wek'èezhìi Renewable Resources Board, Sahtú Renewable Resources Board, Gwich'in Renewable Resources Board, Wildlife Management Advisory Council (NWT), or any other group alone. All NWT residents are invited to join in supporting and implementing this strategy for the benefit of the boreal caribou and NWT society as a whole.

The management authorities also developed an action framework (see Appendix 1) that outlines more specific recommended conservation and recovery actions under each approach:

Recommended specific actions for conservation and recovery of boreal caribou in the NWT.

This recovery strategy will be followed by a consensus agreement by the Conference of Management Authorities that will lay out the actions Management Authorities agree to undertake to implement it. This recovery strategy does not commit any party to actions or resource expenditures; implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating Management Authorities.

At least every five years, the Conference of Management Authorities will review this recovery strategy and report on the actions undertaken to implement it, and the progress made towards meeting its objectives.

Background information on boreal caribou and threats is mainly summarized from the Species at Risk Committee (2012) report. To avoid repetitive citations, it can be assumed that the information was taken from the 2012 report, unless another reference is given.

ACCEPTANCE STATEMENT

The Wildlife Management Advisory Council (NWT), Gwich'in Renewable Resources Board, Sahtú Renewable Resources Board, Wek'èezhìi Renewable Resources Board, Tłı̨chǫ Government, and the Government of the Northwest Territories accepted this recovery strategy on October 20, 2016 through a Conference of Management Authorities consensus agreement under the *Species at Risk (NWT) Act*.

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We thank the many individuals who reviewed drafts and provided input that significantly improved the recovery strategy. We also thank the following organizations for providing helpful comments:

- Government of Northwest Territories: Environment and Natural Resources; Industry, Tourism and Investment; Lands; Transportation; Municipal and Community Affairs; Aboriginal Affairs and Intergovernmental Relations
- Dehcho Boreal Caribou Working Group
- Salt River First Nation
- First Nation of Nacho Nyak Dun
- Wildlife Management Advisory Council (NWT)
- Gwich'in Renewable Resources Board
- Sahtú Renewable Resources Board
- Wek'èezhì Renewable Resources Board
- Tłchq Government
- Government of Canada: Environment and Climate Change Canada; Parks Canada Agency
- North Slave Métis Alliance
- Acho Dene Koe First Nation
- Kátł'odeeche First Nation
- Northwest Territory Métis Nation
- Gwich'in Tribal Council
- Dene Tha First Nation
- Canadian Parks and Wilderness Society
- Explor
- NWT and Nunavut Chamber of Mines
- Canadian Association of Petroleum Producers
- Association of Mackenzie Mountain Outfitters
- Land and Water Boards of the Mackenzie Valley

EXECUTIVE SUMMARY

The purpose of this recovery strategy is to provide an action-oriented planning tool that identifies how the conservation and recovery of boreal caribou (*Rangifer tarandus caribou*, woodland caribou [boreal population]) can be accomplished in the NWT. It will assist the Management Authorities in deciding what actions to take, how to prioritize their work, and how to allocate their resources. The next step is for Management Authorities to make an agreement laying out the actions they intend to take to implement this strategy. They will review this recovery strategy and report on progress every five years.

This recovery strategy was prepared by the Department of Environment and Natural Resources (ENR) of the Government of the Northwest Territories (GNWT), in accordance with the Conference of Management Authorities' guidelines and template for recovery strategies. There were many steps involved in the process; this included discussions with communities in the NWT, conducting Crown Consultation with regard to Aboriginal or treaty rights, and providing the opportunity for public comment. Their feedback was incorporated into the plan which was edited and reviewed by all parties who have the authority to manage this species, including Government of the Northwest Territories, Tłı̨chǫ Government, Wek'èezhì Renewable Resources Board, Sahtú Renewable Resources Board, Gwich'in Renewable Resources Board, Wildlife Management Advisory Council (NWT), and Government of Canada.

1. Species Description and Biology

Boreal caribou are a distinct population of woodland caribou. Woodland caribou are the largest subspecies of caribou in the NWT and their antlers are thicker and broader compared to those of barren-ground caribou. Their coat is brown in summer and greyish in winter. Their throat, belly and rump are white in all seasons.

Boreal caribou are distinguished from northern mountain caribou (the other type of woodland caribou) by their different habitat preferences and behaviour. Boreal caribou live in the forests east of the Mackenzie Mountains, prefer to stay within the forest year-round, and do not migrate. Boreal caribou females space out for calving; by spacing out throughout the forest they reduce the risk of predation. Boreal caribou startle easily, move quickly and are very elusive.

2. Current status

In 2012, boreal caribou were assessed by the NWT Species at Risk Committee as ¹threatened in the NWT. Boreal caribou were subsequently listed as a threatened species under the territorial *Species at Risk (NWT) Act* in 2014. This means boreal caribou are likely to become ²endangered in the NWT if nothing is done to reverse the factors leading to its extirpation or extinction. This recovery strategy is legally required due to the listing of boreal caribou in the NWT.

¹ **Threatened in NWT:** A species that is likely to become an endangered species in the NWT if nothing is done to reverse the factors leading to its extirpation or extinction.

² **Endangered in NWT:** A species that is facing imminent extirpation from the NWT or extinction.

Boreal caribou were assessed nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as a ³threatened species in 2002 and listed under the federal *Species at Risk Act* (SARA) in 2003. In 2014, they were re-assessed by COSEWIC as threatened.

3. Population and distribution

Boreal caribou in the NWT inhabit an extensive area of boreal forest east of the mountains as far north as Tuktoyaktuk. The range is continuous with northern Alberta and northern British Columbia to the south, although boreal caribou there are considered different populations for management purposes. NWT's population (called NT1) also extends slightly into northeastern Yukon. Boreal caribou are naturally found at low densities, either individually or in small groups. They do not form cohesive herds in the NWT; rather they are one continuous population of loosely distributed individuals. Rivers and habitat fragmentation may affect movement.

It is estimated that there are roughly between 6000 and 7000 boreal caribou in the NWT. This is a crude estimate based on the estimated density of caribou in different regions (derived from community and scientific knowledge), multiplied by the size of the range in each region. The estimate is a rough one and it is recognized that better population estimates are needed.

Determining population trends is difficult and trends vary among regions. In general, there is evidence of population decline in the southern part of the territory where it is believed that the majority of NWT's boreal caribou occur. The NWT boreal caribou population was classified as '*likely self-sustaining*' by Environment Canada (EC) in 2012 based on habitat conditions at that time and the current understanding of a single NWT population with a continuous range (Environment Canada 2012). '*Likely self-sustaining*' was determined based on EC's disturbance management thresholds model, which identifies 65% undisturbed habitat as a threshold that provides a measurable probability (60%) for a population to be ⁴self-sustaining. This is considered a minimum threshold because at 65% undisturbed habitat there remains a significant risk (40%) that a population will not be self-sustaining.

4. Needs of the boreal caribou

Boreal caribou require large expanses of contiguous old growth boreal forests. They tend to spend time in mature or old growth coniferous forests with plentiful ground and tree lichens. Ridges, swamps, burned areas and meadows are important for avoiding predators and insects in spring and summer. Boreal caribou need large areas of intact habitat so they can spread out to avoid predators.

Habitat conditions that benefit females and their calves are essential to the overall survival of boreal caribou. Research has shown that boreal caribou populations do better where there is less overall habitat disturbance (human-caused as well as fire) and when undisturbed habitat occurs in large patches. Disturbances that create younger forest habitat can lead to increases in numbers

³ **Threatened in Canada:** A wildlife species that is likely to become endangered in Canada if nothing is done to reverse the factors leading to its extirpation or extinction.

⁴ A self-sustaining population is one that on average demonstrates stable or positive population growth over the short-term (≤ 20 years), and is large enough to withstand stochastic events and persist over the long-term (≥ 50 years), without the need for ongoing active management intervention (Environment Canada 2012).

of alternate prey such as deer and moose, in turn leading to greater numbers of predators. More predators, and linear disturbances that facilitate their travel through boreal caribou habitat, in turn increase the risk of predation for caribou, resulting in higher predation rates.

As of 2011, approximately 69% of the boreal caribou range in the NWT was undisturbed habitat. Undisturbed habitat is defined in the national recovery strategy (Environment Canada 2012) as areas that have not burned within the past 40 years, and areas that are further than 500 m from human disturbance footprints visible on 1:50,000 scale Landsat imagery. Habitat in the southern NWT is more disturbed and more fragmented compared to habitat in the northern NWT. In 2014 and 2015, severe fires resulted in an estimated reduction in undisturbed habitat in NWT from 69% to 66%. Fire disturbance is expected to increase in the territory as a result of climate change, including hotter, drier summers that provide a longer fire season. With the growth of industrial development in both northern and southern NWT, human-caused disturbances including seismic lines, pipelines, industrial infrastructure, cut blocks and roads are also expected to increase.

5. Threats to survival and recovery

The most important threat to boreal caribou in the NWT is habitat disturbance which increases predation risk. Currently, the majority of habitat disturbance in the NWT range is caused by fire. Habitat disturbance is cumulative and includes human-caused disturbance - particularly seismic lines, forestry cut-blocks and roads – combined with natural disturbance, specifically forest fire. Parts of the NWT range have already been impacted, especially in southern NWT. There is concern that several projects underway in NWT will increase human-caused disturbance. There is also concern that climate change will lead to an increase in fire disturbance.

The relationship between boreal caribou and their predators (mainly wolves, but also bears and other carnivores) changes as the landscape becomes more disturbed. Habitat disturbance increases the number of predators in boreal caribou habitat (primarily because disturbed landscapes tend to support more alternative prey) and increases the risk of caribou being killed by predators. Increased predation can lead to population declines. High predation rates caused by high levels of habitat disturbance have been responsible for serious boreal caribou population declines in much of Canada.

Boreal caribou are lawfully harvested by Aboriginal people and resident hunters in the NWT. Management of boreal caribou harvest to date has been based on the understanding that harvest levels are low because people tend to harvest boreal caribou opportunistically. However, concerns have been raised that harvest may have been underestimated and harvest levels are likely increasing, particularly in the southern NWT (e.g. Dehcho First Nations 2011). Factors such as barren-ground caribou declines, increasing access to boreal caribou range, and non-traditional harvest practices (e.g. reckless shooting, meat wastage) may be causing harvest levels to increase.

Climate change is having extensive impacts on boreal caribou habitat. Changes including warmer weather, a decline in snowfall and permafrost thaw have already been observed in NWT. There are also more ice-on-snow events that make travel and foraging difficult for boreal

caribou. These changes could become more extensive in the future and will likely have long-term negative impacts on boreal caribou.

Other threats that are currently of lesser importance include parasites and diseases, noise and light disturbance, the impacts of various research techniques, pollution, interactions with other ungulates, and vehicle collisions.

It is important to consider the cumulative effects of multiple threats to boreal caribou. Although one threat may appear minor on its own, when combined with other threats there may be significant impacts.

6. Conservation and recovery goal

The conservation and recovery goal is to ensure a healthy and sustainable boreal caribou population across their NWT range that offers harvesting opportunities for present and future generations.

7. Conservation and recovery objectives

Objectives for the conservation and recovery of boreal caribou are:

- 1) Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou;
- 2) Ensure that harvest of boreal caribou is sustainable;
- 3) Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects;
- 4) Manage boreal caribou collaboratively, using adaptive management practices and the best available information;
- 5) Exchange information with NWT people about boreal caribou in all regions; and
- 6) Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.

8. Highlights of the main recommended approaches for conservation and recovery

Objective #1) Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.

Large areas of undisturbed habitat are essential to the survival of boreal caribou. Range plans for habitat management should be developed that describe where and how undisturbed boreal caribou habitat should be maintained. Landscape change – both human-caused and natural – should be monitored. Fire disturbance should be managed as a natural and necessary part of boreal caribou habitat, adhering to the existing fire management policy to the best extent possible, with consideration of the possible use of fire management tools for maintaining important caribou habitat.

Human-caused landscape disturbance should be managed by minimizing the impacts of industry and development activities. Land use planning and protected/conservation area planning should be supported. Boreal caribou habitat supply should be considered in planning and issuing permissions or rights for forestry, oil and gas, mineral activities, roads and other development. If necessary, in response to landscape change, management

authorities may need to recommend to regulatory agencies and land use planning boards that development activities be scaled back, delayed or not approved in a particular area until sufficient habitat regenerates to offset the new disturbance. Agencies that have authority to regulate land use (e.g. land and water boards, GNWT, Tłıchǫ Government and Government of Canada) have legal obligations under the federal *Species at Risk Act* to ensure that critical habitat for boreal caribou is not being destroyed and should implement the appropriate recommendations when required. Regulatory authorities and lead agencies that manage caribou should provide leadership in this regard by demonstrating that boreal caribou habitat supply has been considered in their own planning processes. Range plans and reporting of habitat disturbance will help to inform these decisions.

Objective #2) Ensure that harvest of boreal caribou is sustainable.

Boreal caribou harvest levels are believed to be low but increasing, however reliable harvest data are lacking. This objective focuses on measuring harvest levels and then managing the harvest of boreal caribou in order to ensure its sustainability. This can be accomplished by educating people about the importance of reporting harvest, and working with local harvesting committees, First Nations and other groups to develop systems for reporting harvest and measuring harvest levels. Other actions that help in achieving a sustainable harvest include encouraging harvest practices that minimize negative impacts on the population, promoting compliance with hunting regulations, reviewing Big Game Hunting Regulations for boreal caribou, and making harvest management recommendations if necessary (e.g. temporary harvest limitations). Investigating and defining⁵ sustainable harvest levels is also an important factor in achieving this objective.

Objective #3) Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects.

The focus of Objective #3 is to monitor boreal caribou and fill information gaps so that management can be based on the best possible information. Estimating local population trends in each region and exploring methods to use this information for estimating the overall NWT population trend would provide key information needed to manage boreal caribou appropriately. Developing an approach to modeling cumulative effects would provide additional information needed for management. Improving our understanding of boreal caribou distribution, relationships, movement and population structure would also inform management. The possible use of population and habitat thresholds as triggers for management actions should be considered. Partnerships with academic researchers and other agencies can be used to learn more about the disturbance-predator-prey dynamic, the natural fire regime, habitat regeneration and restoration, and habitat changes due to climate change in the NWT. Community and traditional knowledge should be used at all stages to inform boreal caribou management and monitoring, as well as our understanding of boreal caribou ecology.

⁵ Sustainable harvest is currently understood to be a harvest that does not cause the population to decline. In other words, the population should at least be stable with that harvest.

Objective #4) Manage boreal caribou collaboratively, using adaptive management practices and the best available information.

Management must be done collaboratively among NWT regions and with other jurisdictions to be successful. Co-management authorities for boreal caribou are established and the Conference of Management Authorities provides a forum for these co-management partners to work together on boreal caribou issues, including issues that cross NWT regional boundaries. Management partners in the NWT should have regular check-ins to review the latest information on the state of boreal caribou, review progress on boreal caribou recovery, and adjust management actions if needed. Working with Aboriginal governments and organizations, communities, resident hunters, non-governmental organizations, and industry to manage caribou collaboratively will be essential. Investment and collaborative partnerships will be required to increase the human and financial capacity to implement the actions in this recovery strategy.

It is also important to work with neighbouring jurisdictions such as Yukon, B.C. and Alberta to share information and co-ordinate boreal caribou planning, monitoring and management. Agreements and processes for cooperation are already in place and should continue.

Objective #5) Exchange information with NWT people about boreal caribou in all regions.

Keeping the flow of information open will ensure all perspectives are integrated into boreal caribou recovery. This will help build and maintain support for recovery, and keep managers informed about what is happening on the ground. A variety of methods may be used to share information, with use of appropriate methods depending on the groups being engaged.

Objective #6) Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.

The national recovery strategy established indicators for maintaining a self-sustaining boreal caribou population and protecting critical habitat. This objective focuses on tracking and reporting NWT's progress with respect to these indicators, to ensure that recovery in the NWT remains on track and meets or exceeds national requirements. Feeding into this cooperative national approach will help to meet the conservation needs of boreal caribou. It will also help ensure that co-management processes and other northern tools are used to manage boreal caribou in the NWT. Over time, new information on boreal caribou ecology and habitat can be used to improve and refine these indicators for the NWT.

The management authorities also developed an action framework (see Appendix 1) that outlines more specific recommended conservation and recovery actions under each approach:

Recommended specific actions for conservation and recovery of boreal caribou in the NWT.

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1. STRATEGY DEVELOPMENT

1.1 *Purpose and Principles*

The purpose of this recovery strategy is to provide an action-oriented planning tool that identifies how the conservation and recovery of boreal caribou can be accomplished in the Northwest Territories. It will help the Management Authorities decide what actions to take, how to prioritize their work, and how to allocate their resources in order to conserve and recover boreal caribou.

The following guiding principles informed the development of this recovery strategy:

- Recognize that the biological diversity of the Northwest Territories is a legacy to be preserved, and that all residents 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; and
 - Involve interested parties in developing the plan/strategy, including engagement at the community level throughout the process especially for culturally sensitive species;
- Respect Treaty and Aboriginal rights as well as land claim and self-government agreements;
- Recognize that some 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 is: where there are threats of serious or irreversible damage, lack of full certainty shall not be used as a reason for postponing cost-effective conservation measures;
- Make full and appropriate 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; and
 - Recognize and address information gaps;
- Have a clear goal and clear, measurable objectives;
 - Include only management approaches that are realistic and biologically feasible; and
 - Recognize that conservation and recovery can take a long time, therefore long-term approaches are needed.

1.2 Planning Partners

The groups with management authority for boreal caribou in the NWT are:

- Wildlife Management Advisory Council (NWT) [WMAC (NWT)];
- Gwich'in Renewable Resources Board (GRRB);
- Sahtú Renewable Resources Board (SRRB);
- Wek'èezhìi Renewable Resources Board (WRRB);
- Tłı̨chǫ Government (TG);
- Government of the Northwest Territories (GNWT);
- Government of Canada (Environment Canada and Parks Canada)

The Wildlife Management Advisory Council (NWT) advises governments on wildlife policy, management, regulation, and administration of wildlife, habitat and harvesting in the NWT portion of the Inuvialuit Settlement Region (Inuvialuit Final Agreement, section 14). The Wildlife Management Advisory Council (NWT) works collaboratively with the Inuvialuit Game Council, Hunters and Trappers Committees and government in research, monitoring and management of wildlife and habitat. The Wildlife Management Advisory Council (NWT) consults regularly with the Inuvialuit Game Council and Hunters and Trappers Committees, and these groups may assist the Council in carrying out its functions.

The Gwich'in Renewable Resources Board (GRRB) is the main instrument of wildlife management in the Gwich'in Settlement Area. Its powers include approving plans for the management and protection of particular wildlife populations (including endangered species), particular wildlife habitats, and forests (Gwich'in Comprehensive Land Claim Agreement, sections 12 and 13). The Gwich'in Renewable Resources Board works collaboratively with Renewable Resources Councils and government in research, monitoring and management of wildlife and habitat. The Gwich'in Renewable Resources Board consults regularly with the Renewable Resources Councils, and its management authority may be delegated to Renewable Resources Councils.

The Sahtú Renewable Resources Board (SRRB) is the main instrument of wildlife management in the Sahtú Settlement Area. Its powers include approving plans for the management and protection of particular wildlife populations (including endangered species), particular wildlife habitats, and forests (Sahtú Dene and Metis Comprehensive Land Claim Agreement, sections 13 and 14). The Sahtú Renewable Resources Board works collaboratively with Renewable Resources Councils and government in research, monitoring and management of wildlife and habitat. The Sahtú Renewable Resources Board consults regularly with the Renewable Resources Councils, and management authority may be delegated to Renewable Resources Councils.

The Wek'èezhìi Renewable Resources Board (WRRB) is the wildlife co-management authority responsible for managing wildlife, wildlife habitat, forests, plants and protected areas in Wek'èezhìi as set out in the Tłı̨chǫ Agreement (Tłı̨chǫ Agreement, sections 12, 13, 14 & 16). Responsibilities include making determinations or recommendations on management proposals for activities which may affect wildlife and wildlife habitat. The Wek'èezhìi Renewable Resources Board works collaboratively with the Tłı̨chǫ communities and Tłı̨chǫ, territorial and federal governments in research, monitoring and management of wildlife and habitat.

The Tłıchǵ Government (TG) has powers to enact laws in relation to the use, management, administration and protection of lands and renewable resources, on Tłıchǵ lands. This includes laws relating to the management and exercise of harvesting rights for wildlife, plants and trees (Tłıchǵ Agreement, section 7). The Tłıchǵ Government has prepared the Tłıchǵ Land Use Plan to assist in managing approximately 39,000 km² of Tłıchǵ lands. The Plan provides a guide for future development by outlining how Tłıchǵ land will be protected and how activities and development on Tłıchǵ lands should occur.

The Government of the Northwest Territories (GNWT), represented by the Minister of Environment and Natural Resources (ENR), has ultimate responsibility for the conservation and management of wildlife, wildlife habitat and forest resources in the NWT, subject to land claims and self-government agreements. It is the Minister of ENR's ultimate responsibility to prepare and complete management plans and recovery strategies under the *Species at Risk (NWT) Act*. Other GNWT departments also have responsibilities including land management, resources, communities, transportation, and economic development. ENR engages with other GNWT departments on species at risk issues through the Inter-departmental Species at Risk Committee, inter-departmental committees of Directors and Deputy Ministers, and Cabinet.

The Government of Canada has ultimate responsibility for the management of migratory birds (as described in the *Migratory Birds Convention Act, 1994*), fish, marine mammals, and other aquatic species (as described in the *Fisheries Act*). It also has responsibilities for the implementation of the federal *Species at Risk Act*, including enforcement of the general prohibitions and critical habitat prohibitions where listed species occur on federal land that belong to her Majesty in right of Canada or under the direct authority of the Minister of the Environment (National Wildlife Areas and Migratory Bird Sanctuaries) and the Minister responsible for the Parks Canada Agency (National Parks, National Park Reserves and National Historic Sites).

1.3 Consideration of National Species at Risk Legislation

In developing the NWT recovery strategy for boreal caribou, the management authorities agreed that the strategy should recognize species at risk requirements under the federal *Species at Risk Act* (SARA) that must be met in the NWT, as well as work that is already underway or planned to meet those requirements.

Federal, provincial, and territorial government signatories to the Accord for the Protection of Species at Risk agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. The federal SARA applies everywhere in the NWT and is complementary to the territorial *Species at Risk (NWT) Act*. The Government of the Northwest Territories (GNWT) cooperates in implementing the federal SARA as outlined in the Accord. The GNWT has the mandate and jurisdiction to manage boreal caribou and their habitat and is the lead agency for managing boreal caribou within the NWT boreal caribou range, with the exception of federal lands such as National Parks, National Park Reserves and National Wildlife Areas. Since devolution, the GNWT also has the ability to make land use decisions that enable habitat management.

Under the federal SARA, the federal government must identify critical habitat for listed threatened and endangered species. Critical habitat under SARA means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species. The federal SARA requires that critical habitat, once identified, must be protected from destruction. This requirement applies in the NWT regardless of where the critical habitat is located (i.e. on federal lands or non-federal lands). Federal SARA requires that critical habitat on federal land be legally protected. SARA requires that critical habitat on non-federal land be protected, and Environment Canada looks to provincial/territorial jurisdictions to provide effective protection for critical habitat on non-federal lands. If the federal Minister of the Environment is of the opinion, after consultation with the appropriate provincial or territorial minister, that critical habitat is not effectively protected, the federal Minister must recommend to the Governor in Council that a protection order be made under section 61 of SARA.

Critical habitat for boreal caribou in the NWT range, that must be protected from destruction under federal SARA, has been defined in the national recovery strategy (Environment Canada 2012). Critical habitat for boreal caribou is identified as:

- i) the area within the boundary of the boreal caribou range that provides an overall ecological condition that will allow for an ongoing recruitment and retirement cycle of habitat, which maintains a perpetual state of a minimum of 65% of the area as undisturbed habitat; and
- ii) biophysical attributes required by boreal caribou to carry out life processes.

The national recovery strategy identifies 65% undisturbed habitat in a range as the disturbance management threshold, which provides a measurable probability (60%) for a local population to be self-sustaining. This threshold is considered a minimum threshold because at 65% undisturbed habitat there remains a significant risk (40%) that local populations will not be self-sustaining. The national recovery strategy recognizes that there is variation in habitat and population conditions between boreal caribou populations across Canada, and that for some ranges it may be necessary to manage the range above the 65% undisturbed habitat threshold, while for others it may be possible to manage the range below the 65% undisturbed habitat threshold. However, there must be strong evidence, validated by Environment Canada, from population data collected over an extended period of time to support the management decision to establish a lower range-specific threshold. In the absence of strong evidence to support lowering the undisturbed habitat threshold below 65%, the amount of critical habitat for all ranges is at least 65% undisturbed habitat (Environment Canada 2012). The NWT does not currently have strong evidence to support changing the threshold, and the minimum threshold of 65% disturbance applies to the NWT range.

The national recovery strategy identifies a need for range plans that outline how range-specific land and/or resource activities will be managed over space and time to ensure that critical habitat for boreal caribou is protected from destruction. Development of the range plan for the NWT range is underway and is being led by Environment and Natural Resources, GNWT. Canada will use NWT's range plan to determine if NWT laws effectively protect critical habitat, inform reporting required under the federal SARA on implementation and progress toward meeting

national recovery objectives, and inform decisions related to environmental assessments, issuance of permits and other approval processes. If NWT uses northern tools to effectively protect and maintain critical habitat for boreal caribou, the likelihood of a federal protection order in the NWT should be low.

Although the requirements outlined above come from the federal SARA and not from the *Species at Risk (NWT) Act*, they are important aspects of how boreal caribou are managed in the NWT. Effective protection of critical habitat in the NWT is required under SARA, will reduce the likelihood of a federal protection order, and will help to achieve the NWT conservation and recovery goal for boreal caribou. Recognition of the federal critical habitat requirements, and the related work underway in the NWT, is included throughout the NWT recovery strategy. For example:

- Developing range plans for habitat management (approach 1.1);
- Monitoring and managing landscape disturbance (approaches 1.2-1.4);
- Ensuring national obligations for critical habitat are met or exceeded in the NWT (objective 6);
- Tracking and reporting on critical habitat indicators (approach 6.1); and
- Improving information on boreal caribou ecology and habitat disturbance in the NWT (approach 3.2) and using this new information to refine and improve indicators for critical habitat (approach 6.3).

1.4 Planning Process

This recovery strategy was prepared by the Department of Environment and Natural Resources (ENR) of the Government of the Northwest Territories (GNWT), following the Conference of Management Authorities' guidelines and template for recovery strategies.

Many sources were consulted in the preparation of this plan, including the following:

- Input from Wildlife Management Advisory Council (NWT), Gwich'in Renewable Resources Board, Sahtú Renewable Resources Board, Wek'èezhì Renewable Resources Board, Tłı̨chǫ Government, Environment Canada, Parks Canada, Aboriginal governments and organizations, boreal caribou experts and the public;
- NWT Species at Risk Committee's status report, assessment and reasons for assessment of boreal caribou, which includes the best available traditional, community and scientific knowledge on boreal caribou in the NWT;
 - Species at Risk Committee. 2012. Species Status Report for Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.
- *Species at Risk (NWT) Act*. 2009. S.N.W.T. 2009, c. 16.; and
- Input and information gathered from 2006 to 2013 during the development of the territorial *Action Plan for Boreal Caribou Conservation in the Northwest Territories* (ENR 2010) and the national *Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada* (Environment Canada 2012), as well as consultation and engagement on listing boreal caribou as a species at risk.

As part of the engagement and consultation process, the management authorities involved in management of boreal caribou conducted meetings and other consultation activities. These activities included the following:

The GRRB consulted with the four Renewable Resource Councils (RRCs) and communities within the Gwich'in Settlement Area in the summer of 2013 with respect to the proposed listing of boreal caribou as a threatened species. The Board discussed the proposed listing at their September 2013 meeting and provided approval. The GRRB consulted with the RRCs and communities with respect to the boreal caribou recovery framework in the winter of 2014/15 and the proposed recovery strategy in the summer of 2015. The edited recovery strategy was submitted to the Board for approval at their October 2016 meeting, which included an overview of how GRRB and RRC comments were addressed and incorporated.

In the summer of 2013, the WRRB, in collaboration with TG, consulted with the communities of Gamèti, Whati, and Behchokò regarding the listing of boreal caribou as threatened. The WRRB and TG conducted further consultations with the three Tłìchq communities about the proposed boreal caribou recovery strategy in May 2015.

The SRRB engaged with the five communities of the Sahtú Region: Colville Lake, Délı̄ne, Fort Good Hope, Norman Wells and Tulít'a, in the summer of 2013 with regard to the listing of boreal caribou. The SRRB's consultations in the summer of 2015 regarding the proposed boreal caribou recovery strategy were associated with ongoing community-based caribou populations research activities.

The WMAC (NWT) and ENR visited communities in the Inuvialuit Settlement Region (ISR) to discuss the NWT boreal caribou recovery framework in June and July 2014. Comments and feedback were considered and incorporated, where appropriate, into the boreal caribou recovery strategy developed for consultation. In June 2015, WMAC (NWT) and ENR returned to the ISR communities to provide them with opportunities to comment on the boreal caribou recovery strategy.

ENR consulted with Aboriginal governments and organizations with respect to potential adverse effects of the recovery strategy on established or asserted Aboriginal or treaty rights. ENR also worked with other GNWT departments through the Inter-departmental Species at Risk Committee. ENR provided an opportunity for members of the public and interested organizations to comment on the draft recovery strategy in the summer of 2015.

The recovery strategy was edited and reviewed by all of the above management partners who are involved in managing boreal caribou in NWT.

As part of this process the management authorities also developed an action framework (see Appendix 1) that outlines more specific recommended conservation and recovery actions under each approach: *Recommended Specific Actions for Conservation and Recovery of Boreal Caribou in the NWT*.

As a final step, the GRRB, WRRB, TG, SRRB, WMAC (NWT), and GNWT accepted this recovery strategy for the boreal caribou through a Conference of Management Authorities consensus agreement on October 20, 2016.

2. SOCIAL PERSPECTIVES

Boreal caribou are very important to Aboriginal peoples living in the boreal forest of NWT, from a spiritual, cultural and economic perspective.

On a spiritual level, many Aboriginal people hold tremendous respect toward boreal caribou. This carries with it certain obligations not to unduly harm or disrespect this animal. Prayer and leaving offerings before hunting are important factors in this belief. Respecting rules about the use of meat and hide, including sharing harvests and not wasting meat, are also considered essential to this approach.

Boreal caribou are highly respected and valued by Aboriginal harvesters. The meat is important for human consumption and the hide – being thin and strong – is highly valued for making specialized craft products such as snowshoe lacing, dog harnesses, and drums.

Aboriginal people in much of the NWT tend to harvest boreal caribou opportunistically (when the opportunity arises), routinely relying more on other species such as moose or barren-ground caribou. However, there are indications that boreal caribou harvest levels may have been underestimated in the Dehcho and South Slave regions. Some General Hunting Licence holders actively target boreal caribou in the South Slave region, and some resident hunters also harvest boreal caribou for subsistence use throughout their NWT range. The estimated harvest by resident hunters has increased in recent years, concurrent with harvest restrictions on barren-ground caribou and wood bison (ENR unpublished data).

In addition to harvesting, boreal caribou hold value for many residents (non-hunters) of NWT and other Canadians. The species is a part of northern biodiversity and is considered an indicator of a healthy ecosystem. Boreal caribou represent an important symbol of Canadian wilderness and many residents wish to conserve the species due to its intrinsic value.

****Note:** The above is a basic, generalized summary of perspectives on boreal caribou. More detail on traditional knowledge and stewardship of boreal caribou from the various Aboriginal cultures in the NWT can be found in traditional knowledge reports. The Traditional and Community Knowledge component of the *Species Status Report for Boreal caribou (Rangifer tarandus caribou) in the Northwest Territories* (SARC 2012) includes a list of such information sources.

3. SPECIES INFORMATION

3.1 Species Names and Status

Common Name in English used in this report: boreal caribou

Other common names: boreal woodland caribou; woodland caribou (boreal population)

Name(s) in Other Languages: Vadzaih (Gwich'in), Mbedzih (South Slavey, Dehcho region), Medzih (South Slavey, Kátl'odehche dialect), Ṯɔdzı (Ṯẖcẖo and Sahtú region), Tuktut (Siglitun), Tuttut (Uummarmiutun), ɫądzié (Chipewyan), sakaw atihk (Cree), la population boréale du caribou des bois (French).

References for names: Benson (2011), Chocolate (2011), Community Corporations of Aklavik, Inuvik and Tuktoyaktuk (2006), Dehcho First Nations (2011), Kaulback et al. (2014), Sahtu Renewable Resources Board (pers. comm. 2012 cited in SARC 2012), Schramm (2005), South Slave Divisional Education Council (2009; 2012).

Order: Artiodactyla (Even-toed ungulates)

Family: Cervidae (Deer-like mammals)

Species name: *Rangifer tarandus* (caribou)

Sub-species name: *R. t. caribou* (woodland caribou)

Population name: boreal population

Occurrence:

Boreal caribou are primarily found in the NWT's boreal forest, north from 60° to the Mackenzie Delta. They are found between the Mackenzie Mountains and east to the treeline (in northern NWT) or to the Canadian Shield (in southern NWT).

Summary of status designations in the NWT and Canada

Jurisdiction	General Status Rank ¹	Detailed Status Assessment ²	Legal Listing ³
NWT	At Risk (2015)	Threatened (2012)	Threatened (2014)
Canada	*	Threatened (2014)	Threatened (2003)

¹General Status Ranks have no legal implications. They set priorities for more detailed assessment. Ranks are determined using NatureServe Canada methodologies and are reviewed every 5 years.

²Status assessments are independent biological assessments that do not change the legal status of the species. Assessments are done in the NWT by SARC and in Canada by COSEWIC. Status assessments are reviewed every 10 years.

³This is the legal status of the species on the NWT List of Species at Risk under the territorial *Species at Risk (NWT) Act* and on Schedule 1 of the national *Species at Risk Act*.

*Sub-species and ecotypes do not have a Canada General Status Rank.

Assessment by the NWT Species at Risk Committee (SARC): Threatened (December 2012)

SARC Status History: SARC assessed this species for the first time in 2012.

Status on NWT List of Species at Risk: Threatened (February 2014)

NWT Listing History: Boreal caribou was added to the NWT List of Species at Risk for the first time in 2014.

Excerpt from SARC (2012):

Status: Threatened in the Northwest Territories

Likely to become endangered in the Northwest Territories if nothing is done to reverse the factors leading to its extirpation or extinction

Reasons for the assessment: Boreal Caribou fits criterion (c) for Threatened

(c) – There is evidence that the population size is small and there is a decline in population size such that it could disappear from the Northwest Territories in our children’s lifetime

- Boreal caribou need large tracts of undisturbed habitat so they can spread out to minimize predation risk. This adaptation results in naturally low densities across a large area, making them more vulnerable to systematic habitat fragmentation.
- Population size is small: about 5,300 mature individuals, 6,500 total population. While there is uncertainty in the estimate (e.g. in the eastern Sahtu region), it is unlikely that the total population size is larger than 10,000 in the Northwest Territories.
- Currently, there is variation across the Northwest Territories in rates and direction of population change. There are documented population declines in parts of the southern Northwest Territories where the majority of boreal caribou occur.
- Current and future threats leading to habitat fragmentation are expected to increase.
- A continuing decline in the amount of secure habitat and in population size is projected.
- There is no foreseen possibility of rescue from outside populations due to severely declining populations in Alberta and British Columbia.

3.2 Species Description and Biology

Boreal caribou are a medium-sized member of the deer family. Both males and females grow antlers, with those of the male being larger than the female. They are very well adapted to the northern climate. They have thick coats of semi-hollow hair, allowing them to endure cold winter temperatures and providing buoyancy while swimming across rivers and lakes.

Boreal caribou are a distinct population of woodland caribou. Woodland caribou are the largest subspecies of caribou in the NWT and their antlers are thicker and broader compared to those of barren-ground caribou. They have large shovel-like hooves that help them to travel easily on soft surfaces like snow or muskeg. During the winter they are a greyish colour but after moulting in the summer, they become very sleek animals that are dark to tawny brown. In all seasons, they are white around the throat area, on the belly, and on the rump below the tail.

Boreal caribou are similar to northern mountain caribou, the other ecotype of woodland caribou found in the NWT, but have different habitat preferences and behaviour. Boreal caribou live in the forests east of the Mackenzie Mountains, prefer to stay within the forest year-round, and do not migrate seasonally to different elevations, as mountain caribou do. Boreal caribou are naturally found at low densities and are typically found in small groups throughout their range. Groups most often number one to five individuals, although larger groups are sometimes reported depending on the region and time of year.

During calving season, female boreal caribou separate and remain solitary. By spacing out throughout the forest they reduce the risk of predation. This means that large areas of habitat are needed for the survival of females and their calves.

Female boreal caribou first breed at age two and produce their first calf at age three. They can produce calves up to an age of at least 16 years. Females sometimes give birth to twins, although this is rare. Calves remain with their mothers until the following spring. Often less than half of calves survive their first six weeks of life.

Boreal caribou startle easily and are quick to run away. They can travel quickly over rough or snowy terrain. Some people refer to them as “secretive” animals because of their elusive nature and behavior.



Figure 1. Photograph of boreal caribou in the NWT in 2007, GNWT / J. Nagy, ENR.

3.3 Population and Distribution

Boreal caribou occur only in Canada and occupy the boreal forests of seven provinces and two territories. Their range extends from the northeast corner of the Yukon, east to Labrador and south to Lake Superior. Within the NWT, they inhabit a vast area of boreal forest that extends from Tuktoyaktuk in the north down to Alberta and northern British Columbia in the south. The western border of their range is defined roughly by the foothills of the Mackenzie Mountains and in the east their range extends to Great Bear Lake, Great Slave Lake and the Little Buffalo River.

The range is continuous with northern Alberta and northern British Columbia to the south, although boreal caribou there are considered different populations. NWT's population (NT1) extends slightly into northeastern Yukon.

Unlike barren-ground caribou, boreal caribou do not undertake long-distance migrations. However, they do move around according to their seasonal needs (e.g. availability of lichen, suitable calving habitat). In some areas of their range, rivers or habitat disturbance (including burned areas and human-made features such as highways and pipelines) can be barriers to movement. Currently, there is no clear evidence for gaps in the NWT distribution of boreal caribou or for genetic subpopulation structure. Therefore, boreal caribou in the NWT are being managed as a single population with a continuous range.

It is estimated that there are between 6000 and 7000 boreal caribou in the NWT. This is a rough estimate based on the estimated density of caribou in different regions (ranging from approximately 1 to 3 caribou per 100 km²), derived from community and scientific knowledge, and multiplied by the size of the range in each region. More accurate estimates of population size are needed.

Determining population trends for boreal caribou is difficult and population trends vary among regions. Traditional and community knowledge compiled in 2012 suggests that boreal caribou population trends are stable or increasing in the Inuvialuit Settlement Region and Sahtú Settlement Area, increasing in some parts of the Gwich'in Settlement Area (GSA), and declining in other parts of the GSA. In different areas of the Dehcho region, traditional knowledge suggests that boreal caribou population trends are increasing, stable or declining depending on the area. There is concern that caribou may be declining in Wek'èezhì and the North Slave region overall. In some areas, boreal caribou group sizes have been smaller in recent years than in the past. Scientific collaring studies have allowed short-term population growth rates to be calculated in some local study areas. These rates indicate recent population decline in the Dehcho region, population stability or decline in the South Slave region, and population increase in the Gwich'in region.

Although there is no trend estimate for NWT's population as a whole, regional trend information can provide insight into how the population is doing overall. Combining the regional trend information described above with estimated regional caribou densities, the Species at Risk Committee (2012) estimated that over half of NWT boreal caribou are found in areas where their numbers have been declining or at best stable. Probably less than 10% of the population is found in areas where their numbers have been increasing, and a large percentage of the population is found in regions where the population trend is unknown.

Analysis by Environment Canada suggests that boreal caribou require habitat that has less than 35% disturbance to have at least a 60% probability of maintaining a stable or increasing population trend over 20 years. Disturbed habitat was defined by Environment Canada as areas that have burned within the past 40 years, and areas that are within 500 m of human disturbance footprints (e.g. roads, seismic lines, cutblocks) visible on 1:50,000 scale Landsat imagery (Environment Canada 2011). Using this measurement, in the national recovery strategy for boreal caribou (Environment Canada 2012), the NWT population was classified as 'likely self-sustaining' with total range disturbance estimated at 31%. Fire disturbance from the severe 2014

and 2015 fire seasons has increased total habitat disturbance in the NWT range to approximately 34%. With an expected increase in anthropogenic disturbance in the long-term future (seismic activity, pipelines, roads and logging) and continued fire disturbance, there is concern that areas with an already declining boreal caribou population will continue declining and areas with stable or increasing population trends might begin to experience decline.



Figure 2. Map of Northwest Territories showing the approximate current range of boreal caribou (map prepared by B. Fournier, Environment and Natural Resources, January 2015). More information is needed to verify the eastern boundary of the range in the Sahtú Settlement Area; the range map could change as new information becomes available. The area known as Wek'èezhii was established under the Tłı̨chǫ Agreement. The North Slave region includes Wek'èezhii, as well as the neighbouring area to the east which includes Yellowknife and Lutsel K'e. The Dehcho region boundary follows the Dehcho Interim Measures Agreement.

3.4 Needs of the Boreal Caribou

3.4.1 Habitat and biological needs

Boreal caribou move among a variety of habitats based on their seasonal requirements. Lichens are an important food source for boreal caribou. Boreal caribou typically prefer dense, mature or old growth pine or spruce forests with ground and tree lichens. They are also frequently seen in

muskeg, bogs, fens and around peat lands where lichens are easily located. They sometimes use recently burned areas (e.g. < 5 years old) in certain seasons, but may avoid burned areas for several decades thereafter.

Over the winter season, boreal caribou prefer thick spruce or pine forests, where tree lichens are available and snow is soft. This over-wintering habitat is considered very important. The soft snow provides favourable conditions for foraging and travel. During this time, boreal caribou typically gather in larger numbers in the trees and they spend less time in open and muskeg areas.

During the spring as calving takes place, and over the summer, predator avoidance becomes a priority. At this time, boreal caribou space themselves out throughout the range, often where access is difficult for predators. They also seek out open, elevated areas exposed to the wind, to avoid insects. In the fall, during and after the rut, they move through various habitats.

Boreal caribou eat a variety of foods, depending on the season. Examples include willow, sedges, tree buds, mushrooms, shrubs, grasses and aquatic vegetation. They are sometimes seen eating mineral and salt licks as well as muskrat push-ups (muskrat lodges that show through frozen lakes). During the summer, hunters in Wek'èezhii and North Slave region have observed caribou seeking out meadows where there is fresh plant growth.

Although food availability is an important factor influencing habitat selection, food is unlikely to limit boreal caribou populations. Predation likely limits boreal caribou populations to levels below the carrying capacity of their habitat (i.e. the density that food availability could sustain; Bergerud 1996; Rettie and Messier 1998; Environment Canada 2008; 2011). Calf mortality can be as high as 50% during the first six weeks of life, primarily due to predation (Bergerud 1974). Population growth rates of boreal caribou are determined by adult female and calf survival. Therefore, habitat conditions that benefit females and their calves are essential to the overall survival of this species.

Historically, when a forest fire occurred, boreal caribou would move to a different part of their range with more suitable habitat. However, as human-caused disturbance in their range increases, there are fewer suitable areas into which boreal caribou can move. Habitat disturbance has led to boreal caribou declines in several southern ranges, and the reasons for decline involve the relationship between habitat disturbance, predators and prey.

Seismic lines and other linear disturbances cause habitat fragmentation and provide travel and sight corridors for wolves and for human hunters. This provides easier access to caribou in places where they may once have found refuge. Human-caused disturbance therefore increases the chances of predators encountering caribou, resulting in higher predation rates. Caribou typically tend to avoid seismic lines and other linear features, but their ability to do so decreases as overall habitat disturbance increases. At the landscape scale, habitat disturbance that converts forest to early seral stages creates favourable habitat for other ungulates such as moose, deer and wood bison, which in turn leads to an increase in the number of predators. Conversion of forest can also directly create favourable habitat for some predators (e.g., berries for black bears). The combination of all these factors leads to more predators in boreal caribou range with easier access to boreal caribou, resulting in higher predation rates on boreal caribou.

Research from several study areas across Canada (including NWT) demonstrated that an increase in total habitat disturbance (from seismic lines and fire) results in a decrease in calf recruitment (for details, see Environment Canada 2011). A NWT study also found that boreal caribou that had access to large areas (over 500 km² in size) of unburned habitat without seismic lines, where boreal caribou can more easily avoid predators, had higher population growth rates than those that did not (for details, see Nagy 2011).

Disturbances are not all identical, and factors such as the pattern and severity of a burn, or the width and vegetation attributes of a seismic line, may influence how boreal caribou are affected. More information is needed on how specific types of disturbance influence habitat quality for boreal caribou in the NWT. There is also some uncertainty regarding whether the habitat disturbance-predator-prey dynamic is the same in NWT as in southern Canada, because density of predators and diversity of alternate prey are relatively low in NWT. Furthermore, total habitat disturbance is lower in NWT than in many southern ranges and the dominant disturbance type is fire, not human. However, there is clear evidence that at the landscape scale, large patches of undisturbed boreal forest are an important requirement for boreal caribou across their distribution.

Fire and anthropogenic disturbances (seismic activity, pipelines, roads, and logging) are the main factors impacting the availability of large areas of undisturbed habitat. An analysis by Environment Canada found that as of 2011, 69% of the boreal caribou range in NWT was undisturbed using the definition of disturbance in the national recovery strategy (Environment Canada 2011; 2012). In 2014 and 2015, severe fires in NWT resulted in approximately 0.7 million hectares of boreal caribou range burned in Wek'èezhì and 2.3 million hectares of boreal caribou range burned throughout the NWT. It is estimated that the 2014 and 2015 fires reduced the percentage of undisturbed habitat from 69% to 66% in the NWT. Regionally, the percentage of undisturbed habitat as of autumn 2015 was approximately 98% in the ISR, 68% in the GSA, 78% in the Sahtu, 55% in Wek'èezhì, and 51% in the Dehcho and South Slave combined (ENR unpublished data; Figure 2).

A slightly different analysis of NWT data presented in SARC's 2012 status report found that as of 2010, approximately 62% of the boreal caribou range in the NWT was 'secure unburned habitat' (land over 400 m from seismic lines and undisturbed by fire in the last 45 years). Large patches (>500 km²) of secure unburned habitat covered approximately 43% of the range. There is more secure unburned habitat in the northern portion of the NWT range compared to the southern portion, and habitat in northern NWT is also less fragmented than in the south.

3.4.2 Limiting factors

Boreal caribou are naturally found at low densities. Large areas of secure, undisturbed habitat are necessary for a healthy population since females spatially separate from each other during calving. Calf survival is low during the first six weeks of life, often 50% or less.

Boreal caribou in southern NWT move across the border and interact with caribou in northern Alberta and British Columbia, and vice versa. The populations in Alberta and British Columbia are declining rapidly and are not self-sustaining. These populations south of the NWT cannot be relied on to 'rescue' the NWT population.

3.5 Threats

3.5.1 Summary of threats

The most important threat to boreal caribou in the NWT is habitat disturbance which increases predation risk. Habitat disturbance is cumulative and includes human-caused disturbance – particularly seismic lines, pipelines, forestry cut-blocks and roads – combined with natural disturbance, specifically forest fire. Parts of the NWT range have already been impacted, especially in southern NWT. There is concern that several projects underway in NWT will increase human-caused disturbance. There is also concern that climate change will lead to an increase in fire disturbance.

The relationship between boreal caribou and their predators (mainly wolves, but also bears and other carnivores) changes as the landscape becomes more disturbed. Elsewhere in Canada, habitat disturbance in boreal caribou ranges has led to an increase in alternative prey (e.g. deer), leading to an increase in the number of predators on the landscape and an increased risk of caribou being killed by predators. High predation rates caused by high levels of habitat disturbance have been responsible for serious boreal caribou population declines in much of Canada.

Boreal caribou are lawfully harvested by Aboriginal people and resident hunters in the NWT. Management of boreal caribou harvest to date has been based on the understanding that harvest levels are low, but significant concerns have been raised that harvest may have been underestimated in the southern NWT. There is evidence that harvest levels may be increasing.

Climate change is having extensive impacts on boreal caribou habitat. Changes including warmer weather, a decline in snowfall and permafrost thaw have already been observed in NWT. There are also more ice-on-snow events that make travel and foraging difficult for boreal caribou. These changes could become more extensive in the future and will likely have long-term negative impacts on boreal caribou.

Other threats that are currently of lesser importance include parasites and diseases, noise and light disturbance, the impacts of various research techniques, pollution, interactions with other ungulates, and vehicle collisions.

It is important to consider the cumulative effects of multiple threats to boreal caribou. Cumulative effects refer to changes in the environment caused by multiple interactions among human activities and natural processes. Although an individual threat may appear minor on its own, when combined with other threats there may be significant impacts.

3.5.2 Description of threats

Habitat loss, degradation, and fragmentation resulting from human land-use activities and natural processes

Large, continuous areas of intact habitat allow boreal caribou to space themselves out from predators. The most important threat to boreal caribou in the NWT is habitat disturbance that increases predation risk. Habitat disturbance includes loss, degradation and fragmentation of large, continuous areas of old-growth forest and it results from human land-use activities and

natural processes. Habitat disturbance can also have other negative impacts on boreal caribou. For example, it can reduce the suitability of adjacent habitat and can act as a barrier to boreal caribou movement. Large-scale disturbances (e.g., large, intense forest fire; widespread timber harvesting) can cause boreal caribou to stop using a portion of the range (Vors et al. 2007).

Anthropogenic, or human-caused habitat change is much less in the NWT than in many southern provinces, but parts of the NWT have already been impacted by human land-use activities; these activities are expected to increase. Petroleum (oil and gas) exploration and development, timber harvesting and road construction are the three main activities responsible for anthropogenic disturbance across the NWT range. These activities produce seismic lines, pipelines, industrial infrastructure, cut blocks and roads, all of which create habitat loss and/or fragmentation. Some parts of the boreal caribou range in southern NWT have been extensively fragmented by seismic lines. To date, timber harvesting and road construction have been limited in the NWT range, but there is concern that several proposed or recently approved projects in the NWT will increase human activity and cause further habitat disturbance. These include implementation of the NWT Biomass Energy Strategy, Forest Management Agreements for timber harvesting in the Fort Providence and Fort Resolution areas, future petroleum exploration and coal mining activities in the Sahtú region, and construction of the proposed Mackenzie Valley highway.

Forest fire is an important agent of habitat change and is responsible for the majority of disturbance in NWT boreal caribou range. Boreal caribou evolved in a landscape regularly disturbed by fire and they are normally able to move to undisturbed parts of their range after a fire. However, their ability to move away decreases as the overall amount of disturbance, including human-caused disturbance, increases. As such, fire disturbance becomes an issue for boreal caribou when combined with human-caused habitat disturbance. Changes to the fire regime that are outside the natural range of variation are also cause for concern. In 2014 and 2015, severe fires resulted in approximately 0.7 million hectares of boreal caribou range burned in Wek'èezhì and 2.3 million hectares of boreal caribou range burned throughout the NWT. It is predicted that fire disturbance will continue to increase as a result of climate change and hotter, drier summers (longer fire season, increased frequency and severity of fires; Soja et al. 2007). If so, this will intensify the negative impacts on boreal caribou habitat.

In many cases, habitat loss and/or fragmentation is temporary and habitat disturbed by fire and human activities, such as seismic exploration, will regenerate to a state suitable for boreal caribou, or which no longer results in functional habitat loss, although this may take decades. When new disturbance occurs rapidly or over large expanses it can exceed the rate of habitat regeneration, resulting in negative consequences for the boreal caribou population.

To understand how cumulative habitat changes from human activities and natural processes impact boreal caribou, it is important to consider how habitat change influences predation risk.

Predation

Boreal caribou population growth rates are primarily determined by the combination of adult female survival and calf survival; predation is a key factor influencing survival of both adult females and calves. An increase in predation can lead to population declines. Although wolves are the key predator of boreal caribou, black bears, grizzly bears, cougars, lynx, wolverines and eagles share their landscape.

Predation is considered a threat when it exceeds the range of variability that boreal caribou have evolved in and adapted to. Boreal caribou evolved in a landscape with predators, but the cumulative effects of fire and human disturbance can lead to unnaturally high levels of predation. Habitat disturbance can alter the relationships between predator and prey. Boreal caribou tend to separate themselves from predators by selecting locations with difficult access for predators. This “spatial segregation” strategy is especially important during calving. However, linear features such as seismic lines can provide predators with access into areas caribou once used for refuge, allowing predators to travel quickly and increasing their probability of encountering caribou. Some habitat disturbances are also attractive to other ungulates such as moose and wood bison. As alternative prey move into areas once used by caribou, more predators may follow, further increasing the predation pressure on adult and calf caribou. Disturbances may also create alternative food for predators (e.g., berries for bears).

Wolves are the primary predators of adult female boreal caribou in the NWT, and black bears are also known to kill adult females. The effect of wolf, black bear, grizzly bear and lynx predation on calf survival is unknown. Overall, predator density in the NWT is not well known and there are gaps in understanding the specific relationship between NWT’s boreal caribou, disturbance and predation. However, the link between habitat disturbance, predation and caribou decline is well studied in many other parts of Canada. The weight of evidence from science and traditional knowledge indicates that increased predation linked to habitat disturbance is the main proximate cause of boreal caribou declines across Canada (Environment Canada 2012). Local population trends of boreal caribou in the NWT have been consistent with findings in other jurisdictions: stable or increasing trends in northern NWT, where habitat is relatively intact, and stable or declining trends in southern NWT, where habitat disturbance is greater.

Harvesting

Boreal caribou are lawfully harvested by Aboriginal people and resident hunters in the NWT. Management of boreal caribou harvest to date has been based on the understanding that harvest levels are low because people tend to harvest boreal caribou opportunistically. According to rough estimates based on the NWT resident hunter harvest survey, regional harvest studies and traditional knowledge reports, the average number of boreal caribou harvested each year in the NWT could be as low as 80 (about 1% of the estimated population) or as high as 200 (more than 3% of the estimated population). However, significant concerns have been raised that harvest may have been underestimated in the Dehcho and South Slave regions, and that illegal harvest may be occurring in the Hay River area (SARC 2012; ENR unpublished data; ENR consultation notes). More reliable information is necessary to determine the sustainability of the harvest.

Traditional and community knowledge holders as well as biologists have raised concerns about factors that may be increasing harvest levels and could lead to overharvesting. With restrictions on harvest of barren-ground caribou and wood bison, more harvesters are moving to boreal caribou areas to hunt. Increased access to boreal caribou habitat via rivers (with travel made easier by jet boats), seismic lines, roads and other developments has added to concerns about overharvesting. Non-traditional harvesting practices including reckless shooting, over-use of motorized vehicles and jet boats, and wasting meat are seen as increasing this threat.

Climate change and severe weather

Climate change has and will continue to impact boreal caribou habitat. Climate change is taking place more rapidly in the Mackenzie Basin than in most other areas in North America. Changing weather conditions, including warmer weather and a decline in snowfall, have already been noted in the forested part of NWT. Rain on snow and freeze-thaw events are more common than in the past, making travel, foraging, and predator avoidance more challenging. With the melting of permafrost, the ground absorbs more moisture than it used to, leaving less water on the surface of the land. Permafrost thaw is causing mortality of vegetation on peat plateaus and a change from forest to bog-fen habitat. These changes could lead to loss of forest habitat for boreal caribou. As noted earlier, with hotter, drier summers, it is anticipated that climate change will lead to an increase in forest fires, causing further habitat disturbance. There is potential for climate change to create more favourable environments for alternative prey such as deer, and for additional predators such as cougar and coyote.

At this point, the long term impacts of climate change are unknown, but climate-related habitat change that is happening now and in the coming years could have significant effects on boreal caribou.

Parasites and diseases

Although native parasites and diseases occur such as warble flies, nose bot flies and *Besnoitia*, they are currently of low concern for boreal caribou in the NWT. Traditional and community knowledge indicates that boreal caribou are generally in good health with a healthy fat content.

New diseases and parasites could become an issue in the future and should be monitored, but are currently not considered as having an impact on boreal caribou in the NWT (Johnson et al. 2010). White-tailed deer have expanded their range in the NWT bringing the potential for brain worm (meningeal worm; *Parelaphostrongylus tenuis*) and Chronic Wasting Disease which occur in white-tailed deer and mule deer in Alberta. These parasites and diseases have caused declines in ungulate populations elsewhere and should be monitored in the NWT. An expansion of winter tick in the NWT also poses a potential threat to boreal caribou health (B. Elkin pers. comm. 2015). Recently, the bacterium *Erysipelothrix rhusiopathiae* was discovered and linked to the deaths of boreal caribou in northeastern BC in summer 2013 (Schwantje et al. 2014). Banked serum samples from boreal caribou from the Dehcho have been analyzed for this bacterium and there is evidence that some boreal caribou in the Dehcho have been exposed to this bacterium. Further research and monitoring is required to understand the potential impact of this bacterium on boreal caribou in the NWT.

Noise and light disturbance; research techniques

The NWT is sparsely populated and issues of noise and light disturbance are likely localized around populated centers, near roads and trails, and some oil or gas developments. Regardless, boreal caribou are very sensitive to human disturbances such as industrial noise, aircraft and motorized vehicles, including snowmobiles and industry vehicles. These disturbances can cause them to become stressed and/or avoid the affected area (Sambaa K'e Dene Band 2004, as cited in AMEC Americas 2005; McDonald 2010; Benson 2011; Dehcho First Nations 2011; Environment Canada 2012). Recreational, tourist and work-related use of airplanes, all-terrain vehicles, and snowmobiles out on the land can all disturb caribou. Knowledge holders have

expressed concern that increased tourism and increased access to habitat – due to seismic lines and roads – is causing excessive disturbance and stress to boreal caribou.

Research methods are also cited as a threat to boreal caribou. Many traditional and community knowledge holders have found that collaring-related activities (netting, handling and the collars) can cause physical injuries and can weaken animals. They are also concerned that these techniques cause behavioural change or possibly even disease. Some Aboriginal people feel these practices are culturally inappropriate and disrespectful, while others see collaring caribou as the only way to answer their questions.

Though it is recognized that these activities are ongoing threats to boreal caribou, the extent of their impacts at a population level is unknown.

Interactions with other ungulates

Many traditional and community knowledge sources report negative interactions between boreal caribou and other ungulates (e.g. wood bison, muskoxen). These interactions could be competition, avoidance, displacement, and/or linked to predation. They see a link between increased presence of other ungulates and decreased presence of boreal caribou, for example in the Mackenzie Bison Sanctuary. The impact is considered relatively minor compared to other threats.

Pollution

Pollution is generally considered a minor threat to boreal caribou, although there has not been extensive research on this subject. The primary issues in NWT boreal caribou range include waterborne pollutants produced in Alberta (e.g. pulp mills and tailings pond effluent) that flow downstream in the Mackenzie River, and airborne pollution that is transferred by global air currents. Dust from mines and roads is a concern since it has the potential to kill lichens which are the main food source for caribou. Some traditional and community knowledge holders have suggested that pollution and acid rain may be affecting habitat and have expressed concern that contaminated mining sites also pose a threat to boreal caribou. Little is known about the effects of pollution on the recovery of boreal caribou.

Vehicle collisions

Vehicle collisions occasionally occur along roads in NWT, but very few vehicle-caused mortalities of boreal caribou are reported to ENR. At this point, vehicle collisions are not considered a major threat to boreal caribou.

Cumulative effects

It is important to consider all threats from a cumulative perspective. Cumulative effects refer to changes in the environment caused by multiple interactions among human activities and natural processes that accumulate across space and time. Each threat can be considered individually, but when all threats are considered in combination, the overall threats to the boreal caribou become more significant.

3.6 Factors that may have a positive influence

There are various factors that have resulted in a positive impact on the conservation of boreal caribou.

Since 2002, government agencies and wildlife management boards have been collaborating on research and monitoring initiatives to collect information on this species and its habitat in the NWT. This includes the development and implementation of the *Action Plan for Boreal Caribou Conservation in the Northwest Territories* (ENR 2010), and regional research projects that have provided opportunities for collaboration.

The Dehcho Boreal Caribou Working Group provides a forum for review, advice and information exchange on boreal caribou research and management in the Dehcho region.

The GNWT has a *Memorandum of Understanding for Cooperation on Managing Shared Boreal Populations of Woodland Caribou* with the Government of Alberta.

Boreal caribou have been formally listed as threatened under the federal *Species at Risk Act* (SARA) and a national recovery strategy was completed in 2012 (Environment Canada 2012). Under the federal *Species at Risk Act*, the federal government can enact measures to protect critical habitat from destruction. The national recovery strategy identifies critical habitat for boreal caribou as at least 65% undisturbed habitat in each boreal caribou range. An analysis of the relationship between boreal caribou population trends and habitat condition, from populations across Canada, found that 65% undisturbed habitat was associated with a 60% chance that the population would be self-sustaining. Since there remains a significant risk (40%) that local populations would not be self-sustaining, 65% undisturbed habitat is identified in the national recovery strategy as a minimum disturbance management threshold. A range plan for boreal caribou habitat in the NWT is being developed to ensure this threshold is met or exceeded.

The regulatory system in the NWT provides a process for the impacts of development on boreal caribou and their habitat to be identified, considered, mitigated and monitored. The *Mackenzie Valley Resource Management Act* gives Land and Water Boards and the Mackenzie Valley Environmental Impact Review Board the authority to review projects and recommend terms and conditions within permits pertaining to boreal caribou habitat. In the Inuvialuit Settlement Region the Inuvialuit Final Agreement and *Canada Environmental Assessment Act* provide similar authority to the Environmental Impact Screening Committee and Environmental Impact Review Board. Caribou management authorities can provide comments during environmental screening and review processes regarding the monitoring and mitigation of impacts of development on boreal caribou and their habitat. The *Species at Risk (NWT) Act* sections 76-77 requires that GNWT Environment and Natural Resources make a submission regarding potential impacts whenever there is any proposed development or permit or license application that could affect boreal caribou or their habitat. The federal *Species at Risk Act* section 79 also has requirements for Environmental Assessment in which adverse effects on boreal caribou and their critical habitat must be identified, mitigated and monitored. The NWT *Wildlife Act* requires that project-specific wildlife management and monitoring plans be developed for projects that may (a) result in a significant disturbance to big game or other prescribed wildlife; (b) substantially

alter, damage or destroy habitat; (c) pose a threat of serious harm to wildlife or habitat; or (d) significantly contribute to cumulative impacts on a large number of big game or other prescribed wildlife, or on habitat.

Conservation areas such as Wood Buffalo National Park, and approved land use plans in the Gwich'in Settlement Area, Sahtú Settlement Area and Tłı̨chǫ private lands, provide for the conservation of some boreal caribou habitat. The conservation mechanisms vary, but many include restrictions on resource development, either temporarily or on a permanent basis. Additional habitat protection has been proposed under the Protected Areas Strategy as well as the interim draft Dehcho Land Use Plan, but since these have not yet been finalized, their long-term impact is not yet known. Some of the established and proposed protected areas and conservation zones are large tracts of land and overlap with important habitat for boreal caribou. Habitat protection has the potential to have a significant positive impact on the conservation of boreal caribou.

Some Aboriginal harvesters in Tłı̨chǫ, Dehcho and Gwich'in communities indicate that they have voluntarily changed their hunting habits in response to population declines, taking fewer boreal caribou than in the past. The NWT has a harvest limit of one woodland caribou per year (either boreal or northern mountain caribou) for resident hunters. Non-residents can only hunt woodland caribou in the Mackenzie Mountains, which are northern mountain caribou not boreal caribou.

Traditional stewardship practices of Aboriginal cultures in the NWT provide rules and guidance for a respectful relationship with caribou. Examples include an obligation not to unduly harm the animals, and the practice of taking only a few caribou from each group. When followed, these traditional practices can be a positive influence on boreal caribou.

3.7 Knowledge Gaps

1. Human-caused habitat disturbance: Accurate information on past and current human-caused habitat disturbance is not always available. Annual changes in human-caused disturbance are not tracked.
2. Cumulative effects: The cumulative impacts of many threats on boreal caribou are not monitored; a complete assessment of cumulative effects has not occurred.
3. Population/demography: Population estimates, trends and health and condition data are lacking in some regions of the NWT. Monitoring has previously been conducted at local scales in the Inuvik, Sahtu, Dehcho, and South Slave regions, but currently only the Dehcho and South Slave regions of the NWT have monitoring programs for estimating local population trends of boreal caribou.
4. Harvest information: More reliable harvest data are needed, including sex and age class of harvested caribou.
5. Predator-prey dynamics: It is unknown if the apparent competition hypothesis (based on studies in the south) applies in the north given that the density and diversity of alternate prey species is not as high in the NWT.
6. Preferred habitat: Although there is useful information available on caribou habitat preferences, there is incomplete information on the locations of preferred habitat on the

- landscape, current use of those habitats and how changes to habitat over time influence caribou distribution and population trends.
7. **Genetics and population structure:** Information on interactions and gene flow between boreal caribou and other types of caribou is limited. More information is needed to determine whether there are multiple distinct populations of boreal caribou within NWT, or just one.
 8. **Habitat regeneration:** Understanding of when habitat disturbed by fire or by a human footprint (e.g. seismic line) becomes suitable for boreal caribou once again is currently based on research done primarily in the south. A better understanding of habitat regeneration in the NWT would help to refine the national definition of habitat disturbance (Environment Canada 2012) for the NWT.
 9. **Natural disturbance regime:** Better knowledge of the natural fire regime in the NWT (fire recurrence, severity, and landscape patterns) would improve our ability to predict fire, as well as to understand fire-based disturbance and how it impacts boreal caribou.
 10. **Pollution and contaminants:** Little is known about the effects of pollution and contaminants on boreal caribou recovery.
 11. **Climate change impacts on habitat:** There is evidence that boreal caribou habitat is changing due to climate change, but the long-term impacts on caribou are unknown. A better understanding of the impacts of climate change (e.g. permafrost thaw) on boreal caribou habitat is needed.

4. CONSERVATION AND RECOVERY

4.1 *Conservation and Recovery Goal*

The conservation and recovery goal is to ensure a healthy and sustainable boreal caribou population across their NWT range that offers harvesting opportunities for present and future generations.

The key ideas in this goal statement are explained below:

A healthy and sustainable boreal caribou population: Boreal caribou play an important role in the northern boreal forest ecosystem. The vision is to have a NWT population of boreal caribou that can persist into the foreseeable future on its own, without serious management intervention. We do not want the population to undergo a long-term decline.

Across their NWT range: The vision is for boreal caribou to continue to occur in the areas of NWT where they have historically been found. We do not want to see range recession in which boreal caribou disappear from part of their NWT range, and we do not want the NWT range to become isolated or severely fragmented.

Harvesting opportunities for present and future generations: Harvesting is one of the important values of boreal caribou in the NWT. The vision is for boreal caribou harvesting to be able to continue, now and in the future. We want to manage boreal caribou at a level that can sustain harvesting.

4.2 Conservation and Recovery Objectives

This recovery strategy recommends the following six objectives for the conservation and recovery of boreal caribou, which apply broadly across all NWT regions:

Table 1. Conservation and Recovery Objectives

No.	Conservation and Recovery Objective
1	Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.
2	Ensure that harvest of boreal caribou is sustainable.
3	Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects.
4	Manage boreal caribou collaboratively, using adaptive management practices and the best available information.
5	Exchange information with NWT people about boreal caribou in all regions.
6	Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.

4.3 Approaches to Achieve Objectives

This recovery strategy recommends approaches to reach the conservation and recovery objectives for boreal caribou. The recommended approaches are described on the following pages and summarized in Table 2. Other population management tools are available that are not being recommended at this time in the NWT, although they could be considered in the future. These tools are discussed in Section 4.4.

The management authorities also developed an action framework (see Appendix 1) that outlines more specific recommended conservation and recovery actions under each approach:
Recommended specific actions for conservation and recovery of boreal caribou in the NWT.

Objective #1: Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.

Large areas of undisturbed habitat are essential to the survival of boreal caribou. The effectiveness of managing range wide impacts on habitat will be key in achieving the conservation and recovery objectives for the boreal caribou. Objective #1 requires specific

approaches to ensure that enough connected, undisturbed habitat is maintained for a ⁶healthy and ⁷sustainable population of boreal caribou to thrive.

Approach 1.1: Develop region-specific range plans and an overall NWT-Yukon range plan for habitat management.

The development of range plans is required under the national recovery strategy for boreal caribou (Environment Canada 2012) and was also recommended in the *Action Plan for Boreal Caribou Conservation in the Northwest Territories* (ENR 2010). Range plans should describe where and how undisturbed boreal caribou habitat should be maintained. Areas of importance to boreal caribou, patch size, connectedness, and level of disturbance should be considered in range plans. Where range plans identify gaps (areas without appropriate tools in place to manage disturbance), the suite of northern tools should be considered and mechanisms should be put in place to manage disturbance. Due to continual changes in landscape from industrial activity, forest fires, climate change and other factors, range plans must be periodically updated (e.g. every five years).

Habitat disturbance and fragmentation vary among administrative regions in NWT. Regions also have their own management agencies and land use plans. Therefore, it makes sense to develop a specific range plan for each NWT administrative region. These region-specific range plans can be integrated into one overall NWT-Yukon range plan to manage boreal caribou habitat for the single continuous population that is shared by NWT and Yukon. Region-specific plans should be coordinated within the range of the NWT-Yukon population, and the NWT-Yukon range plan should be coordinated with Alberta and British Columbia, to ensure habitat connectivity extends across regional and jurisdictional boundaries. Mechanisms for coordinating among regions and jurisdictions are described under Objective 4.

Approach 1.2: Monitor landscape change annually.

Monitoring landscape change will allow management partners to keep track of the degree to which boreal habitat has been disturbed both naturally (by fire) and from anthropogenic activities (such as seismic activity, pipelines, roads, and logging). Habitat regeneration following disturbance should also be tracked. Existing records of human-caused landscape change should be compiled and improved, and appropriate information on new activities in boreal caribou habitat should be submitted, compiled and made publicly available.

Products should be developed to facilitate the timely and effective consideration of boreal caribou in land use decisions (e.g. a boreal caribou screening tool). Reporting habitat disturbance levels to land management authorities will help ensure that boreal caribou needs are taken into account in decision-making about land use. These tasks will require a centralized way to compile and manage spatial information on landscape change. The definition of habitat disturbance in the national recovery strategy (Environment Canada 2012) can be used for tracking purposes, but may be refined for the NWT in the future as

⁶ A healthy population is a population that is not very low or declining, relative to earlier levels.

⁷ A sustainable population is a population that is likely to persist into the foreseeable future on its own, without serious intervention.

new information and methods become available. Criteria should be developed to determine the types of anthropogenic activities that contribute to habitat disturbance. There should also be criteria developed to establish when anthropogenic and natural disturbances have become functional caribou habitat again.

Approach 1.3: Manage fire disturbance as a natural and necessary part of boreal caribou habitat.

Fire management should not be viewed as the primary means of managing habitat disturbance. Fire is a major agent of disturbance for boreal caribou habitat, but it is also natural and essential to the ecology of the boreal forest. It is not feasible or desirable to fight or prevent all forest fires. Instead, the recommended approach is to adhere to the existing Government of the Northwest Territories Forest Fire Management Policy (ENR 2005) to the best extent possible. When fire management responses are taken the highest priorities are the protection of human life and property, but critical habitat and other important habitat for boreal caribou can be classified as a ‘value at risk’ to increase its priority for forest fire response. Other fire management tools recognized in the Forest Fire Management Policy should also be explored for maintaining important caribou habitat (e.g. landscape-level prescribed burns to limit fire growth potential, fire breaks and fuel management).

Approach 1.4: Manage human-caused landscape disturbance.

This approach aims to maintain existing large areas of undisturbed habitat through minimizing impacts (i.e., habitat fragmentation) from industry, human activities and development projects. The *Mackenzie Valley Resource Management Act* and the *NWT Wildlife Act* are important mechanisms for implementation. Developing and updating guidelines and standard advice to mitigate the impacts of development projects, reviewing development proposals and establishing terms and conditions for permits will be essential. Where the cumulative habitat disturbance surpasses the threshold for a self-sustaining population, management authorities may need to recommend to regulatory agencies and land use planning boards that development activities be scaled back or not approved in a particular area, until sufficient habitat regenerates to offset the new disturbance. Agencies that have authority to regulate land use (e.g. land and water boards, GNWT, Tłchq Government and Government of Canada) have legal obligations under the federal *Species at Risk Act* to ensure that critical habitat for boreal caribou is not being destroyed and should implement the appropriate recommendations when required. Boreal caribou habitat supply should be considered in planning and issuing permissions or rights for forestry, oil and gas, mineral activities, roads and other development. Regulatory authorities and lead agencies that manage caribou should provide leadership in this regard by demonstrating that boreal caribou habitat supply has been considered in their own planning processes. Range plans (Approach 1.1) and reporting of habitat disturbance (Approach 1.2) will help to inform these decisions.

Protected/conservation area planning and land use planning have the potential to protect large areas of boreal caribou habitat from human-caused landscape disturbance. The completion of these processes should be supported. Concepts of ecosystem-based management should also be explored. Ecosystem-based management may be useful for

considering a range of ecological values, in addition to boreal caribou habitat requirements, when managing the landscape.

Objective #2: Ensure that harvest of boreal caribou is sustainable.

This objective focuses on a harvest of boreal caribou that allows for a self-sustaining population. Boreal caribou harvest levels are believed to be low but increasing. Accurate harvest data are lacking, with reports of anywhere from 80 to 200 caribou harvested per year. Therefore, more reliable information is needed on both harvest levels and population estimates to determine whether the harvest is sustainable. If it appears that current harvest levels do not allow for a self-sustaining caribou population, then harvest management actions (e.g. temporary harvest limitations) may need to be considered to prevent further population decline.

Approach 2.1: Measure harvest levels.

Since current harvesting data is incomplete and/or unreliable, this approach focuses on gathering reliable harvest data – including the number harvested and the sex ratio – by educating communities on the importance of reporting, working with local harvesting committees, First Nations and other groups to develop systems for reporting harvest and measuring harvest levels, and estimating harvest levels of resident hunters through the resident hunting survey. Every effort should be made to report the estimated total harvest levels yearly to caribou management authorities or local harvesting committees so that appropriate management decisions can be made.

Approach 2.2: Manage the harvest to ensure it is sustainable.

To manage the harvest appropriately, caribou management authorities need to know what the total harvest is (including Aboriginal, other General Hunting License, and resident harvest; see approach 2.1). They also need to know what harvest levels will allow for a self-sustaining boreal caribou population. As part of this approach, the concept of *sustainable harvest levels* must be investigated and defined for boreal caribou, for the NWT as a whole, and also at the scale of regions or First Nations' traditional territories. Caribou management authorities should annually review harvest information, along with population information, and assess whether the current harvest levels are sustainable. If they are unsustainable, the management authorities should make management recommendations regarding harvesting, such as temporary harvest limitations.

Responsible harvesting practices that minimize negative impacts on the population should be promoted (e.g. following traditional laws surrounding caribou hunting and use; excellence in marksmanship; ability to distinguish sex and types of caribou; avoid harvesting cows with calves). Compliance with hunting regulations should be promoted through education, prevention and enforcement. The Big Game Hunting Regulations for boreal caribou should be reviewed in the context of concerns about possible overharvesting in some regions and the status of boreal caribou as threatened.

Objective #3: Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects.

Objective #3 is about monitoring boreal caribou and filling information gaps so that management can be based on the best possible information. Some research questions can be explored through partnerships with academic researchers or other agencies. The results of monitoring and research should be reported annually to management authorities to inform sound management decisions. Community and traditional knowledge should be used at all stages to inform boreal caribou management and monitoring, as well as our understanding of boreal caribou ecology.

Approach 3.1: Estimate population trends in each region.

Estimating local population trends is necessary so that managers can keep track of how boreal caribou are doing, determine whether the NWT population continues to be self-sustaining, and assess whether the recovery actions are appropriate and are addressing threats. Estimating local population trends can be accomplished by implementing monitoring programs that provide key information on boreal caribou vital rates, numbers, population trends, health and/or condition. Monitoring programs may need to be region-specific because capacity, interest and community concerns vary among regions. However, consistency would allow information to be more easily compared and combined among regions. Methods to combine or ‘scale up’ local population trend information should be explored, in order to better estimate the trend of NWT’s population as a whole.

Approach 3.2: Improve our understanding of boreal caribou ecology in the NWT.

There is a significant body of information that describes boreal caribou habitat preferences in the NWT. However, there is incomplete information available to management authorities at this time on the locations of preferred boreal caribou habitat areas on the landscape and current use of those areas. The areas used by boreal caribou also change over time, and information is lacking on how changes to habitat over time influence caribou distribution. The state of knowledge can be improved by further documenting traditional and community knowledge, and by further analysis of data from surveys and collared boreal caribou. Range maps and habitat maps for boreal caribou should be continually improved using the best available information. Research on the impacts of climate change on boreal caribou habitat should be promoted.

Boreal caribou sometimes come into contact with other populations and types of caribou (including northern mountain woodland caribou and barren-ground caribou). A strong understanding of the relationships between different types of caribou, including spatial overlap, evolutionary relationships, genetics and interbreeding, would help to improve our understanding of boreal caribou ecology in the NWT. Boreal caribou in the NWT are currently being managed as a single population with a continuous range, but more information on caribou genetics and movement would clarify whether distinct populations or subpopulations exist that should be differentiated for management.

Currently, understanding of how habitat disturbance impacts boreal caribou – by leading to increased predation and ultimately caribou decline – is based on research conducted predominantly outside of the NWT. It is uncertain if the same relationship applies in the

NWT, given that the density and diversity of other ungulates (alternate prey) is lower than in the south, and the density of predators in the NWT is unknown. Overall habitat disturbance is still relatively low in NWT compared to many southern ranges. Furthermore, fire, rather than human footprint, is the dominant agent of landscape disturbance in the NWT, and some regions have a very high percentage of habitat disturbed by fire. Academic research partnerships can be pursued to improve our understanding of the disturbance-predator-prey dynamic in the NWT. This improved understanding could eventually be used to refine the indicators used for population status and critical habitat (see approach 6.3).

Better knowledge of the natural disturbance regime in the NWT would improve our ability to understand fire-based disturbance patterns and how they impact boreal caribou. Similarly, research on habitat regeneration and habitat restoration techniques would improve our understanding of when habitat disturbed by fire or by a human footprint becomes suitable for boreal caribou once again. This type of information could eventually be used to refine the national definition of habitat disturbance for the NWT.

Approach 3.3: Explore possible use of population and habitat thresholds as triggers for management actions.

Recovery and management actions can be implemented more efficiently when population and habitat thresholds that trigger management action(s) are known at the outset. Defining thresholds also allows people to plan accordingly. Although a critical habitat threshold has been established (see approach 6.1), there is currently no defined population threshold for boreal caribou in the NWT, making it difficult to establish when management needs to change. Possible types of data that may be used for a threshold could be investigated as monitoring programs are developed (3.1). Given that accurate population estimates are difficult to obtain, other possible options for using population and habitat thresholds to trigger management actions should be explored. Note that any management associated with thresholds should be collaborative as described under Objective #4.

Approach 3.4: Develop an approach to modeling cumulative effects.

Threats that may have low or negligible impacts by themselves can have a significant effect when they are combined. The cumulative effects of many threats are a key issue to address in the recovery and conservation of boreal caribou. A cumulative effects model would be a valuable tool to help managers understand the relative importance of different pressures on boreal caribou and how they ultimately determine the state of the population. Such a model can also be used to help predict the consequences of different management scenarios and to develop more effective mitigation measures. Information to input into the model could come from the research and monitoring recommended in approaches 1.2, 2.1, 3.1, 3.2 and 3.5. It could include indicators such as habitat disturbance (both natural and human-caused), harvesting, predation, and population dynamics (e.g., mortality, recruitment and population growth rates). The next step would be to develop an approach for integrating this information into a cumulative effects model.

Approach 3.5: Incorporate community and traditional knowledge on an ongoing basis.

In order to be successful, the recovery of boreal caribou needs to respect the cultural and spiritual values of the people who share the landscape with them. Community knowledge, traditional knowledge and science are all sources of information that are essential for effective recovery and management of this species. Community knowledge provides information based on on-the-ground experience, and traditional knowledge offers information acquired over generations of experience. Traditional knowledge is not just information, but is also a way of perceiving the world and interacting with it, and includes systems for making wildlife and other land and resource management decisions.

Community knowledge can be incorporated by supporting community monitoring programs, and by developing local training programs for community monitors directed at those with local knowledge. Collecting and analyzing traditional knowledge can provide valuable information on boreal caribou, including long-term trends. Traditional knowledge work must follow appropriate protocols and best practices and respect issues such as ownership, copyright, sensitivity, informed consent and confidentiality. It is essential that community and traditional knowledge perspectives be brought to the decision-making table to inform boreal caribou management and monitoring, as well as our understanding of boreal caribou ecology.

Objective #4: Manage boreal caribou collaboratively, using adaptive management practices and the best available information.

Boreal caribou in the NWT move across borders with Yukon, British Columbia and Alberta. They are also widely distributed within the NWT so there are several different agencies with authority for boreal caribou management. Management must be done collaboratively among NWT regions and with other jurisdictions to be successful. Co-management authorities for boreal caribou are established and their roles are described above under *Planning Partners*. The Conference of Management Authorities provides a forum for co-management partners to work together on boreal caribou issues, including issues that cross NWT regional boundaries. Working with Aboriginal governments and organizations, communities, resident hunters, non-government organizations, and industry is also essential. Collaborative partnerships and investment will be required in order to increase the human and financial capacity to implement the actions in this recovery strategy.

The natural environment is always changing; accordingly, threats may change and a species' reaction to these threats may also change. Using ⁸adaptive management practices allows managers to cope with these changes. Having them annually review the most up-to-date information on the state of boreal caribou would increase their knowledge, providing a strong foundation for adaptive management. Having annual check-ins of the management partners would help ensure the recovery strategy is used and that boreal caribou management actions are adjusted if necessary.

⁸ Adaptive management is a systematic approach for continually improving management policies or practices by deliberately learning from the outcomes of management actions.

Approach 4.1: Annually review boreal caribou management and any new information, and adapt management practices as necessary.

At regularly scheduled annual meetings, caribou management authorities for the NWT can review progress made under this recovery strategy and current information on population and habitat, including information from community and traditional knowledge. At this time, managers may decide whether current management actions are still appropriate. If the boreal caribou population or habitat continues to decline, they could consider recommending more aggressive management actions. This annual check-in could be a standing agenda item in an existing forum (e.g., at regularly scheduled meetings of the Conference of Management Authorities). The *Species at Risk (NWT) Act* requires that every 5 years, the management authorities review this NWT recovery strategy for boreal caribou and report on actions taken to implement it and the progress made towards meeting its objectives.

Approach 4.2: Work with other jurisdictions to share information and co-ordinate cross-boundary planning, monitoring and management.

Sharing information with other jurisdictions will maximize knowledge, and coordinating recovery actions is important. Continuing to participate on the National Boreal Caribou Technical Committee is one way that NWT can cooperate with other jurisdictions. The national recovery strategy recognizes a single population of boreal caribou shared by NWT and Yukon, and Gwich'in traditional lands extend into the Yukon portion of the range. For these reasons, range planning should be done in collaboration with the Gwich'in and Government of the Yukon, and information sharing should occur across the NWT-Yukon border. Management, monitoring and research can be coordinated through formal agreements (e.g., implementing the Memorandum of Understanding for Cooperation on Managing Shared Boreal Populations of Woodland Caribou between GNWT and Government of Alberta) as well as other means (e.g., sharing data on collared caribou).

Approach 4.3: Work with other co-management partners, Aboriginal governments and organizations, communities, resident hunters, non-governmental organizations, and industry to share information and collaborate on management actions.

All NWT people can play important roles in managing the boreal caribou to ensure its survival. Working with Aboriginal governments and organizations, communities, resident hunters, non-governmental organizations and industry is therefore an integral part of this plan. Where a boreal caribou management action could potentially infringe on an asserted or existing Aboriginal or treaty right, government has an obligation to consult under section 35 of the *Constitution Act*. Industry can be an important partner in cooperative research and monitoring, and its role can be strengthened by facilitating information sharing and developing standard monitoring protocols. Overall, managing boreal caribou collaboratively is essential to the successful recovery of this species.

Approach 4.4: Increase capacity, both human and financial, to implement management actions in this recovery strategy.

Success in the conservation and recovery of boreal caribou cannot be achieved by any single agency alone. Human and financial resources are limited; therefore partnerships and

investment will be required in order to maximize the collective capacity of the caribou management authorities and other partners to implement the actions in this strategy. Non-government organizations could play a significant role in building partnerships with potential investment partners.

Objective #5: Exchange information with NWT people about boreal caribou in all regions.

NWT people, management authorities, non-governmental organizations and industry each have a different role to play in recovery of the boreal caribou. Exchanging information between all parties helps everyone to know their roles and responsibilities in the process. It also ensures that all perspectives are integrated into boreal caribou recovery. People will become more informed about boreal caribou, which will build and maintain support for recovery of this species. The exchange of information between these parties also ensures that caribou managers are aware of on-the-ground matters such as the status and health of boreal caribou and the state of the habitat.

Approach 5.1: Encourage flow of information between communities, caribou hunters, caribou management authorities, industry, non-governmental organizations and the interested public within and across all regions.

A variety of methods may be used to share information, depending on the demographic. For example, home visits or community meetings would be appropriate for elders, while social media, or visits to schools would be more effective for youth. Continuing and expanding communication with the Dehcho Boreal Caribou Working Group, local First Nations, and with local harvesting committees (eg. holding a harvesters conference) are also part of this approach.

Objective #6: Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.

The national recovery strategy established indicators for maintaining a self-sustaining boreal caribou population and protecting critical habitat. This objective focuses on tracking and reporting NWT's progress with respect to these indicators, to ensure that recovery in the NWT remains on track and meets or exceeds national requirements. Over time, new information on boreal caribou ecology and habitat can be used to improve and refine these indicators for the NWT.

The federal *Species at Risk Act* requires that boreal caribou be protected and that critical habitat for boreal caribou be protected against destruction. On federal land that belongs to her Majesty in right of Canada or is under the direct authority of the Minister of the Environment or the Minister responsible for the Parks Canada Agency, Government of Canada is responsible for providing this protection. On other lands, the federal *Species at Risk Act* can be used to impose a protection order if NWT laws fail to provide effective protection.

As a signatory to the *National Accord for the Protection of Species at Risk*, Government of the Northwest Territories is committed to a cooperative national approach for the protection of

species at risk. Cooperation is the best way to meet the conservation needs of boreal caribou. Although this NWT recovery strategy is focused on the NWT boreal caribou population, it feeds into a national process and therefore strives to be complementary to the national recovery strategy.

Approach 6.1: Track and report on critical habitat indicators established in the national recovery strategy, to trigger adaptive management where necessary.

The national recovery strategy states that at least 65% of the boreal caribou range must be undisturbed habitat. This is critical habitat necessary for the survival or recovery of boreal caribou. Since there remains a significant risk that local populations may not be self-sustaining with 65% undisturbed habitat, it is identified in the national recovery strategy as a minimum disturbance management threshold. In some regions of NWT it may be possible and desirable to maintain more than 65% undisturbed habitat for boreal caribou. Measuring total habitat disturbance in the NWT range, comparing it to the threshold, and reporting results at the annual boreal caribou management meeting can allow management authorities to keep track of habitat disturbance and make recommendations if needed.

Approach 6.2: Track and report on self-sustaining population status indicators established in the national recovery strategy, to trigger adaptive management where necessary.

Indicators used to determine whether a boreal caribou population is self-sustaining focus on short term population trends, population size and percentage of habitat disturbance. These indicators should be tracked and annually compared to the self-sustaining status indicators in the national recovery strategy. The results should be reported at the annual boreal caribou management meeting so that management authorities can make management recommendations, if necessary.

Approach 6.3: As new information becomes available, refine and improve indicators for critical habitat and population status.

The indicators for critical habitat from the national recovery strategy are based on Canada-wide analyses that include data from the NWT. The national strategy recognizes that there is variation in habitat and population conditions between boreal caribou populations across Canada. As new information becomes available from research and monitoring (Objective #3), it may be possible to refine these indicators if there is strong evidence they can be improved upon for the NWT. This could also inform the national recovery strategy when it is updated in the future.

Population status indicators, like critical habitat indicators, may also be improved and refined for the NWT as new information becomes available over time.

Table 2. Approaches to conservation and recovery of the boreal caribou in NWT

Relative priority can be Critical, Necessary or Beneficial. *Critical* approaches are the highest priority for survival and/or recovery and should be implemented sooner rather than later. *Necessary* approaches are important to implement for survival and recovery but with less urgency than Critical. *Beneficial* approaches help to achieve recovery goals but are less important to the survival and recovery of the species compared to Critical or Necessary.

Relative timeframe can be Short-term, Long-term, or Ongoing. *Short-term* approaches should be completed within five years and *long-term* approaches require more than five years to complete. *Ongoing* approaches are long-term actions carried out repeatedly on a systematic basis.

More specific actions for each approach are provided in Appendix 1: *Recommended specific actions for conservation and recovery of boreal caribou in the NWT*.

Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
Objective #1: Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.				
<i>Critical</i>	<i>Ongoing</i>	- Management of habitat and threats	<p>Threats:</p> <ul style="list-style-type: none"> • Habitat loss, degradation, and fragmentation resulting from human land-use activities and natural processes • Predation • Noise and light disturbance • Vehicle collisions 	1.1. Develop region-specific range plans and an overall NWT-Yukon range plan for habitat management.
<i>Critical</i>	<i>Ongoing</i>	- Monitoring of habitat and threats	<p>Knowledge gaps:</p> <ol style="list-style-type: none"> 1. Human-caused habitat disturbance 	1.2 Monitor landscape change annually.

Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
<i>Necessary</i>	<i>Ongoing</i>	- Management of habitat and threats	Threats: <ul style="list-style-type: none"> • Habitat loss, degradation, and fragmentation resulting from human land-use activities and natural processes 	1.3 Manage fire disturbance as a natural and necessary part of boreal caribou habitat.
<i>Critical</i>	<i>Ongoing</i>	- Management of habitat and threats	Threats: <ul style="list-style-type: none"> • Habitat loss, degradation, and fragmentation resulting from human land-use activities and natural processes • Predation • Noise and light disturbance • Vehicle collisions 	1.4 Manage human-caused landscape disturbance.
Objective #2: Ensure that harvest of boreal caribou is sustainable.				
<i>Necessary</i>	<i>Ongoing</i>	- Monitoring of threat	Knowledge gaps: 4. Harvest information	2.1 Measure harvest levels.
<i>Necessary</i>	<i>Ongoing</i>	- Management of threat	Threats: <ul style="list-style-type: none"> • Harvesting 	2.2 Manage the harvest to ensure it is sustainable.
Objective #3: Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects.				
<i>Necessary</i>	<i>Ongoing</i>	- Monitoring of species	Knowledge Gaps: 3. Population/demography	3.1 Estimate population trends in each region.

Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
<i>Beneficial</i>	<i>Long term</i>	- Research on species and habitat	<p>Knowledge Gaps:</p> <p>5. Predator-prey dynamics 6. Preferred habitat 7. Genetics and population structure 8. Habitat regeneration 9. Natural disturbance regime 11. Climate change effects on habitat</p>	3.2 Improve our understanding of boreal caribou ecology in the NWT.
<i>Beneficial</i>	<i>Long term</i>	- Management of species and habitat	<p>Threats:</p> <p>**This would support sound management practices; therefore it applies to all threats.</p>	3.3 Explore possible use of population and habitat thresholds as triggers for management actions.
<i>Necessary</i>	<i>Ongoing</i>	- Monitoring of species and habitat	<p>Threats:</p> <p>**This refers to changes to the environment and species, caused by multiple interactions (threats), that accumulate over space and time; therefore it applies to all threats.</p> <p>Knowledge Gaps:</p> <p>2. Cumulative effects</p>	3.4 Develop an approach to modeling cumulative effects.
<i>Necessary</i>	<i>Ongoing</i>	- Monitoring of species and habitat - Management of species and habitat	<p>Threats:</p> <p>**This would support sound management practices; therefore it applies to all threats.</p>	3.5 Incorporate community and traditional knowledge on an ongoing basis.

Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
		habitat - Stewardship		
Objective #4: Manage boreal caribou collaboratively, using adaptive management practices and the best available information.				
<i>Critical</i>	<i>Ongoing</i>	- Management of species and habitat	Threats: **This would support sound management practices; therefore it applies to all threats.	4.1 Annually review boreal caribou management and any new information, and adapt management practices as necessary.
<i>Necessary</i>	<i>Ongoing</i>	- Management of species and habitat	Threats: **This would support sound management practices; therefore it applies to all threats.	4.2 Work with other jurisdictions to share information and co-ordinate cross-boundary planning, monitoring and management.
<i>Necessary</i>	<i>Ongoing</i>	- Management of species and habitat	Threats: **This would support sound management practices; therefore it applies to all threats.	4.3 Work with other co-management partners, Aboriginal governments and organizations, communities, resident hunters, non-governmental organizations and industry to share information and collaborate on management actions.
<i>Necessary</i>	<i>Ongoing</i>	- Management of species and habitat	Threats: **This would support sound management practices; therefore it applies to all threats.	4.4 Increase capacity, both human and financial, to implement management actions in this recovery strategy.

Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
Objective #5: Exchange information with NWT people about boreal caribou in all regions.				
<i>Necessary</i>	<i>Ongoing</i>	- Communications, Education and Outreach	Threats: **This would support sound management practices; therefore it applies to all threats.	5.1 Encourage flow of information between communities, caribou hunters, caribou management authorities, industry, non-governmental organizations and the interested public within and across all regions.
Objective #6: Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.				
<i>Necessary</i>	<i>Ongoing</i>	- Management and monitoring of habitat	Threats: <ul style="list-style-type: none"> • Habitat loss, degradation, and fragmentation resulting from human land-use activities and natural processes • Predation 	6.1 Track and report on critical habitat indicators established in the national recovery strategy, to trigger adaptive management where necessary.
<i>Necessary</i>	<i>Ongoing</i>	- Management and monitoring of species	Threats: **This would support sound/adaptive management practices; therefore it applies to all threats.	6.2 Track and report on self-sustaining population status indicators established in the national recovery strategy, to trigger adaptive management where necessary.
<i>Necessary</i>	<i>Ongoing</i>	- Management and monitoring of species	Threats: <ul style="list-style-type: none"> • Habitat loss, degradation, and fragmentation resulting from human 	6.3 As new information becomes available, refine and improve indicators for critical habitat and

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Relative Priority	Relative Timeframe	Category	Threats or Knowledge Gaps Addressed	Approach to Conservation and Recovery
			land-use activities and natural processes • Predation	population status.

4.4 Other Population Management Tools

For some local populations of caribou in Canada, immediate management action is needed to stabilize numbers and prevent extirpation (local extinction) in the short term. These populations are very small, in steep decline, and/or isolated because of habitat fragmentation, habitat change and loss, and increased human access. Population management tools for this situation are being used and/or tested in some local populations of boreal caribou and mountain woodland caribou elsewhere in Canada (e.g. Antoniuk et al. 2012; British Columbia Ministry of Environment 2016; Chisana Caribou Recovery Team 2010; Farnell 2009; Gillingham et al. 2010; Hervieux et al. 2014; Smith and Pittaway 2011; Spence et al. 1999). Tools to manage predation risk include direct management of predators and alternate prey (e.g. a sustained high level of predator removal; predator sterilization programs; removing alternate prey to decrease the prey base for predators) and indirect predator management techniques (e.g. limiting predator access with enclosure fencing; maternal penning of caribou). Augmenting caribou numbers using translocation is also being attempted in some areas.

These techniques may be used as interim management tools while the habitat conditions necessary to support the caribou population are being restored. On their own, they cannot successfully achieve the recovery of the caribou population. Where these interim tools are used, habitat management is needed at the same time to address the root causes of caribou declines driven by habitat change and restore a landscape where self-sustaining caribou can persist (Environment Canada 2012; Hervieux et al. 2014).

The use of these population management tools is not considered necessary or appropriate for boreal caribou in the NWT at this time. Although boreal caribou are threatened in the NWT, the NWT population is not currently facing an imminent risk of extinction, and there is still an opportunity to address the root cause of caribou declines by managing habitat disturbance. The use of population management tools could potentially be re-considered in the future if the situation worsens significantly for boreal caribou in the NWT.

At the time of writing this strategy, there are no limits on Aboriginal harvest of wolves in the NWT. Resident hunters may harvest wolves in accordance with the number of tags held and there is no limit on the number of tags. All hunters are provided with financial incentives for wolf skulls and pelts through ENR and the Genuine Mackenzie Valley Fur Program.

4.5 Socioeconomic and Environmental Effects of Management

Boreal caribou are important to NWT people, and maintaining a healthy and sustainable boreal caribou population across their NWT range will have important cultural and economic benefits for people.

Some of the recommended approaches and actions in this recovery strategy are already underway. For example, range plans for habitat management (Approach 1.1) are already being developed because they are needed under the national recovery strategy for boreal caribou and were also recommended in the *Action Plan for Boreal Caribou Conservation in the Northwest Territories* (ENR 2010). There are approved land use plans in the Gwich'in, Sahtú and Tłı̨chǫ regions that provide some protection for areas of boreal caribou habitat. The protection

mechanisms vary, but many include restrictions on resource development, either temporarily or on a permanent basis (Approach 1.4). The Dehcho and South Slave regions of the NWT already have monitoring programs for estimating local population trends of boreal caribou (Approach 3.1).

Many species share similar habitat requirements as boreal caribou (e.g. old growth boreal forest) and will benefit from the habitat management approaches in this recovery strategy. However, some species, like moose, benefit from recently disturbed habitat (e.g., young forest in the early post-fire stage). In other words, suitable habitat for boreal caribou is not favourable to all species. Habitat disturbance needs to be managed and limited to maintain boreal caribou, but habitat disturbance cannot and should not be eliminated. As more is learned about the natural disturbance regime and the natural range of variation in the NWT boreal forest, the natural balance between disturbed and undisturbed habitat should be reconsidered. See approaches 3.2 and 6.3.

Managing human-caused landscape disturbance through range planning, developing standard advice and protocols for industry, and participating in the regulatory process (Approaches 1.1 and 1.4) would provide increased certainty in terms of industrial operations and how they should be conducted in boreal caribou habitat. However, the implementation of recommended practices may result in some additional work and increased cost for industry. If and when the management authorities recommend scaling back, delaying or not approving development activities in a particular area, and these recommendations are implemented by regulatory agencies, there may be costs or lost opportunities. This will have economic effects on industry and government revenue, as well as possible impacts on job opportunities.

This recovery strategy is recommending that boreal caribou harvest levels be measured and then managed to ensure a self-sustaining population (Approach 2.2); it is not recommending that harvest levels be reduced. However, if it appears that current harvest levels do not allow for a self-sustaining caribou population, then harvest management actions such as temporary harvesting limits may be recommended to prevent further population decline. This could have impacts on Aboriginal and resident hunters, and those impacts would need to be carefully considered and addressed, in reference to land claim agreements and Aboriginal and treaty rights.

There are concerns about potential negative effects of research and monitoring (Approaches 3.1, 3.2 and 3.4) on boreal caribou (see section 3.5). These effects need to be considered and minimized.

Predator management (e.g. wolf culling) is not being recommended as a recovery action for boreal caribou at this time (see section 4.4). If it is ever contemplated in the future, impacts on populations of predators and other prey would need to be carefully considered.

4.6 *Measuring Progress*

Every five years, the Management Authorities for boreal caribou in the NWT will report on progress under this recovery strategy.

Conservation and recovery will be considered successful if the goal is achieved; that is, if there is a healthy and sustainable boreal caribou population across their NWT range that offers harvesting opportunities for present and future generations.

Overall success can be measured using the following performance measures and indicators:

Performance Measure	Indicators to be monitored
<p>Status of boreal caribou Status of boreal caribou has not become further at risk (i.e. not endangered) when reassessed by the NWT Species at Risk Committee (SARC).</p> <p>Population and habitat trends Proportion of habitat that is disturbed and fragmented has not increased Population trends are stable, increasing, or not indicative of long-term declines</p> <p>Range Boreal caribou are still found across the NWT range (range recession has not taken place)</p> <p>Harvesting opportunities People are still able to harvest boreal caribou</p>	<ul style="list-style-type: none"> - Status of boreal caribou in NWT as assessed by SARC every 10 years; may be re-assessed sooner if there is significant new information that could affect status - Estimated total habitat disturbance - Estimated number of individuals in population - Estimated population trends in each region - Change in boreal caribou range, as indicated by up-to-date range map(s) - Estimated harvest levels

The following performance measures and indicators may be used to measure progress on the conservation and recovery objectives and approaches:

Performance Measure	Indicators to be monitored
<p>Objective #1: Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.</p>	
<p>Performance Measurement: Range planning Range plans exist and are being used</p> <p>Amount of adequate habitat across NWT range Proportion of habitat that is disturbed and fragmented has not increased.</p> <p>There is at least 65% undisturbed habitat, or progress toward achieving this target.</p> <p>Managing human-caused landscape disturbance Guidance documents (e.g., standard advice for industry) produced, distributed and in use.</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Number of up-to-date range plans (regional and overall NWT-Yukon) that are required and in-place - Estimated total habitat disturbance from a combination of human impacts and fire - Number of guidance documents produced, distributed and in use - Number of instances where guidance was added to a permit and/or adhered to by the proponent
<p>Objective #2: Ensure that harvest of boreal caribou is sustainable.</p>	
<p>Performance Measurement: Harvest information There is reliable information on harvest levels.</p> <p>Sustainability of harvest ‘Sustainable harvest levels’ are defined for boreal caribou in the NWT. Harvest levels do not prevent the population from being self-sustaining, as defined by ‘sustainable harvest levels’.</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Estimated harvest by Aboriginal hunters - Estimated harvest by resident hunters - Estimated population size - Estimated total harvest

Performance Measure	Indicators to be monitored
<p>Objective #3: Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators, and cumulative effects.</p>	
<p>Performance Measurement: Information collected and shared Monitoring results, research reports, maps and other information products are produced and shared with decision-makers and communities.</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Number of indicators for which we have information - Number of reports or other information products completed - Number of reports or other information products provided to decision-makers and communities
<p>Objective #4: Manage boreal caribou collaboratively, using adaptive management practices and the best available information.</p>	
<p>Performance Measurement: Co-management systems functioning Co-management bodies annually review information and progress on boreal caribou. Co-management bodies make management recommendations in response to changes in boreal caribou population, habitat or threats. Collaboration with other partners functioning Aboriginal governments and organizations, local harvesting committees, Dehcho Boreal Caribou Working Group, resident hunters, NGOs, industry and the public are actively engaged in boreal caribou management. Cross-boundary cooperation functioning NWT shares information and participates in cross-boundary groups. Capacity to implement management is increased</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Number of co-management meetings in which information and progress on boreal caribou is reviewed - Number of management recommendations made by co-management bodies - Number of management recommendations implemented - Number of meetings (possibly including number of people in attendance) in which information and progress on boreal caribou is reviewed - Number of collaborative or partner-driven boreal caribou management initiatives - Number of cross-boundary groups with active NWT participation - Number of active cross-boundary agreements - Number and value of funding partnerships related to recovery strategy implementation

Performance Measure	Indicators to be monitored
Objective #5: Exchange information with NWT people about boreal caribou in all regions.	
<p>Performance Measurement: Extent of communications Information-sharing is occurring through various means.</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Number of ‘<i>communication events</i>’ about boreal caribou (e.g., meetings, workshops, conferences, media campaigns, presentations, home visits, school visits) - Number of publication products about boreal caribou
Objective #6: Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.	
<p>Performance Measurement: Track and report on national obligations Total habitat disturbance is periodically compared to national threshold and results are reported.</p> <p>Self-sustaining population status indicators are periodically compared to national indicators and results are reported.</p> <p>National obligations are met or exceeded There is at least 65% undisturbed habitat, or progress toward achieving this target.</p> <p>NWT population continues to be self-sustaining.</p> <p>Indicators are evaluated and improved if necessary over time Indicators for critical habitat and population status are evaluated against new information from research and monitoring.</p> <p>New information from the NWT is informing the national recovery strategy.</p>	<p>Indicators:</p> <ul style="list-style-type: none"> - Number of times that critical habitat indicators were measured, compared to national indicators and reported to management authorities - Number of times that self-sustaining population status indicators were measured, compared to national indicators and reported to management authorities - Estimated total habitat disturbance from a combination of human impacts and fire - Estimated number of individuals in population - Estimated local population trends in each region - Estimated rate of change in NWT population - Number of times that habitat and population indicators were critically evaluated using new information - Number of times that NWT information was provided to Environment Canada for their review of national recovery efforts

5. **NEXT STEPS**

This recovery strategy will be followed by a consensus agreement by the Conference of Management Authorities that will lay out the actions Management Authorities agree to undertake to implement it. The intent is for the consensus agreement on implementation to consider the capacity and priorities of the Management Authorities and identify which actions each agency intends to focus on. Partnerships and investment will be required to increase the collective capacity of Management Authorities and other partners to implement this recovery strategy. This recovery strategy does not commit any party to actions or resource expenditures; implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating Management Authorities.

At least every five years, the Conference of Management Authorities will review this recovery strategy and report on the actions undertaken to implement it, and the progress made towards meeting its objectives. The first progress report will be due in 2022. The recovery strategy may also be updated at that time.

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Background information on boreal caribou and threats is mainly summarized from the *Species at Risk Committee (2012)* report. To avoid repetitive citations, it can be assumed that the information was taken from this report, unless another reference is given.

APPENDIX 1: Recommended Specific Actions for Conservation and Recovery of Boreal Caribou

Notes: The specific actions will be useful at a later date when the Conference of Management Authorities (CMA) will need to develop the consensus agreement on implementing the recovery strategy. The ‘lead’ agency will not be the same for each action and sometimes the lead agency may be a group that does not belong to the CMA. The recovery strategy only recommends these actions; it does not commit anyone to these actions. These actions correspond to the conservation and recovery approaches listed below and in Table 2 of this recovery strategy. Some actions may be region-specific.

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
Objective #1: Ensure there is adequate habitat across the NWT range to maintain a healthy and sustainable population of boreal caribou.	
1.1.	Develop region-specific range plans and an overall NWT-Yukon range plan for habitat management.
1.1.1.	Create range plans by mapping and prioritizing caribou habitat areas, identifying the tools to manage disturbance in each area, and showing how these areas contribute to achieving or maintaining adequate habitat.
1.1.2.	Where range plans identify gaps (areas without appropriate tools in place to manage disturbance), consider the suite of northern tools and ensure mechanisms are in place to manage disturbance.
1.1.3.	Coordinate range plans among NWT regions and with neighbouring jurisdictions to ensure habitat connectivity extends across boundaries.
1.1.4.	Every 5 years, review the effectiveness of range plans and update them.
1.2.	Monitor landscape change annually.
1.2.1.	Track natural landscape changes, especially fire disturbance.
1.2.2.	Track human-caused landscape changes, using both remote sensing and current disturbance data from industry.

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
1.2.3.	Compile and improve existing records of human-caused landscape change.
1.2.4.	Work with land and water boards, land managers and industry to ensure appropriate information on activities in boreal caribou habitat is submitted, compiled and made publicly available.
1.2.5.	Develop criteria to determine which types of human development activities will be considered as contributing to the disturbance footprint for boreal caribou.
1.2.6.	Develop criteria to determine when anthropogenic disturbances and natural disturbances have become functional caribou habitat again.
1.2.7.	Compile and manage spatial information on landscape change.
1.2.8.	Report natural and human-caused disturbance levels (both current and cumulative) to land management authorities.
1.2.9.	Develop products to facilitate the timely and effective consideration of boreal caribou in environmental impact assessment and other land use decisions (e.g., a screening tool for project applications that provides a real-time assessment of boreal caribou habitat supply and how the proposed development would affect habitat supply, relative to critical habitat thresholds).
1.3.	Manage fire disturbance as a natural and necessary part of boreal caribou habitat.
1.3.1.	Adhere to the existing fire management policy to the best extent possible, recognizing that forest fire is a natural phenomenon and that fire suppression may be unsuccessful.
1.3.2.	Explore the use of fire management tools for the maintenance of high value caribou habitat areas. Possible tools include classifying caribou habitat as a value at risk, landscape-level prescribed burns to limit fire growth potential, fire breaks (including strategic planning of timber harvesting), and fuel management.
1.4.	Manage human-caused landscape disturbance.
1.4.1.	Explore concepts of ecosystem based management for managing disturbances and habitat requirements holistically (or in an integrated way).
1.4.2.	Review and update existing guidelines and standard advice for industry, and develop new guidance documents where needed, to address current best practices for mitigating the impacts of development (e.g. seismic techniques, restoration of habitat and management of access).

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
1.4.3.	Develop or update guidelines and/or regulations under the <i>NWT Wildlife Act</i> for how to plan and conduct development activities to minimize impacts on boreal caribou and their habitat, and ensure that wildlife management and monitoring plans for development projects adequately address boreal caribou and their habitat.
1.4.4.	Work with applicants to consider how potential impacts on boreal caribou and their habitat can be mitigated before submitting their permit and license applications to a land and water board.
1.4.5.	Review development proposals and applications for land use permits and water licenses and provide comments and recommendations with regard to impacts on boreal caribou and their habitat.
1.4.6.	Develop terms and conditions for use by the Mackenzie Valley Land and Water Board and other regulatory bodies in permits and licenses for development activities (e.g., through the <i>Mackenzie Valley Resources Management Act</i>) that help to avoid, minimize or mitigate impacts to boreal caribou habitat.
1.4.7.	Using range plans as a guide, consider boreal caribou habitat supply in forest management planning and issuance of forest management agreements.
1.4.8.	Using range plans as a guide, consider boreal caribou habitat supply in issuing permissions and rights for oil and gas exploration and development (calls for nominations, calls for bids, exploration licenses, operations authorizations, significant discovery licenses, production licenses, oil & gas leases); and permissions for mineral exploration and development (prospector's licenses, coal exploration licenses, prospecting permits, mineral claims, mining leases).
1.4.9.	Using range plans as a guide, consider boreal caribou habitat supply in planning and issuing permissions for road construction and other development.
1.4.10.	Use range plans to guide decisions about issuance of permissions and rights; then if necessary, in response to landscape change, recommend and implement that development activities be scaled back, delayed or not approved in a particular area, to ensure adequate habitat remains for boreal caribou, and to avoid destruction of areas identified as critical habitat in a range plan.
1.4.11.	When a caribou management authority is also a regulatory authority or a lead agency for land use decisions, provide leadership by demonstrating that boreal caribou habitat supply has been considered during its own planning processes and that destruction of critical habitat identified in a range plan has been avoided.
1.4.12.	Support the completion of land use plans and the protected/conservation area planning process, especially for lands identified as having value for boreal caribou conservation.

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
Objective #2: Ensure that harvest of boreal caribou is sustainable.	
2.1. Measure harvest levels.	
2.1.1.	Educate people on the importance of reporting harvest.
2.1.2.	Work with local First Nations, harvesting committees and the Dehcho Boreal Caribou Working Group to develop reporting systems for Aboriginal harvesting of boreal caribou; these systems must be respectful of treaty and Aboriginal rights and maintain harvester privacy.
2.1.3.	Continue to estimate harvest levels of resident hunters through the <i>Resident Harvest Survey</i> .
2.1.4.	Report estimated total harvest levels, including the number harvested and the sex ratio, to caribou management authorities.
2.2. Manage the harvest to ensure it is sustainable.	
2.2.1.	Investigate and define sustainable harvest levels.
2.2.2.	Encourage harvesting practices that minimize negative impacts on the population (e.g., following traditional laws surrounding caribou hunting and use; excellence in marksmanship; ability to distinguish types of caribou; avoid harvesting cows with calves).
2.2.3.	Work with officers and communities to promote compliance with hunting regulations for boreal caribou.
2.2.4.	Review the NWT Wildlife Act Big Game Hunting Regulations for woodland caribou. As part of this review, consider whether regulations for boreal and mountain woodland caribou should be further differentiated, and whether changes to seasons, bag limits, quotas, open harvesting zones and/or harvest reporting mechanisms are needed.
2.2.5.	Periodically review harvest levels and make management recommendations if necessary (e.g. temporary harvest limitations).
Objective #3: Obtain information to inform sound management decisions, including boreal caribou ecology, key habitat and population indicators and cumulative effects.	
3.1. Estimate population trends in each region.	

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
3.1.1.	Expand upon, or develop and implement monitoring program(s) that provide key information on boreal caribou vital rates, numbers, population trends, health, and condition.
3.1.2.	Explore methods for using local population trend information to estimate the trend of NWT's population as a whole.
3.2.	Improve our understanding of boreal caribou ecology in the NWT.
3.2.1.	Investigate relationships among different types of caribou and whether the NWT population of boreal caribou has subpopulation structure (e.g., using genetics and traditional knowledge).
3.2.2.	Improve range map for boreal caribou, using the best available information on their changing locations and movements.
3.2.3.	Promote research to improve our understanding of the relationship between habitat disturbance, alternate prey, predator density and behaviour, and boreal caribou in the NWT.
3.2.4.	Promote research to improve our understanding of the natural fire regime and habitat regeneration in the NWT, as they relate to boreal caribou habitat.
3.2.5.	Promote research on regeneration of human disturbances in the NWT and the effectiveness of habitat restoration techniques for boreal caribou.
3.2.6.	Promote research on the impacts of climate change on boreal caribou habitat.
3.3.	Explore possible use of population and habitat thresholds as triggers for management actions.
3.3.1.	As monitoring programs are developed (3.1.1), assess options for population data that could be used to trigger management actions.
3.3.2.	Through consultation, discuss the possibility of using population and habitat thresholds to trigger boreal caribou management actions.
3.4.	Develop an approach to modeling cumulative effects.
3.4.1.	Develop a model that shows how monitored indicators relate to the state of the population.
3.5.	Incorporate community and traditional knowledge on an ongoing basis.

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
3.5.1.	Support community monitoring programs.
3.5.2.	Develop local training programs for community monitors, directed at those with local knowledge.
3.5.3.	Analyze existing knowledge and gather new knowledge.
3.5.4.	Ensure community and traditional knowledge perspectives are brought to the decision-making table.
Objective #4: Manage boreal caribou collaboratively, using adaptive management practices and the best available information.	
4.1.	Annually review boreal caribou management and any new information, and adapt management practices as necessary.
4.1.1.	Caribou management authorities annually review progress on recovery actions and current information on population and habitat, including community and traditional knowledge.
4.1.2.	If necessary, consider alternative recovery actions (e.g., stricter habitat and/or harvest management) and make management recommendations.
4.1.3.	Every five years, review the NWT recovery strategy and report on the actions undertaken to implement it and the progress made towards meeting its objectives.
4.2.	Work with other jurisdictions to share information and co-ordinate cross-boundary planning, monitoring and management.
4.2.1.	Continue to participate on the National Boreal Caribou Technical Committee to share knowledge, develop strategies and resolve key technical questions amongst jurisdictions.
4.2.2.	Continue to implement the Memorandum of Understanding for Cooperation on Managing Shared Boreal Populations of Woodland Caribou between GNWT and Government of Alberta.
4.2.3.	Continue working with Gwich'in and Government of Yukon on range planning and exchanging information for the shared NWT-Yukon population.

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
4.2.4.	Continue sharing information about boreal caribou with neighbouring jurisdictions (e.g., determining metapopulation status, sharing collaring data).
4.3. Work with other co-management partners, Aboriginal governments and organizations, communities, resident hunters, non-governmental organizations, and industry to share information and collaborate on management actions.	
4.3.1.	Continue working with renewable resources boards, local harvesting committees, Dehcho Boreal Caribou Working Group, Aboriginal governments and organizations on boreal caribou management.
4.3.2.	Continue engaging resident hunters, non-governmental organizations, industry and the public on boreal caribou management.
4.3.3.	Encourage cooperative work with all parties on boreal caribou stewardship and other conservation activities.
4.3.4.	Encourage cooperative research, monitoring and information sharing with all parties.
4.3.5.	Develop standard monitoring protocols for boreal caribou that could be adopted by government, industry and other parties to facilitate data sharing and increase the geographic scope of monitoring programs.
4.3.6.	Ensure meaningful consultation, as required under section 35 of the <i>Constitution Act</i> , when a government action with respect to boreal caribou could potentially infringe on an asserted or existing Aboriginal or treaty right.
4.4. Increase capacity, both human and financial, to implement management actions in this recovery strategy.	
4.4.1.	Build and strengthen partnerships and collaborations to increase capacity for implementing management actions.
4.4.2.	Identify and pursue opportunities for public and private investments in recovery strategy implementation, with help from non-government organizations.
Objective #5: Exchange information with NWT people about boreal caribou in all regions.	

Recommended Specific Actions for Conservation and Recovery of Boreal Caribou	
5.1.	Encourage flow of information between communities, caribou hunters, caribou management authorities, industry, non-governmental organizations and the interested public within and across all regions.
5.1.1.	Communicate about boreal caribou using a variety of approaches, depending on the demographic (e.g., <i>Elders</i> – community meetings or home visits; <i>Youth</i> –social media, internet, visits to schools; <i>Harvesters</i> - harvesters’ conference; <i>All</i> : radio, “out on the land” trips, information sessions in communities).
5.1.2.	Continue/enhance communication with local harvesting committees, Dehcho Boreal Caribou Working Group, and local First Nations.
Objective #6: Further to the national recovery strategy, ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NWT.	
6.1.	Track and report on critical habitat indicators established in the national recovery strategy to trigger adaptive management where necessary.
6.1.1.	Measure total undisturbed habitat in the NWT range annually and compare it to the 65% threshold in the national recovery strategy.
6.1.2.	Report results at annual boreal caribou management meeting to allow management authorities to make recommendations.
6.2.	Track and report on self-sustaining population status indicators established in the national recovery strategy, to trigger adaptive management where necessary.
6.2.1.	Annually compare short term population trend, population size, and percentage of habitat disturbance in the NWT to the self-sustaining status indicators in the national recovery strategy.
6.2.2.	Report results at annual boreal caribou management meeting to allow management authorities to make recommendations.
6.3.	As new information becomes available, refine and improve indicators for critical habitat and population status.
6.3.1.	As new information becomes available, use it to improve and refine habitat indicators for the NWT.
6.3.2.	As new information becomes available, use it to improve and refine population status indicators for the NWT.