Species at Risk Act
Recovery Strategy Series

Report on the Progress of Recovery Strategy Implementation for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada for the Period 2012-2017

Woodland Caribou, Boreal population

2017

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For copies of the recovery strategy, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

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Note: Woodland Caribou, Boreal population is referred to as “boreal caribou” in this document.

[1] http://sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1

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Executive Summary

Introduction

The Recovery Strategy for the Woodland Caribou, Boreal population in Canada (herein referred to as "the Recovery Strategy") was posted on the Species at Risk Public Registry on October 5, 2012. The Minister of the Environment and the Minister responsible for the Parks Canada Agency (PCA) are the competent ministers under the *Species at Risk Act* (SARA) for Woodland Caribou, Boreal population (herein referred to as "boreal caribou"). Section 46 of SARA states that the competent ministers are responsible for reporting on the implementation of the recovery strategy and on the progress towards meeting its objectives (herein referred to as the "Progress Report") within five years after it is included in the Public Registry. The purpose of this Progress Report is to fulfill this legal obligation by providing Canadians with a summary of the progress made toward implementing the Recovery Strategy since 2012. The Minister of Environment and Climate Change has prepared this Progress Report for the time period of 2012-2017.

Boreal caribou are endemic to Canada and found in the boreal forest across nine provinces and territories, including British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Newfoundland and Labrador, Northwest Territories, and the Yukon.

The 2008 Scientific Review established boreal caribou ranges as the appropriate spatial scale to plan for the species' recovery and to identify critical habitat (Environment Canada, 2008). This is because habitat conditions within boreal caribou ranges affect their survival and reproduction, which ultimately determines whether or not a local population will survive (Environment Canada, 2008; Environment Canada, 2011).

Science and Traditional Knowledge support that conservation of a wide-ranging species like boreal caribou is achieved by maintaining multiple local population units across a species' geographical distribution, in representative ecological settings, with replicate local populations in each setting (Boreal Caribou ATK Reports, 2010-2011; Environment Canada, 2011). Each boreal caribou local population contributes to the biodiversity, ecological functionality, and resilience of the species to environmental change, reducing the risk of the species' extinction (Ray, 2011).

Recovery Measures

This Progress Report focuses primarily on actions taken by the federal, provincial, and territorial governments and reflects the best available information at the time of publication. However, it also recognizes the important work being done by Indigenous peoples, stakeholders, academia, and citizens to recover boreal caribou across the country. Key contributions and investments have been made by all groups. For example, research was conducted to support recovery efforts and address the schedule of studies for critical habitat identification in northern Saskatchewan's Boreal Shield range; habitat restoration activities were undertaken in many areas across Canada;

innovative approaches to support recovery were developed; population and habitat monitoring efforts were undertaken; and, collaboration and engagement increased.

The Government of Canada released the proposed Action Plan for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, In Canada – Federal Actions (herein referred to as "the proposed Action Plan") on July 27, 2017. The proposed Action Plan illustrates a federal framework that outlines specific efforts that the federal government is taking, and plans to take, in support of boreal caribou recovery moving forward. These measures have been summarized in three pillars: 1) science to support recovery with a focus on research projects and the Boreal Caribou Knowledge Consortium; 2) recovery and protection of the species and its critical habitat, including by negotiating agreements under section 11 of SARA; and 3) reporting on progress, including this Progress Report on implementing the Recovery Strategy (s.46 of SARA) and a report on progress toward the protection of critical habitat, if the Minister determines that any portion of critical habitat is unprotected (s.63 of SARA). The PCA has also posted the Multi-species Action Plan for Pukaskwa National Park of Canada which addresses threats and recovery measures for boreal caribou.

Progress on Recovery Strategy Implementation

This Progress Report evaluates the performance indicators established in the Recovery Strategy for the purpose of measuring progress toward achieving the population and distribution objectives established in the Recovery Strategy. The performance indicators fall under three main categories:

1. Range planning;
2. Population condition (size and trend); and,
3. Habitat condition (amount of undisturbed habitat).

Performance Indicator 1: Range Planning

Provinces and territories have the primary responsibility for management of lands, natural resources and wildlife within boreal caribou ranges. This is because the majority of boreal caribou habitat falls on provincial crown land. The 2012 Recovery Strategy called upon provinces and territories to develop range plans by October 2017 to demonstrate how they will protect the species' critical habitat under their jurisdiction. In 2016, Environment and Climate Change Canada (ECCC) published guidance to assist provinces and territories with their efforts to develop range plans.

Provinces and territories have not fully met the October 5, 2017 deadline for completing range plans. However, some progress has been achieved. For example, British Columbia, Alberta, Ontario and Quebec released draft or final range plans or similar planning or policy documents, or portions thereof. Alberta committed to completing a draft provincial range plan for all ranges by December 2017. Saskatchewan committed to completing a draft range plan for the Central Unit of SK2 by October 2017. Manitoba has indicated that it will complete five of nine range plans by 2018 and the remainder by

2020. Quebec plans to complete the second phase of a provincial action plan by the spring of 2018. As boreal caribou harvest is the key issue in Newfoundland and Labrador, the province is addressing this issue as a priority and working collaboratively with key partners. The Northwest Territories is developing a framework for range planning expected in fall 2017. The Yukon Government may work with the Northwest Territories Government on range planning efforts for the transboundary range (NT1).

Performance Indicator 2: Population Condition

Since the 2012 Recovery Strategy, boreal caribou continue to occur in all 51 local population ranges across Canada. However there are several small local populations, some of which are isolated, that continue to be at greater risk of extirpation or of not achieving or maintaining self-sustaining status. The best available data, submitted by provinces and territories, indicates that many boreal caribou local populations continue to decline across Canada (see Appendix A).

Based on the population trend data available, none of the 30 local populations, for which data was provided, have an increasing population trend, 10 are considered stable, and 20 local populations have a decreasing population trend. There is no trend data available for the remaining 21 local populations. No or limited population trend data were received from the Northwest Territories, Saskatchewan, Manitoba and Newfoundland and Labrador for this report.

In the 2012 Recovery Strategy, there were 13 local populations that had fewer than 100 animals, 30 that had greater than or equal to 100 animals, and 8 that did not have an estimate available. In 2017 there are 10 local populations that have fewer than 100 animals, 34 that have greater than or equal to 100 animals, and 7 that do not have an estimate available. However, the change from 13 to 10 local populations with fewer than 100 animals does not necessarily represent an improvement in overall status of the local populations, as a few ranges increased to greater than 100 animals due to increased survey effort or changes in survey methodology. See Appendix A for details on population condition information by local population.

Performance Indicator 3: Habitat Condition

The 2012 Recovery Strategy set a 65% undisturbed habitat threshold as one component of critical habitat for the species, which provides a 60% probability that a local population will be self-sustaining. This 65% threshold was a policy decision, based on a model developed by ECCC that considered both human and natural disturbance.

In 2012, 21 of the 51 ranges had 65% or greater undisturbed habitat. In 2017, 19 of the 51 ranges have 65% or greater undisturbed habitat (see Appendix A for disturbance calculations by local population).

Range and/or action plans or other similar documents developed by provinces and territories to-date have not met the performance indicator to spatially identify specific

areas of existing undisturbed habitat, as well as those areas where future habitat is to be restored to an undisturbed condition over reasonable, gradual increments every five years.

Based on an analysis of changes to disturbance levels between 2010 and 2015, net total habitat disturbance (anthropogenic and fire) increased in 34 caribou ranges, decreased in 9 ranges, and remained the same in 8 ranges. When looking only at anthropogenic disturbance within the same time periods, disturbance increased in 29 ranges, decreased in 9 ranges and remained the same in 13 ranges.

Moving Forward on Protection and Recovery

The federal government will implement the measures outlined in the proposed Action Plan including conducting research, creating the Knowledge Consortium, and protecting critical habitat on federal lands.

In the fall of 2017, ECCC will assess whether boreal caribou and its critical habitat are effectively protected across the species' Canadian distribution based on an evaluation of provincial and territorial range plans or other similar documents and other relevant information available. In the absence of range plans, the best available information and consultation with jurisdictions will be used to determine whether the species and its critical habitat are effectively protected. These assessments will be completed by ECCC in early 2018.

If the Minister of the Environment determines that any portion of critical habitat is unprotected, a report on steps being taken to protect that critical habitat will be published by April 2018. If the Minister determines that the boreal caribou and/or its critical habitat are not protected, she must recommend that the Governor in Council (a committee of the federal cabinet) make an order to protect the species and its habitat. The Governor in Council will then decide whether to issue the order(s). This is a requirement under SARA.

A strong section 11 agreement between the Government of Canada and individual provinces/territories that is based on a range plan or similar document may provide the Governor in Council with an alternative to a protection order or limit the scope of a protection order. ECCC is prepared to negotiate conservation agreements under section 11 of SARA with provinces and territories and other parties as appropriate to describe the commitments each party is making to protect and recover boreal caribou on non-federal lands. These agreements will provide a framework for further conservation actions toward achieving the population and distribution objectives for boreal caribou. The federal government will enter into such agreements if they are robust, science-based and provide specific, measurable, achievable, relevant, and time-bound measures for the protection and/or recovery of the species and its critical habitat.

Conclusion

While work is underway in many parts of the country to protect and recover boreal caribou, timely action is required to ensure that local populations either remain at self-sustaining levels or achieve this state. Five years after the release of the Recovery Strategy, every province and territory is still working to fully complete its range plans. While boreal caribou continue to occur in all 51 ranges identified in the 2012 Recovery Strategy, habitat condition in the majority of ranges has worsened since 2012. Moreover, the boreal caribou population as a whole has continued to decline. More needs to be done to recover boreal caribou including having robust range plans in place. It is imperative that all parties work collaboratively on a multi-stakeholder basis to develop innovative solutions that will provide for effective protection of boreal caribou and its critical habitat while concurrently allowing for continued economic activity where appropriate.

Federal Path Forward on Boreal Caribou

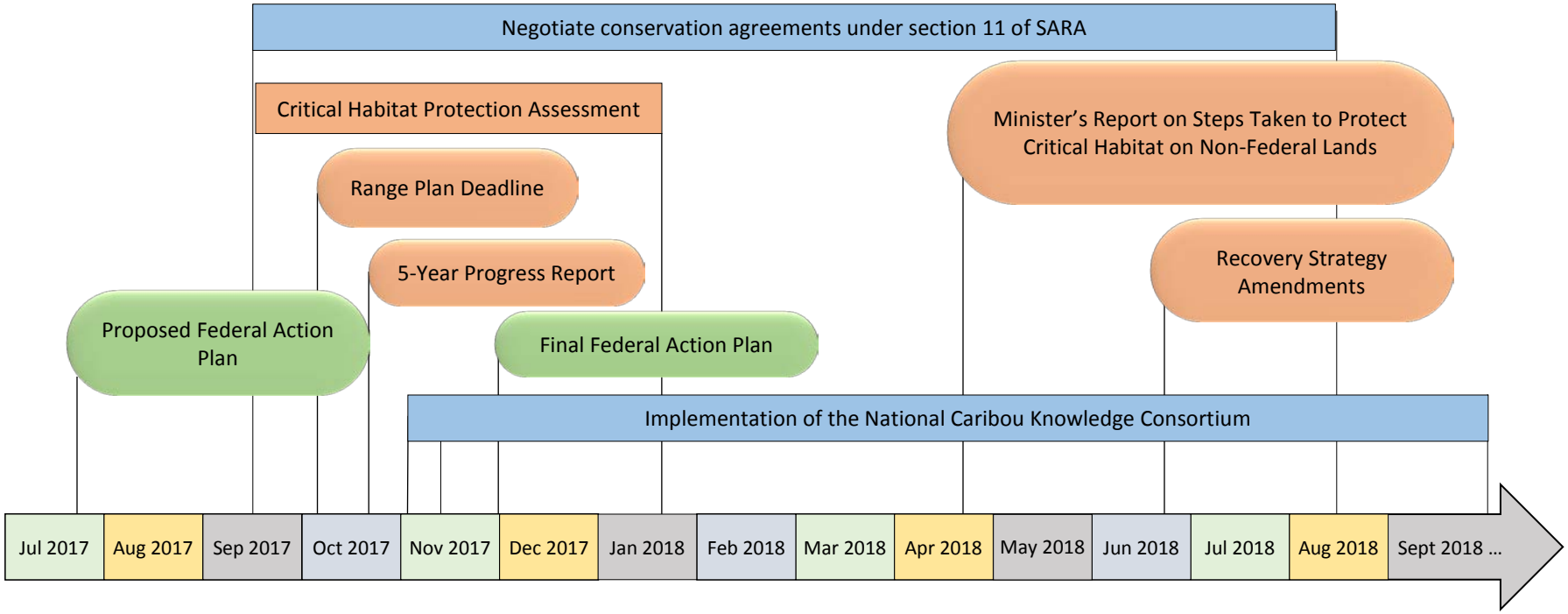

Table of Contents

1. Introduction

This document reports on the progress towards meeting the objectives for Woodland Caribou, Boreal population (herein referred to as “boreal caribou”) listed in the Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population in Canada (hereafter referred to as “the Recovery Strategy”; Environment Canada, 2012) from 2012 to 2017. This Progress Report should be considered as one of a linked series of documents, including: the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status report (COSEWIC, 2002, 2014), the Recovery Strategy (Environment Canada, 2012), the Action Plan for the Woodland Caribou, Boreal population in Canada: Federal Actions (hereafter referred to as “the proposed Action Plan”; Environment and Climate Change Canada (ECCC), 2017), and the Multi-species Action Plan for Pukaskwa National Park of Canada (PCA, 2017).

Boreal caribou is a wide-ranging species distributed across nine provinces and territories in the boreal forest of Canada and, as such, it is not possible to capture every project implemented by all parties across Canada within this report. Although the primary focus of this report is on the implementation of recovery efforts by the federal, provincial, and territorial governments, this report also recognizes the important and innovative work being done by Indigenous peoples, industry, environmental non-governmental organizations, academia, and all citizens to recover boreal caribou in Canada.

2. Background

2.1 Species Information

Boreal caribou was listed as threatened in Canada when the *Species at Risk Act* (SARA) came into force in 2003. This listing was based on an assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2002. The status was re-examined and confirmed by COSEWIC in November 2014. The main reason for this designation is range-wide declines, loss of local populations, and range contraction up to 50% of their historical range in some areas.

2.2 Threats

The Recovery Strategy identified the primary threat to most boreal caribou local populations as unnaturally high predation rates as a result of human-caused habitat loss, degradation, and fragmentation. The detailed threat assessment for boreal caribou can be found in section 4 of the Recovery Strategy (Environment Canada, 2012).

2.3 Population and Distribution

The Canadian distribution of boreal caribou stretches from the northeast corner of Yukon east to Labrador, and extends as far south as Lake Superior. The Recovery

Strategy recognized 51 local population ranges (see Figure 1) based on the best available information provided by the provinces and territories. Ranges are the geographic area occupied by a group of boreal caribou that are subject to similar factors affecting their demography and used to satisfy their life history processes (e.g. calving, rutting, wintering) over a defined timeframe. Since the Recovery Strategy for boreal caribou was published in October 2012, some provinces and territories have updated range boundaries in their jurisdiction based on new or more refined evidence. This Progress Report reports on the ranges as identified in the Recovery Strategy.

3. Recovery

3.1 Recovery Goals and Objectives

The 2008 Scientific Review established boreal caribou ranges as the appropriate spatial scale to plan for the species' recovery and to identify critical habitat (Environment Canada, 2008). This is because habitat conditions within boreal caribou ranges affect their survival and reproduction, which ultimately determines whether or not a local population will survive (Environment Canada, 2008; Environment Canada, 2011).

Science and Traditional Knowledge support that conservation of a wide-ranging species like boreal caribou is achieved by maintaining multiple local population units across a species' geographical distribution, in representative ecological settings, with replicate local populations in each setting (Boreal Caribou ATK Reports, 2010-2011; Environment Canada, 2011). Each boreal caribou local population contributes to the biodiversity, ecological functionality, and resilience of the species to environmental change, reducing the risk of the species' extinction (Ray, 2011).

As outlined in the Recovery Strategy, the recovery goal for boreal caribou is to achieve self-sustaining local populations in all 51 boreal caribou ranges throughout their current distribution in Canada, to the extent possible.

To guide recovery efforts, the Recovery Strategy identified population and distribution objectives for boreal caribou across their distribution in Canada. They are, to the extent possible, to:

- Maintain the current status of the 14 existing self-sustaining local populations; and,
- Stabilize and achieve self-sustaining status for the 37 not self-sustaining local populations.

Achieving this recovery goal for all local populations will take a number of decades, as boreal caribou are found in mature boreal forest ecosystems that have evolved over centuries.

3.2 **Performance Indicators**

The Recovery Strategy presented performance indicators as national guidelines to define and measure progress toward achieving the population and distribution objectives. Monitoring of local populations based on performance indicators allows for the evaluation of actions and enables adjustments through adaptive management over time.

The ultimate performance indicator for boreal caribou recovery is self-sustaining local populations throughout the entirety of their distribution in Canada.

The performance indicators for boreal caribou as outlined in the Recovery Strategy (section 8 – Measuring Progress) are reproduced in detail below in section 4.3 of this Progress Report.

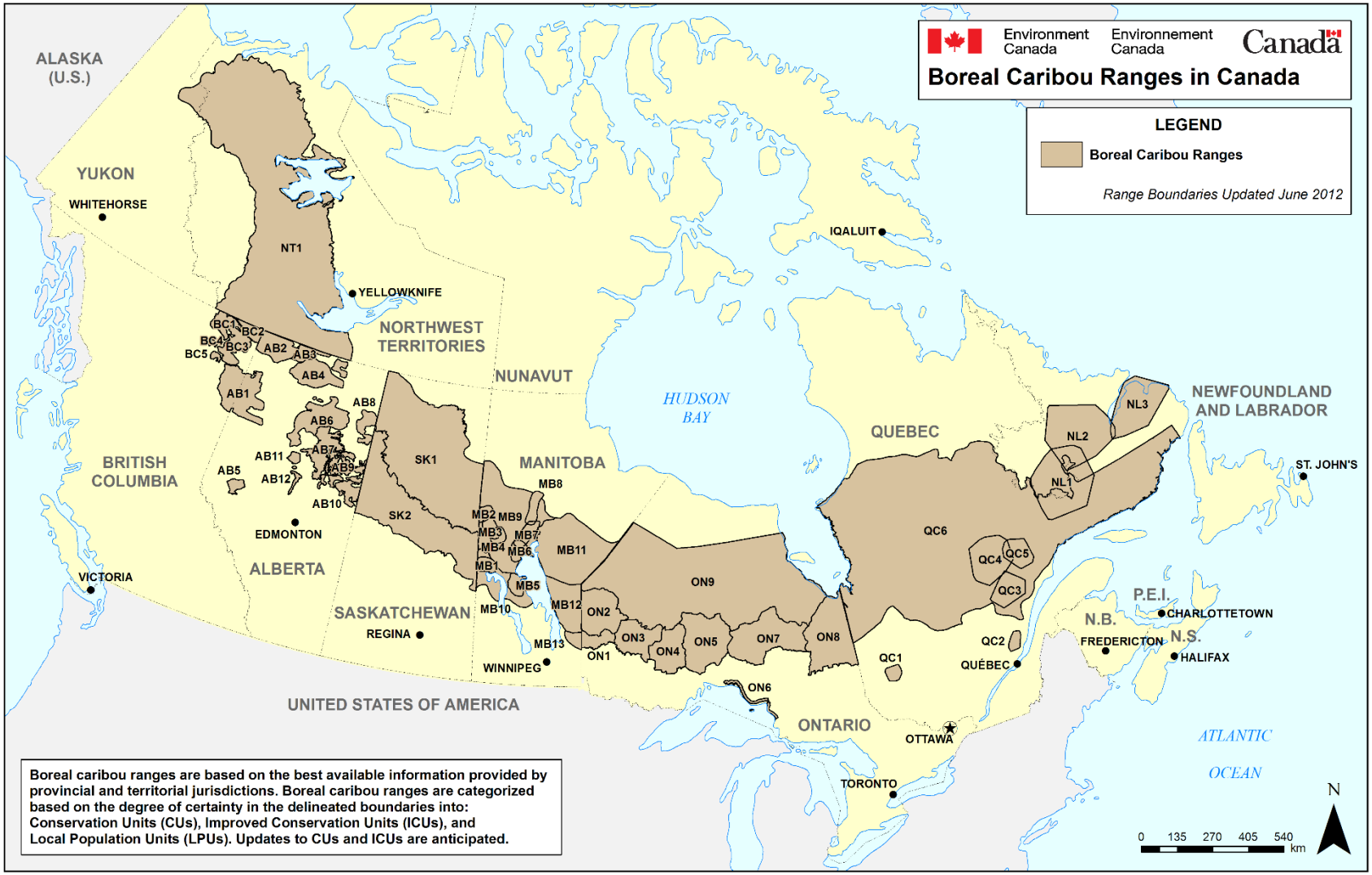

Figure 1. Geographic distribution of the 51 known ranges of boreal caribou in Canada as presented in the Recovery Strategy (Environment Canada, 2012)

4. Progress Towards Implementing the Recovery Strategy

Section 46 of SARA states that the competent minister must report on the implementation of the recovery strategy, and the progress towards meeting its objectives, within five years after it is included in the Public Registry and in every subsequent five-year period, until its objectives have been achieved or the species' recovery is no longer feasible. This document includes a summary of actions completed from 2012 to 2017 under two themes: 1) completing the schedule of studies in support of the identification of critical habitat in Saskatchewan's Boreal Shield (SK1) range, and 2) implementation of recovery measures. It is followed by an assessment of status for each of the performance measures outlined in section 8 of the Recovery Strategy.

4.1 Measures Supporting Identification of Critical Habitat

Critical habitat is identified in the Recovery Strategy (section 7) for all boreal caribou ranges, except for Saskatchewan's Boreal Shield range (SK1). The range condition in SK1 is characterized by high fire and very low anthropogenic disturbance, a unique situation that was not well represented in the data available for the meta-analysis in the 2011 Scientific Assessment (Environment Canada, 2011) that was the basis for the identification of critical habitat in the other ranges. There was also no population trend or size data available for SK1 in 2012 and it was not possible to infer whether SK1 fit the meta-analysis model. As such, the identification of critical habitat in SK1 was deferred until more information was available. The Recovery Strategy included a schedule of studies (section 7.2) required to complete the critical habitat identification for SK1. These activities are progressing and critical habitat for SK1 will be identified in a proposed amendment to the Recovery Strategy in spring 2018 (Table 1).

Table 1. Current status of the activities included in the schedule of studies and the timeline for their completion

Description of Activity (Environment Canada, 2012)	Current status of activity	Timeline for completion of activity
Collect population information (size, trend, etc.) for a minimum of 2 years in SK1 where population condition is unknown.	The University of Saskatchewan led the collection of population information (size, trend, adult female survival and calf recruitment). The preliminary results from 2014-2016 data collection have been released by the University of Saskatchewan in an Interim Report (McLoughlin et al., 2016). An additional year of population data has been provided by the University of Saskatchewan since publication of the Interim Report.	Completed
Update disturbance model in the Department's Scientific Assessment (2011) by including population information for SK1 to incorporate situations of high fire and very low anthropogenic disturbance.	ECCC is currently updating the disturbance model by including the new population information for SK1 and additional data from several study areas with high fire and low anthropogenic disturbance. This analysis will place the SK1 data into a broader national context.	Fall 2017

Description of Activity (Environment Canada, 2012)	Current status of activity	Timeline for completion of activity
Identification of critical habitat in SK1.	Using the information generated from the above activities, ECCC will complete the identification of critical habitat in SK1. ECCC will cooperate with the Government of Saskatchewan and northern Saskatchewan's Indigenous communities, and consult with directly affected stakeholders on the candidate critical habitat for SK1 prior to posting a proposed amendment to the Recovery Strategy on the Species at Risk Public Registry.	Proposed amendment to the Recovery Strategy in spring 2018

4.2 **Recovery Measures**

The Recovery Strategy (section 6.2) describes, at a national level, the broad strategies and general approaches to be taken and the research and management activities needed to address the threats to boreal caribou and achieve the population and distribution objectives. Many strategies and approaches are interrelated and details on their implementation and their level of priority will differ across the country and by local population and habitat conditions. Federal, provincial and territorial governments, wildlife management boards, Indigenous governments and peoples, stakeholders, and other interested parties across Canada have taken a range of actions over the last five years to implement the Recovery Strategy.

4.2.1 Federal, Provincial, Territorial Governments

Provinces and territories have the primary responsibility for management of lands, natural resources and wildlife within boreal caribou ranges. This is because the majority of boreal caribou habitat falls on provincial crown land. The federal government also has an important leadership role to play in caribou recovery. Several strategies have been implemented across the country by each responsible jurisdiction on landscape level planning (including progress on range planning), habitat management, mortality and population management, and population monitoring. A summary of the actions taken by the federal government and each province and territory with management responsibility for the species over the last five years to address the broad strategies outlined in the Recovery Strategy (section 6.2, Table 5) is found below in Tables 2-5. For additional information on the recovery measures implemented by each jurisdiction, please refer to the individual federal, provincial, and territorial summaries found in Appendix B.

Table 2. Summary of the broad strategies undertaken from 2012 to 2017 by each province, territory and federal department/agency: Landscape Level Planning

Broad Strategy to Recovery	Undertake landscape level planning that considers current and future boreal caribou habitat requirements
BC	• Draft range plans were included in the draft Boreal Caribou Recovery Implementation Plan. BC is working on revisions following a public comment period that ended May 31, 2017.
AB	• Draft range plan was released in July 2016 for the AB5 range and A La Peche range (southern mountain population). • Commitment was made to complete a draft provincial range plan by December 2017.
SK	• SK's Conservation Strategy for Boreal Woodland Caribou was released in 2014. • SK has divided the SK2 range into 3 units for range planning: Central unit is expected to be completed by October 2017, Eastern unit by December 2018, Western unit by February 2019. • Range planning for the SK1 range has not yet begun, as critical habitat has not been identified.
MB	• MB's Recovery Strategy for Boreal Woodland Caribou was updated and released in 2015. • An engagement strategy is being developed to engage Indigenous communities and the general public during range plan development. • A framework for range planning has been developed. • Five of nine range plans are scheduled for completion by 2018 with the remaining four by 2020.
ON	• In December 2014, ON released its Range Management Policy (RMP). • The RMP provides guidance for the Range Management Approach identified in ON's Caribou Conservation Plan. • The RMP works within the Ministry of Natural Resources and Forestry's mandated legislative frameworks, and provides direction on the integration of range condition into activity review and assessment when planning and authorizing activities within caribou ranges. • RMP implementation constitutes range planning for the province. • This policy does not apply to ON6. A separate management approach is being developed for this range and the area of discontinuous distribution.
QC	• The QC Recovery Team has published the provincial recovery plan for boreal caribou (2013) and guidelines for caribou habitat management (2013). QC has conducted a detailed, landscape-level analysis of solutions for their implementation (2015). • In April 2016, QC announced its Woodland Caribou Habitat Stewardship Plan. This Action Plan is divided in 2 phases, focused on short-term and long-term actions: phase 1 includes the delineation of a new northern boundary for timber allocations, based on the recommendations of a scientific committee (completed), and phase 2 will include the development of a long-term strategy for habitat management. Expected to be completed by spring 2018.
NL	• As boreal caribou harvest is the key issue in NL, the province is addressing harvest as a priority and working collaboratively with key partners. • NL has focused efforts to identify critical habitat under provincial legislation within each of the provincial ranges, which will support land use planning and other planning activities (possibly range planning) in the future.

Broad Strategy to Recovery	Undertake landscape level planning that considers current and future boreal caribou habitat requirements
	• NL has undertaken coordinated forestry planning with the Innu Nation in NL2. The forestry operating plan includes an ecological protected area network to protect ecological structures and features as well as to provide connectivity at the stand and watershed level.
NT	• Boreal caribou was listed as threatened under the *Species at Risk (NWT) Act* in 2014. • NT's Recovery Strategy for boreal caribou was published in 2017. • A framework for range planning is expected for fall 2017; range plan development will follow for six administrative regions within the NT1 range. • NT met with communities in the Dehcho and South Slave regions to collect local knowledge on important areas for boreal caribou. • NT provided data, input and review of a study of transboundary ranges spanning NT, AB, and BC commissioned by Tolko Industries Ltd.
YT	• YT may work with NT on range planning efforts for the NT1 transboundary range. • The Regional Land Use Plan for the Peel River Watershed, which encompasses the entire boreal caribou distribution in YT, is currently before the courts. Once finalized that land-use plan will identify various land-use designations within boreal caribou range.
ECCC, PCA, NRCan	• In 2016, ECCC published guidance to assist provinces and territories with their efforts to develop range plans. • ECCC posted a proposed Action Plan for federal measures on July 27, 2017. • PCA posted the Multi-species Action Plan for Pukaskwa National Park of Canada and a Management Plan for Saoyú-ʔehdacho National Historic Site. • Federal-provincial-territorial committees were established: National Boreal Caribou Technical Committee and Federal-Provincial-Territorial Coordinating Committee. • ECCC is conducting research to enhance understanding of the relationship between disturbance and population response. • Natural Resources Canada (NRCan) initiated a collaborative research project on the multi-species approach, including evaluating caribou as an umbrella species. • NRCan is working with partners to test best forest reclamation approaches for caribou habitat.

Table 3. Summary of the broad strategies undertaken from 2012 to 2017 by each province, territory and federal department/agency: Habitat Management

Broad strategy to recovery	Manage habitat to meet current and future habitat requirements of boreal caribou
BC	• BC developed a habitat restoration toolkit and a monitoring framework. • Research on restoration was carried out and applied in a range scale restoration strategy for BC4 range. • Disturbance mapping for BC4 range was updated.

Broad strategy to recovery	Manage habitat to meet current and future habitat requirements of boreal caribou
AB	• Mapping of human disturbance within all provincial caribou ranges was completed. • Interim restriction on sale of subsurface mineral rights in caribou ranges was implemented in 2016. • AB developed standard conditions for oil and gas approvals in caribou ranges. • A referral system from Alberta Energy Regulator to Alberta Environment and Parks for review of non-standard industrial applications in caribou range was established. • A deferral was placed on most forest harvesting outside of existing footprint in AB5 until range planning is completed. • AB developed habitat restoration guidelines. • Restoration pilots were initiated for deactivation or restoration of seismic lines in AB5, AB9 and AB10 caribou ranges. • AB is considering options for establishment of conservation areas in select caribou ranges. • AB is documenting the occurrence of caribou biophysical habitat within all caribou ranges.
SK	• Mapping of habitat disturbance and burn severity was completed to gain a better understanding of habitat availability. • SK completed a review of how provincial statutes protect critical habitat.
MB	• A new land cover classification is being completed to provide updated land cover information for identifying caribou habitat within management units/range. • Mapping of habitat disturbance as a part of range plan development was started. • Land Use Plans were developed by Indigenous communities and include areas that prohibit industrial development.
ON	• Mapping of habitat disturbance and disturbance tracking on a range basis with the Caribou Screening Tool. New disturbances are entered as they occur. • The General Habitat Description for caribou was developed in 2013 and informs the categorization of caribou habitat within the context of the range, based on its sensitivity to alteration and how that may affect caribou. • First Nations and ON are working together to identify dedicated protected areas in the far north where no industrial activity can occur. These areas include valuable caribou habitat. Currently, five plans have been approved and eight more are under development. • ON is exploring approaches to integrate requirements under the provincial *Endangered Species Act* and *Crown Forest Sustainability Act* that will protect caribou and their habitat during forestry-related activities. • The Forest Management Guide for Boreal Landscape (2014) directs forest management to manage the quality, quantity, arrangement of habitat within caribou ranges.
QC	• QC implemented the first phase of a test project for road decommissioning and changes to the operational approach to timber harvesting. • QC is working to establish two large scale protected areas within the boreal caribou continuous distribution range, including the Broadback river valley protected area announced in July 2015.

Broad strategy to recovery	Manage habitat to meet current and future habitat requirements of boreal caribou
NL	• A five part analysis was completed to inform the delineation of Boreal Caribou critical habitat. The analysis: provided new subpopulation structure and ranges and an ecological land classification for caribou; identified seasonal habitat use/selection; identified areas used during the sensitive periods of winter and calving/post-calving; and, identified core areas for each subpopulation. • The creation of a new National Park Reserve by PCA within NL3 is in progress. 10,700 km^2 of lands within NL3 (~31%) was transferred from the provincial to federal government.
NT	• Land Use Plans for land claim agreements and community conservation plans include areas that prohibit most types of industrial development. Two new Land Use Plans were approved since 2012. • A new 5-year work plan for conservation network planning was developed. • Mapping of habitat disturbance and assessment of regeneration rates for seismic lines was done.
YT	• A new model for northern YT using aerial imagery to identify anthropogenic disturbances at a fine resolution was developed. This model may be applied to boreal caribou range to quantify anthropogenic disturbances and their recovery.
ECCC, PCA, NRCAN	• The creation of a new National Park Reserve by PCA within NL3 is in progress. 10,700 km^2 of lands within NL3 (~31%) was transferred from the provincial to federal government. • PCA provided legal protection to boreal caribou critical habitat in Prince Albert National Park of Canada, Wood Buffalo National Park of Canada, and Nahanni National Park Reserve of Canada. • PCA has also been involved in monitoring human disturbance patterns, monitoring wildfires and prescribed burns within caribou habitat and outreach activities for visitors to Parks Canada protected heritage places. • NRCan's data was included in ECCC's caribou habitat and population database to help prioritize management actions.

Table 4. Summary of the broad strategies undertaken from 2012 to 2017 by each province, territory and federal department/agency: Mortality and Population Management

Broad strategy to recovery	Manage predators and alternate prey	Manage direct human-caused mortality of boreal caribou
BC	• BC is carrying out monitoring and research efforts on wolves (*Canis lupus*) and primary prey (moose [*Alces alces*]). • A small-scale pilot project on First Nations wolf control in BC5 was undertaken. • Research on the role of primary prey in caribou survival is occurring.	

Broad strategy to recovery	Manage predators and alternate prey	Manage direct human-caused mortality of boreal caribou
AB	• Government is delivering annual wolf population reductions in AB5, AB9, and AB10 caribou ranges. • Management of alternate prey in AB5 is occurring through increased hunting allocations to address prey population increases associated with wolf management. • Feasibility study of a caribou rearing facility is underway for AB5 range.	
SK	• Monitoring of predators (wolves, bears) is underway in SK1 as part of the University of Saskatchewan's 5-year research program in the Boreal Shield.	
MB	• A limited number of wolf surveys are done to better understand wolf densities. • Wolf monitoring has been conducted (collaring) in a few boreal caribou management units.	
ON	• Wildlife management programs include: the Cervid Ecological Framework, new hunting seasons for White-tailed Deer (*Odocoileus virginianus*), and a review of the feasibility of boreal caribou translocations in partnership with PCA. • Assessment of the need for management action to address caribou declines in ON6 is underway given recent arrival of wolves on Michipicoten and Slate Islands.	
QC	• Local predator control, through increased trapping pressure, has been implemented in QC1 and QC2. • Maternity penning was implemented for two years (2014-2015) in QC1.	• QC implemented awareness activities to counteract poaching/disturbance events. • QC increased monitoring and surveillance by enforcement officers, and participates in a federal-provincial (QC and NL) technical working group on Indigenous harvesting.
NL	• A study was implemented from 2010 to 2013 to improve the knowledge of the ecology and life history of wolves in NL. The study had a small sample size and further research and monitoring is required. A second project has been initiated; no results are available yet.	• NL participates in a federal-provincial (QC and NL) technical working group on Indigenous harvesting. • In 2016, NL and ECCC held an information sharing session with Indigenous communities to illustrate the status of the NL ranges, and the impacts of harvest on the caribou. • Enforcement patrols and monitoring of harvest are ongoing. • Stewardship activities were implemented. • In 2013, long-term hunting closures were extended to all caribou in Labrador.

Broad strategy to recovery	Manage predators and alternate prey	Manage direct human-caused mortality of boreal caribou
NT	• Wolf surveys were carried out to assess the relationship between wolf density, caribou population trend, and habitat disturbance in ranges in AB, BC and southern NT.	• NT is reviewing the "woodland caribou" Wildlife Management Zones and proposing to divide into distinct boreal woodland caribou and mountain woodland caribou management zones for more accurate reporting of resident harvest.
ECCC, PCA, NRCAN		• ECCC participates in a federal-provincial (QC and NL) technical working group on Indigenous harvesting.

Table 5. Summary of the broad strategies undertaken from 2012 to 2017 in each province, territory and federal department/agency: Population Monitoring

Broad strategy to recovery	Conduct population studies to better understand population structure, trends, and distribution	Monitor boreal caribou health and condition	Monitor and manage sensory disturbance of boreal caribou
BC	• Population studies have been conducted in all ranges annually since 2012/2013. • Studies were conducted through GPS collars on adult females, calf recruitment surveys and investigation of all mortality events.	• Gathered information to evaluate for bacterial, viral, and parasitic diseases, as well as other aspects including nutrition, body condition, chronic stress levels, and indicators for immune status.	
AB	• Annual population growth rate was estimated for all caribou populations through tracking adult female and female calf survival. • Analysis was completed to document caribou movement patterns and home range occurrence for monitored female caribou in all ranges. • Fecal DNA based capture-mark-recapture population estimates have been initiated in five ranges (AB5, AB6, AB7, AB9 and AB10).		• Limitations on some industrial activities are applied during caribou calving periods.

Broad strategy to recovery	Conduct population studies to better understand population structure, trends, and distribution	Monitor boreal caribou health and condition	Monitor and manage sensory disturbance of boreal caribou
SK	• Population studies have been conducted in both SK boreal caribou ranges. • In SK1, studies were conducted through GPS collars on adult females. Interim results from this are available. • Indigenous Knowledge was used for assessment of population size, trend and distribution in all ranges. • Population size estimates were conducted through Capture-Mark-Recapture using fecal pellets in SK2 Central Unit. • Landscape level population structure was analyzed through genetic analysis in all ranges.		
MB	• Population studies have been conducted in most delineated ranges. • Studies were conducted through GPS collars on adult females and calf recruitment surveys. • Genetic studies that looked at population structure between individual boreal caribou populations and other provincial subspecies were carried out.		• MB reviews all development proposals requiring industry to mitigate potential impacts through avoidance of areas or sensitive periods.

Broad strategy to recovery	Conduct population studies to better understand population structure, trends, and distribution	Monitor boreal caribou health and condition	Monitor and manage sensory disturbance of boreal caribou
ON	• Integrated range assessment surveys were conducted between 2010 and 2013 to calculate population size, recruitment rates, survival, population trend and probability of occupancy. • Reports were released in 2014, providing a snapshot assessment of range condition, i.e., the ability of the range to sustain caribou populations. • This information informed the provincial re-delineation of ON9 into six separate ranges.		• Policy Guidance on Harm and Harassment under the *Endangered Species Act* helps to inform decisions about activities and the manner in which activities should be conducted to avoid or minimize impacts on individual caribou, their health and behaviour.
QC	• Population studies have been conducted in some ranges (including with GPS collars) and have been mainly led by non-government organizations. • Government of QC is currently developing a monitoring strategy/protocol.		
NL	• Population studies have been conducted in all ranges as resources permit, including: GPS collars or satellite transmitters, calf recruitment surveys and annual population changes.	• Samples collected from collared boreal caribou to monitor health, condition, and parasites.	• NL works with Canadian Force Base Goose Bay to put in place mitigation measures to adjust flights and exercise activities based on caribou collaring data. • Nalcor has monitoring and mitigation plans in place for Muskrat Falls Project in NL2 and the Labrador-Island Transmission Link which runs from Muskrat Falls through sections of NL2 and NL3.

Broad strategy to recovery	Conduct population studies to better understand population structure, trends, and distribution	Monitor boreal caribou health and condition	Monitor and manage sensory disturbance of boreal caribou
NT	• Population studies have been conducted within parts of the NT1 range annually since 2004. • Three new study areas were initiated since 2015. • GPS radio-collars on adult female caribou combined with visual surveys provide monitoring data on adult female survival, and calf recruitment. • NT commissioned a literature review and recommendations report to provide advice on how to obtain range-wide estimates of boreal caribou population trend for NT1. • NT provided support for a review of Traditional Knowledge-based wildlife monitoring methods that could be applied to boreal caribou.	• Samples collected from collared boreal caribou to monitor diseases and parasites.	
ECCC, PCA, NRCAN	• PCA has conducted population monitoring in collaboration with provincial governments to better understand population structure, size, and trend, as well as the use of PCA lands by boreal caribou.		• NRCan and partners investigated the effects of disturbance and stand age on caribou forage.

4.2.2 Wildlife Management Boards, Indigenous Governments, Organizations and Communities

During the development of the Recovery Strategy, Indigenous peoples consistently indicated that the conservation of boreal caribou is essential, as this species is integral to the culture, identity and survival of their communities. In addition, knowledge was shared by Indigenous Knowledge holders on boreal caribou life history, habitat use, population status, threats facing the species and conservation measures. This information was used in the development of the Recovery Strategy. Achieving the recovery goal for boreal caribou would allow for local population levels sufficient to sustain traditional Indigenous harvesting activities consistent with existing Aboriginal and treaty rights. Indigenous peoples have, and will continue to play an integral role in boreal caribou conservation.

The responsibility for management of lands, natural resources and wildlife within boreal caribou ranges can include Wildlife Management Boards and Indigenous governments. For example, in the Northwest Territories, the Tłı̨chǫ Government manages land and resources (including wildlife) within Tłı̨chǫ Lands, as described in the Tłı̨chǫ Agreement (a combined comprehensive land claim and self-government agreement). Wildlife Management Boards are established under land claims agreements and provide direction on the sustainable use of wildlife resources within their jurisdiction(s). There are several Wildlife Management Boards established within the distribution of boreal caribou. Indigenous governments, Wildlife Management Boards, and individual communities and organizations have played an important role in the implementation of the Recovery Strategy.

In Labrador, the establishment of the Akami-Uapishqu^{u}-KakKasuak-Mealy Mountains National Park Reserve of Canada (AUKMMNPR) is in the final stages. This National Park Reserve will follow a cooperative management framework. PCA will implement the Canada *National Parks Act* for AUKMMNPR in cooperation with Newfoundland and Labrador, Innu Nation, Nunatsiavut Government and NunatuKavut Community Council.

One mechanism by which funding is provided to Indigenous peoples to participate in the conservation and recovery of species at risk is the federal government's Aboriginal Fund for Species at Risk (AFSAR). Since 2012, a total of 48 projects for which boreal caribou was a target species have been funded by AFSAR, with ECCC funding contributions valued at a total of $4,177,530. Of these projects, 28 targeted only caribou and 20 were multispecies projects. These projects included outreach, Indigenous Knowledge gathering, habitat restoration, habitat protection, population management, and monitoring.

Examples of a few projects undertaken by Indigenous peoples over the last five years can be found in Appendix C.

4.2.3 Stakeholders

Stakeholders, such as environmental non-governmental organizations and industry, have also participated in or implemented innovative and collaborative projects and

research efforts for boreal caribou. Many environmental non-governmental organizations have played a role in conservation efforts through collaborations with industry and governments, and providing outreach to Canadians on boreal caribou recovery. For example, the Canadian Parks and Wilderness Society released annual reviews of progress made by governments in implementing the Recovery Strategy and meeting its objectives.

Industry associations and member companies that operate within boreal caribou ranges have also participated in or implemented innovative and collaborative projects and research efforts across the country. For example, the Canadian Association of Petroleum Producers (CAPP), the Forestry Products Association of Canada (FPAC), and the Mining Association of Canada (MAC) have provided overviews of their work over the last five years to provide insight into some of the projects that are occurring in the boreal forest, especially related to habitat restoration and investments in research (see Appendix D).

One mechanism by which funding is provided for stewardship activities is the federal government's Habitat Stewardship Program (HSP), which funds a wide range of recipients, including stakeholders, to conserve species at risk. Since 2012, a total of 19 projects for which boreal caribou was a target species have been funded by HSP, with ECCC funding contributions valued at a total of $1,083,394. Of these projects, 15 targeted only caribou and four were multispecies projects. These projects have included outreach, Indigenous Knowledge gathering, habitat restoration, habitat protection, and monitoring. Summaries of a few HSP projects that have been funded for boreal caribou over the last five years are highlighted in Appendix D as examples of the important projects taking place on the landscape.

4.3 **Performance Indicators**

The performance indicators for boreal caribou as outlined in section 8 of the Recovery Strategy are reproduced below, with an assessment of status for each measure.

General

a) Complete range plans for each range within 3-5 years of the posting of this recovery strategy.

In light of provincial and territorial responsibilities for land and natural resource management, the Recovery Strategy called for range plans to be completed by provinces and territories by October 2017. Range plans may be stand-alone documents, or part of other planning documents including provincial and territorial action plans or other similar documents. The main purpose of a range plan is to 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. ECCC published guidance to assist provinces and territories with their efforts to develop range plans (ECCC 2016), and continues to work with provinces and territories in their efforts.

None of the provinces or territories fully met the October 5, 2017 deadline for range planning. However, most provincial and territorial governments have made some progress on the development of range plans or other similar documents and have made commitments to timelines for completing outstanding range plans (see Table 2 above).

Population Condition (population size and trend)

Information on distribution and population condition for boreal caribou is based on the best available information including, but not restricted to, genetics, observational and telemetry data, and Indigenous Knowledge provided by provincial and territorial jurisdictions for the purposes of this report. In some cases, local population size estimates and trend data are based primarily on professional judgment and limited data, and not on rigorously collected field data.

Boreal caribou population monitoring is conducted primarily by the provinces and territories. Caribou monitoring approaches and the level of monitoring varies across ranges. The certainty in estimates of population size and trend vary depending on the monitoring technique used and the number of years the population has been monitored. Population monitoring techniques have different strengths and limitations that influence the robustness and accuracy. Precise enumeration of the size of a boreal caribou local population is a challenge due to the large areas that boreal caribou occupy (often over thousands of square kilometres), the low densities at which they occur (making survey from aircraft challenging), and their relatively solitary habits (Environment Canada, 2008; Callaghan et al., 2010).

On behalf of the National Boreal Caribou Technical Committee (NBCTC), ECCC commissioned a study (March 2017) to assess monitoring approaches and to inform the development of standardized monitoring protocols. The role for the federal government in population monitoring will be to continue to develop standardized monitoring protocols in collaboration with the provinces and territories and other partners and stakeholders through the Knowledge Consortium.

In the 2011 Scientific Assessment, the population size estimate was used to evaluate when populations might be vulnerable to extinction from stochastic events due to small size. A minimum of 100 animals was selected to mitigate the risks of quasi-extinction. Due to the current lack of standardization for estimating population size, for reporting on population size, this Progress Report will indicate whether a given local population is estimated to have ≥100 animals, or <100 animals, based on the best available information provided by the provinces and territories.

a) Maintain current distribution of boreal caribou across Canada.

Since the 2012 Recovery Strategy, boreal caribou continue to occur in all 51 local population ranges across Canada. However, there are several small local populations, some of which are isolated, that continue to be at greater risk of extirpation or of not achieving or maintaining self-sustaining status.

b) Achieve and/or maintain a stable to increasing population trend as measured over five years (i.e. λ ≥ stable) or other empirical data that indicates population trend is stable or increasing.

Based on the best available population trend data submitted by provinces and territories, none of the 30 local populations of boreal caribou, for which data were provided, have an increasing population trend, 10 are considered stable, and 20 local populations have a decreasing population trend (see Appendix A for information by local population). There is no trend data available for the remaining 21 local populations. No or limited population trend data were received from Northwest Territories, Saskatchewan, Manitoba and Newfoundland and Labrador for this report.

Of the 10 local populations that are considered stable, two shifted from declining to stable between 2012 and 2017 (Snake-Sahtahneh (BC3), and Little Smoky (AB5[2])), two remained stable (Yates (AB3), and Manouane (QC4)), five went from not available to stable (Maxhamish (BC1), Calendar (BC2), Richardson (AB8), Boreal Shield (SK1), and Pagwachuan (ON7)), and one went from increasing to stable (Manicouagan (QC5)). Of the 20 local populations that are in decline, the population trend continued to decline in nine ranges (seven in AB, one in ON and one in QC), shifted from stable to declining in four ranges (two in ON and two in QC), and shifted from unknown to declining in seven ranges (two in BC and five in ON).

c) Achieve a minimum of 100 animals for boreal caribou ranges with population estimates of less than 100 animals, or show progress towards this goal every five years.

In the 2012 Recovery Strategy, there were 13 local populations that had fewer than 100 animals, 30 that had greater than or equal to 100 animals, and 8 that did not have an estimate available. Of the 13 with fewer than 100 animals, nine local populations have remained at population levels below 100 animals (two in BC, two in AB, three in MB, and two in QC) and four are now estimated to have 100 or more animals (one in AB, two in MB and one in NL). Of these four, three local populations changed because of increased survey effort or changes in survey methodology and therefore do not necessarily indicate an improvement in overall status. The fourth local population (AB5) increased to ≥ 100 animals in response to delivery of an annual wolf population reduction program.

In 2017, there are10 local populations that have fewer than 100 animals, 34 that have greater than or equal to 100 animals, and 7 that do not have an estimate available. The 10 local populations with less than 100 animals includes the nine local populations that have remained below 100 animals since the 2012 Recovery Strategy and one local population (Sydney (ON1)) that changed from not available in 2012 to less than 100 animals in 2017 (see Appendix A for information by local population).

[2] AB5 is stable in response to delivery of an annual wolf population reduction program.

Habitat Condition (amount and type of undisturbed habitat):
In the 2012 Recovery Strategy, ECCC mapped total disturbance levels on boreal caribou ranges across their distribution in Canada. The total disturbance footprint was measured as the combined effects of fire that has occurred in the past 40 years and buffered (500 m) human-caused disturbance defined as any human-caused disturbance to the landscape that could be visually identified from Landsat imagery at a scale of 1:50,000.

In the 2012 Recovery Strategy, the habitat condition data was from 2010, as presented in ECCC's *Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou* (Rangifer tarandus caribou), *Boreal Population, in Canada* (Environment Canada 2011; hereafter referred to as the "2011 Scientific Assessment"). This Progress Report reports on habitat condition using Landsat imagery from 2015 in order to show the change over a five-year period. Mapping of anthropogenic features for 2015 followed the same standardized methods as used in the Recovery Strategy which used 2010 Landsat imagery at a 30m resolution (ECCC 2011; Pasher et al., 2013). Data for mapping of fire disturbances for 2015 were derived from the provincial and territorial jurisdictions through the Canadian National Fire Database (maintained by NRCan). This is the same data source that was used for the 2010 disturbance mapping. Use of the same methodology and resolution for both anthropogenic and fire mapping for 2010 and 2015 imagery allows a more robust comparison of change during the five year period.

The 2012 Recovery Strategy set a 65% undisturbed habitat threshold as one component of critical habitat for the species, which provides a 60% probability that a local population will be self-sustaining. This 65% threshold was a policy decision, based on a model developed by ECCC that considered both human and natural disturbance.

a) For ranges with 65% or more undisturbed habitat, maintain the undisturbed habitat that includes the biophysical attributes needed for boreal caribou to carry out life processes at a minimum of 65% of the total range.

In 2012, 21 of the 51 ranges had 65% or greater undisturbed habitat and the remaining 30 ranges had less than 65% undisturbed habitat. In 2017, 19 of the 51 ranges have 65% or greater undisturbed habitat and the remaining 32 have less than 65% undisturbed habitat (see Appendix A for disturbance calculations by local population). The two ranges that changed from greater than 65% to less than 65% undisturbed habitat are the William Lake range (MB6) and the Manicouagan range (QC5).

b) For ranges with less than 65% undisturbed habitat, identify in a range and/or action plan specific areas of existing undisturbed habitat, as well as those areas where future habitat is to be restored to an undisturbed condition over reasonable, gradual increments every five years.

Range and/or action plans or other similar documents developed by provinces and territories to-date have not met the performance indicator to spatially identify specific

areas of existing undisturbed habitat, as well as those areas where future habitat is to be restored to an undisturbed condition over reasonable, gradual increments every five years.

c) Provide measurements of disturbance for each range that reflect the best available information, as provided by the provinces and territories, to update the recovery strategy accordingly every five years.

Habitat disturbance levels have increased slightly since the 2012 Recovery Strategy. Based on an analysis of changes to disturbance levels between 2010 and 2015 (see Appendix A), net total habitat disturbance (anthropogenic and fire) increased in 34 caribou ranges, decreased in 9 ranges, and saw no change in 8 ranges. When looking only at anthropogenic disturbance between the same time periods, anthropogenic disturbance increased in 29 ranges, decreased in 9 ranges and remained stable in 13 ranges.

With respect to the 30 ranges that in 2012 were below the 65% undisturbed habitat threshold, 22 of these ranges increased in total disturbance between 2012 and 2017. When looking only at anthropogenic disturbance, 19 of the 30 ranges increased in anthropogenic disturbance between 2012 and 2017.

5. Concluding Statement

Boreal caribou is an iconic Canadian species which holds special significance for Indigenous peoples and other Canadians. In the last five years, efforts have been undertaken by the federal government, provinces and territories, Indigenous peoples, industry, environmental non-government organizations, and other partners and stakeholders for boreal caribou conservation. As a result of these efforts, some progress has been made to implement the Recovery Strategy for the species. Notwithstanding this, boreal caribou local populations continue to decline and disturbance of their habitat continues to increase.

It is encouraging to see that recovery measures have been undertaken by various players to: conduct research to address knowledge gaps, monitor populations and habitat condition, undertake habitat restoration, address threats to the species and its habitat, bring together different sources of knowledge, and undertake outreach and education. However, no province or territory has fully met the October 5 deadline for range plans, a key performance indicator for achieving the recovery strategy population and distribution objectives. Some progress has been made in this regard but more needs to be done. The federal government announced its proposed Action Plan (2017) showing federal leadership with significant suggested actions such as the establishment of a Knowledge Consortium. The Knowledge Consortium represents an important step forward in integrating collective efforts across Indigenous communities and organizations, other federal departments, provincial and territorial governments, academics, industry and non-government organizations to recover the species and make better use of resources in order to achieve real outcomes for the species. This

work will ensure that actions are based on the best available science and that it is adapted continually as knowledge is gained.

Various factors contribute to the continued decline of boreal caribou local populations and increased disturbance of their habitat. These factors warrant further investigation to better understand how the decline of the species in Canada can be reversed. While it is recognized that some local populations that are currently not self-sustaining will require a number of decades to return to a recovered state, it is clear that timely, sustained, and coordinated action is required to meet the recovery goal for boreal caribou.

The federal government continues to recognize the principal role of the provinces and territories in the recovery of boreal caribou and is committed to effectively upholding legal obligations and ensuring compliance with federal laws. The federal government will continue to work actively with provinces and territories to support range planning and other recovery measures. Creative, innovative multi-stakeholder solutions are essential to achieve success in the recovery of this iconic species.

6. Glossary

Disturbed habitat: habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer).

Local population: a group of boreal caribou occupying a defined area distinguished spatially from areas occupied by other groups of boreal caribou. Local population dynamics are driven primarily by local factors affecting birth and death rates, rather than immigration or emigration among groups.

In this Progress Report, “local population” refers to a group of boreal caribou occupying any of the three types of boreal caribou ranges (i.e. conservation unit, improved conservation unit, local population unit). See also range.

Not self-sustaining local population: in the population and distribution objectives “not self-sustaining local population” includes both the local populations assessed as “as likely as not self-sustaining” and those assessed as “not self-sustaining”.

Quasi-extinction: a population with less than 10 reproductively active females.

Range: the geographic area occupied by a group of individuals that are subject to similar factors affecting their demography and used to satisfy their life history processes (e.g. calving, rutting, wintering) over a defined time frame. Environment Canada (2011) identified three types of boreal caribou ranges categorized based on the degree of certainty in the delineated range boundaries (i.e. conservation unit, improved conservation unit, local population unit).

Range plan: a document that demonstrates how the habitat condition within a given range will be managed over time and space to ensure that critical habitat for boreal caribou is protected from destruction and therein, that each local population will either continue to be self-sustaining or become self-sustaining over time.

Self-sustaining local population: a local population of boreal caribou 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.

Undisturbed habitat: habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat.

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Appendix A: Boreal Caribou Population and Habitat Condition Information

Table A1. Boreal caribou population and habitat condition information in 2012 and 2017 based on range boundaries in the 2012 Recovery Strategy. The 2012 habitat disturbance data is based on Landsat imagery from 2010 and the 2017 habitat disturbance data is based on Landsat imagery from 2015, both at 30m resolution (ECCC 2011; Pasher et al. 2013).

Range ID	Range Name	2012 Recovery Strategy					2017 Progress Report				
		Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)			Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)		
				Fire[2]	Anthropogenic[3]	Total[4]			Fire[2]	Anthropogenic[3]	Total[4]
Northwest Territories											
NT1	Northwest Territories	≥ 100	not available	24	8	31	≥ 100[5]	not available[6]	28	9	35
British Columbia											
BC1	Maxhamish	≥ 100	not available	0.5	57	58	≥ 100	stable[7]	2	67	68
BC2	Calendar	≥ 100	not available	8	58	61	≥ 100	stable[7]	16	53	61
BC3	Snake-Sahtahneh	≥ 100	declining	6	86	87	≥ 100	stable[7]	5	77	79
BC4	Parker	< 100	not available	1	57	58	< 100	declining[7]	3	57	57
BC5	Prophet	< 100	not available	1	77	77	< 100	declining[7]	10	78	78
Alberta											
AB1	Chinchaga (including BC portion)	≥ 100	declining	8	74	76	≥ 100	declining	9	79	80
AB2	Bistcho	≥ 100	declining	20	61	71	≥ 100	declining	40	58	75
AB3	Yates	≥ 100	stable	43	21	61	≥ 100	stable	42	20	55
AB4	Caribou Mountains	≥ 100	declining	44	23	57	≥ 100	declining	46	27	62
AB5	Little Smoky	< 100	declining	0.2	95	95	≥ 100	stable[8]	0.4	96	96
AB6	Red Earth	≥ 100	declining	30	44	62	≥ 100	declining	40	48	72

Range ID	Range Name	2012 Recovery Strategy					2017 Progress Report				
		Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)			Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)		
				Fire[2]	Anthropogenic[3]	Total[4]			Fire[2]	Anthropogenic[3]	Total[4]
AB7	West Side Athabasca River	≥ 100	declining	4	68	69	≥ 100	declining	5	70	72
AB8	Richardson	≥ 100	not available	67	22	82	≥ 100	stable	74	23	88
AB9	East Side Athabasca River	≥ 100	declining	26	77	81	≥ 100	declining	28	78	84
AB10	Cold Lake	≥ 100	declining	32	72	85	≥ 100	declining	33	76	87
AB11	Nipisi	< 100	not available	6	66	68	< 100	not available[9]	9	75	77
AB12	Slave Lake	< 100	not available	37	63	80	< 100	not available[9]	39	74	87
Saskatchewan											
SK1	Boreal Shield	≥ 100	not available	55	3	57	≥ 100[10]	stable	58	3	60
SK2	Boreal Plain	≥ 100	not available	26	20	42	≥ 100	not available[11]	30	20	45
Manitoba											
MB1	The Bog	< 100	stable	4	12	16	≥ 100[12]	not available[13]	6	14	19
MB2	Kississing	< 100	stable	39	13	51	≥ 100[12]	not available[13]	39	15	54
MB3	Naosap	≥ 100	stable	28	26	50	not available[14]	not available[14]	28	28	52
MB4	Reed	≥ 100	stable	7	20	26	not available[14]	not available[14]	7	20	26
MB5	North Interlake	< 100	stable	4	14	17	< 100	not available[13]	4	14	18
MB6	William Lake	< 100	stable	24	14[15]	34[15]	< 100	not available[13]	25	17	36
MB7	Wabowden	≥ 100	stable	10	19	28	≥ 100	not available[13]	10	20	28
MB8	Wapisu	≥ 100	stable	10	14	24	not available[14]	not available[14]	11	13	24
MB9	Manitoba North	not available	not available	23	10[16]	32[16]	not available[14]	not available[14]	23	11	33

Range ID	Range Name	2012 Recovery Strategy					2017 Progress Report				
		Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)			Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)		
				Fire[2]	Anthropogenic[3]	Total[4]			Fire[2]	Anthropogenic[3]	Total[4]
MB10	Manitoba South	not available	not available	4	11[16]	15[16]	not available[14]	not available[14]	4	12	16
MB11	Manitoba East	not available	not available	26	3	29	not available[14]	not available[14]	26	3	29
MB12	Atikaki-Berens	≥ 100	stable	31	6	35	not available[14]	not available[14]	29	6	34
MB13	Owl-Flinstone	< 100	stable	25	18	39	< 100	not available[13]	25	18	39
Ontario											
ON1	Sydney	not available	stable	28	33	58	< 100	declining	27	25	49
ON2	Berens	not available	not available	34	7	39	≥ 100	declining	31	6	37
ON3	Churchill	not available	not available	6	28	31	≥ 100	declining	8	28	34
ON4	Brightsand	not available	not available	18	28	42	≥ 100	declining	19	26	41
ON5	Nipigon	≥ 100	stable	7	25	31	≥ 100	declining	7	25	30
ON6	Coastal	≥ 100	not available	0	16	16	≥ 100	declining	0	15	15
ON7	Pagwachuan	not available	not available	0.9	26	27	≥ 100	stable	0.7	27	27
ON8	Kesagami	≥ 100	declining	3	36	38	≥ 100	declining	3	37	40
ON9	Far North	≥ 100	not available	14	1	15	≥ 100[17]	declining[17]	15	1	16
Quebec											
QC1	Val d'Or	< 100	declining	0.1	60	60	< 100	declining	0.2	65	65
QC2	Charlevoix	< 100	stable	4	77	80	< 100	declining	4	80	82
QC3	Pipmuacan	≥ 100	stable	11	51	59	≥ 100	declining	11	60	68
QC4	Manouane	≥ 100	stable	18	23	39	≥ 100	stable	18	26	41
QC5	Manicouagan	≥ 100	increasing	3	32	33	≥ 100[18]	stable[18]	3	36	37
QC6	Quebec	≥ 100	stable	20	12	30	≥ 100[18]	not available[19]	20	13	32

Range ID	Range Name	2012 Recovery Strategy					2017 Progress Report				
		Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)			Population Estimate relative to 100[1] (≥ 100, or < 100)	Population Trend	Disturbed Habitat (%)		
				Fire[2]	Anthropogenic[3]	Total[4]			Fire[2]	Anthropogenic[3]	Total[4]
Newfoundland and Labrador[20]											
NL1	Lac Joseph	≥ 100	declining	7	1	8	≥ 100	not available[21]	12	2	14
NL2	Red Wine Mountain	< 100	declining	5	3	8	≥ 100[22]	not available[23]	7	3	9
NL3	Mealy Mountain	≥ 100	declining	0.4	1	2	≥ 100	not available[24]	1	1	2

[1] A minimum of 100 animals was used in the 2011 Scientific Assessment to evaluate when local populations might be vulnerable to extinction from stochastic events due to small size.

[2] Fire disturbance is any area where a fire has occurred in the past 40 years (without buffer).

[3] For anthropogenic disturbance, a 500 meter buffer is applied to all linear and polygonal disturbances.

[4] For total disturbance, both anthropogenic and fire disturbances that overlap are not counted twice in the total.

[5] The population size estimate for NT1 is 6000 to 7000 individuals.

[6] Sub-regional collar-based monitoring programs, and traditional and community knowledge, suggests that boreal caribou population trends differ in various part of NT1. Generally speaking, population trends seem to be increasing or stable in northern NT1, and stable or decreasing in southern NT1. More information is available in the Northwest Territories' Recovery Strategy published in 2017(http://www.nwtspeciesatrisk.ca/sites/default/files/nwt_boreal_caribou_recovery_strategy_2017_final_0.pdf).

[7] In 2013-2014 there was a bacterial pathogen outbreak which caused local population declines in BC. Parker and Prophet ranges have not recovered from the outbreak. The other local populations have been recovering, but the current trend information may not reflect equilibrium conditions for these populations.

[8] AB5 is stable in response to delivery of an annual wolf population reduction program.

[9] Population trend is not available for AB11 and AB12 due to low collared female sample size, resulting in unreliable estimates of annual adult female survival.

[10] The population size estimate for SK1 is >5000 individuals.

[11] Monitoring data is insufficient in SK2 to establish a population trend.

[12] The increase to ≥ 100 reflects an increased survey effort and does not necessarily indicate an improvement in overall status.

[13] Population trend data for Manitoba ranges is under review by the province of Manitoba and was not available to be included in this Progress Report.

[14] The province of Manitoba delineated new range boundaries in 2015 (https://www.gov.mb.ca/sd/wildlife/sar/pdf/caribou strategy_octfall2015.pdf). As a result, the 2017 population data for most new ranges cannot be compared with population data from the 2012 federal Recovery Strategy. Population data for 2017 is presented in Table A2 for all 15 new provincial range boundaries.

[15] The values reported for anthropogenic disturbance and total disturbance in the 2012 Recovery Strategy for MB6 were inaccurate and have been updated in this Progress Report. Polygonal features were accidentally excluded from the calculations during processing of anthropogenic disturbances for MB6, and this error has now been corrected.

[16] The values reported for anthropogenic disturbance and total disturbance in the 2012 Recovery Strategy for MB9 and MB10 were inaccurate and have been updated in this Progress Report. Reservoirs were normally excluded from the calculations for anthropogenic disturbance, however they were included for these two ranges in error, and this has now been corrected.

[17] ON9 was delineated into 6 new ranges by the province of Ontario in 2013 (https://www.ontario.ca/document/range-management-policy-support-woodland-caribou-conservation-and-recovery). Population data for 2017 is presented in Table A3 for these 6 new provincial range boundaries.

The most recent population condition data for these ranges is presented in Table A3.

[18] The province of Quebec is in the process of updating range and population condition metrics for QC5 and QC6. Preliminary data is available in Table A4 for areas defined by Fortin et al. (2017).

[19] It is not possible to estimate population trend for QC6 as a whole because of insufficient survey data across the range. Preliminary population trends are available in table A4 for areas defined by Fortin et al. (2017) that fall within the QC6 range.

[20] The province of Newfoundland and Labrador is in the process of updating population condition metrics as part of an updated provincial recovery plan. The future reporting of survey results will be dependent on ongoing exercises to delineate subpopulations in Labrador.

[21] A recent survey was conducted in the NL1 range, but the data could not be analyzed in time for this Progress Report.

[22] The understanding of population structure for NL2 has changed since the 2012 Recovery Strategy. The increase to ≥ 100 animals is due to a shift from minimum population counts (associated with collar deployment and other field activities) to systematic surveys in portions of the range.

[23] Preliminary data and expert opinion suggests that population trends in NL2 are generally increasing in the southern part of the range and declining in the northern part of the range.

[24] The understanding of population structure for NL3 has changed since the 2012 Recovery Strategy. A survey of NL3 is tentatively being planned during the next five years with Parks Canada Agency.

Table A2. Boreal caribou population condition information for 2017 based on provincial range boundaries as outlined in Manitoba's provincial recovery strategy published in 2015. The 2012 Recovery Strategy has not been amended to reflect these new range boundaries.

Range ID (2012 Recovery Strategy)	Range Name	2017 Progress Report	
		Population Estimate relative to 100 (≥ 100, or < 100)	Population Trend
Not applicable	Atiko	≥ 100	not available[1]
Not applicable	Berens	≥ 100	not available[1]
Not applicable	Bloodvein	< 100	not available[1]
Not applicable	Charron Lake	≥ 100	not available[1]
Not applicable	Harding	< 100	not available[1]
MB5	Interlake	< 100	not available[1]
MB2	Kississing	≥ 100	not available[1]
Not applicable	Naosap-Reed	≥ 100	not available[1]
Not applicable	Norway House	≥ 100	not available[1]
MB13	Owl-Flintstone	< 100	not available[1]
MB1	The Bog	≥ 100	not available[1]
MB7	Wabowden	≥ 100	not available[1]
Not applicable	Wapisu-Wimapedi	≥ 100	not available[1]
Not applicable	Wheadon	≥ 100	not available[1]
MB6	William Lake	< 100	not available[1]

[1] Population trend data for Manitoba ranges is under review by the province of Manitoba and was not available to be included in this report.

Table A3. Boreal caribou population condition information for 2017, based on provincial range boundaries for Ontario's Far North ranges, as outlined in Ontario's 2014 Range Management Policy. The 2012 Recovery Strategy has not been amended to reflect these new range boundaries.

Range ID (2012 Recovery Strategy)	Range Name	2017 Progress Report	
		Population Estimate relative to 100 (≥ 100, or < 100)	Population Trend
ON9	Swan	≥ 100	declining
ON9	Spirit	≥ 100	declining
ON9	Kinloch	≥ 100	declining
ON9	Ozhiski	≥ 100	not available[1]
ON9	Missisa	≥ 100	declining
ON9	James Bay	≥ 100	declining

[1] Population trend is not available for Ozhiski range due to low collared female sample size and lack of clear trend in recruitment data.

Table A4. Preliminary data for boreal caribou population condition information for 2017 based on study areas defined by Fortin et al. (2017) in the Manicouagan and Quebec ranges in the province of Quebec. The 2012 Recovery Strategy has not been amended to reflect these new range boundaries.

Range ID (2012 Recovery Strategy)	Range Name[1]	2017 Progress Report	
		Population Estimate relative to 100 (≥ 100, or < 100)	Population Trend
QC5	Manicouagan Est	≥ 100	stable
QC5	Manicouagan Ouest	≥ 100	stable
QC6	Nottaway	≥ 100	declining
QC6	Assinica	≥ 100	stable
QC6	Témiscamie	≥ 100	declining
QC6	Basse-Côte nord[2]	≥ 100	declining
QC6	Detour	≥ 100	not available[3]

[1] The range names represent study areas (Fortin et al., 2017) and additional areas monitored by the province. These should not be considered as new range boundaries delineated by the province of Quebec. The province of Quebec is currently implementing a population monitoring program that will help inform boreal caribou population structure in Quebec.

[2] The Basse-Côte nord range is located in eastern Quebec (south of Labrador). Range location is available in the survey report for this area (Heppell et al., 2013).

[3] The province of Quebec has done limited monitoring work in this area and is therefore unable to estimate the population trend for the Detour range, located in western Quebec. The Detour range is continuous with the Kesagami range (ON8), but additional monitoring work is required.

Appendix B: Federal, Provincial, and Territorial Government Overviews of Recovery Activities from 2012-2017

The federal government, as well as each provincial and territorial government with management responsibility for boreal caribou, has provided an overview of their efforts since October 2012 to protect and recover boreal caribou and implement the Recovery Strategy. The following sections were written by the respective federal, provincial and territorial jurisdictions, and are included in this Progress Report with their consent.

Government of Canada

Background Information

The 2012 federal Recovery Strategy provided a national framework for the recovery of boreal caribou across Canada and for continued collaboration among all responsible provinces and territories.

Landscape Level Planning

Range Planning

In 2016, Environment and Climate Change Canada (ECCC) published guidance to assist provinces and territories with their efforts to develop range plans (ECCC, 2016). On July 27, 2017, ECCC posted a proposed Action Plan for boreal caribou that presents the recovery measures the federal government is taking or plans to take to help achieve the recovery goal and population and distribution objectives, as identified in the Recovery Strategy.

Action Planning

The Parks Canada Agency (PCA) (2017) has posted the Multi-species Action Plan for Pukaskwa National Park of Canada, which addresses threats and recovery measures for boreal caribou within the National Park. The Management Plan for the Saoyú-ʔehdacho National Historic Site of Canada located within the Northwest Territories (NT1) range, approved in 2016, has as one of its objectives to improve understanding and protection of caribou and their habitat (PCA, 2016). In keeping with this, caribou conservation is a key priority in this cooperatively managed national historic site and the subject of ongoing consultation with the Saoyú-ʔehdacho Management Board.

ECCC posted the proposed Action Plan on the Species at Risk Public Registry on July 27, 2017 for a 60-day public comment period. The public comment period has ended and ECCC is considering the comments received and will proceed to finalize the Action Plan. The proposed Action Plan establishes a framework for action in areas where federal leadership can be most beneficial or is required under SARA. In particular, it describes the measures that are being, or will be taken, by the federal government to implement the Recovery Strategy, which have been summarized in three pillars: 1) science to support recovery; 2) recovery and protection; and 3) reporting on

progress. Under each pillar are measures that will help to achieve the population and distribution objectives for the species and address identified threats.

With respect to science, the Government of Canada will lead the creation of a new National Boreal Caribou Knowledge Consortium to enable governments, Indigenous Peoples, and stakeholders to address key knowledge gaps, regularly share information and lessons learned, and undertake studies to support boreal caribou recovery. The Consortium will provide the opportunity for increased collaboration among all parties. In addition, the federal government is proposing to lead several research projects in collaboration with key partners, including provinces and territories, Indigenous organizations, academia, and stakeholders. The Consortium will ensure that actions are based on the best available science and adapted as we learn more.

In relation to recovery and protection, ECCC will assess whether boreal caribou and its critical habitat are effectively protected across the species' Canadian distribution and, where possible, establish science-based conservation agreements with provinces, territories and other interested parties under section 11 of SARA to describe the commitments each party is making to support protection and recovery boreal caribou. ECCC has begun engaging some provinces and territories in the negotiation of these agreements.

Protection assessments on non-federal lands will be completed by ECCC in early 2018. The Minister will report on unprotected portions of critical habitat by April 2018. If the Minister determines, through protection assessments, that any portion of critical habitat is unprotected, a report on steps being taken to protect critical habitat will be published by April 2018.

Collaboration

The National Boreal Caribou Technical Committee (NBCTC) is a federal, provincial, and territorial government committee established by the Canadian Wildlife Director's Committee (CWDC) in 2013 to facilitate collaboration among jurisdictions in achieving the conservation and recovery of boreal caribou and in implementing the federal Recovery Strategy. The NBCTC provides a forum for jurisdictions to share success stories, advice and experience in addressing challenges related to boreal caribou management.

A focus for the NBCTC since its creation has been the question of what constitutes restored habitat for boreal caribou following an anthropogenic disturbance. In December 2014, the NBCTC received the final version of a discussion paper that was contracted to characterize habitat restoration for boreal caribou at two spatial scales: 1) individual disturbance scale (e.g. seismic line, forest cut); and 2) boreal caribou range scale. The discussion paper is available on the Government of Canada's Species at Risk Public Registry (Ray, 2014). The NBCTC has been working on evaluating and providing recommendations on different methods for boreal caribou population monitoring that are currently being used, could be used, and/or developed across jurisdictions, and identify when and where their use is most appropriate. The NBCTC is

acting as a primary review group for the Enhanced Analysis (see below), and is the technical conduit for communication between federal, provincial, and territorial jurisdictions on progress and results.

In 2017, ECCC and provincial and territorial partners established the Federal-Provincial-Territorial Coordinating Committee on boreal caribou to coordinate recovery implementation, protection actions and science-policy integration. Ontario is currently the co-chair with ECCC. The work of this committee will support bilateral negotiations with individual jurisdictions, and will support the CWDC in providing direction to the NBCTC.

Enhanced Analysis
In 2016, ECCC started the enhanced meta-analysis to increase our understanding of the cumulative effects of different types of disturbance on population status. This is being led by the Science and Technology Branch (ECCC), in collaboration with the Canadian Wildlife Service (ECCC) and the Canadian Forest Service of Natural Resources Canada (NRCan-CFS).This research aims to enhance our understanding of the relationship between different types of disturbance (fire, anthropogenic: polygonal, and linear), as well as amount and configuration of undisturbed habitat, and boreal caribou population response to inform range and action planning. As a part of the enhanced analysis, all provinces and territories provided ECCC with updated population information from monitoring efforts across their jurisdictions. Provinces and territories also provided input and guidance on the direction of the analyses to ensure the work is helpful with respect to informing range planning and caribou management across different regions in Canada. The final report is expected to be completed by December 2017.

Habitat and Population Condition Modeling
NRCan, with collaborators, has enhanced ECCC's caribou habitat and population database by adding spatial data on fire occurrence, predicted future forest vegetation, and metrics such as caribou site selection and fidelity. The database will continue to be used to build models that project potential future effects of natural disturbance, such as fire, and human-caused disturbance, such as fragmentation, on caribou habitat and population viability. This information is necessary for remote sensing projects led by ECCC and will help prioritize regions where management actions to restore populations could be most successful.

ECCC is conducting research examining how the abundance and distribution of wolves is affected by human-caused disturbance. The collaboration involves a number of wolf experts from academia and provincial and territorial governments from across the country. The results from the national wolf habitat analysis will be made available to the public in the form of a peer-reviewed article submitted to a scientific journal.

Multi-species Approach
NRCan initiated a collaborative research project with ECCC that is evaluating the potential of using boreal birds as indicators in a multi-species approach, to identify

trade-offs in caribou management and allow the evaluation of caribou as an umbrella species for the assessment of forest ecosystem stability, risk of ecosystem shift and the subsequent impacts on ecosystem services. This work complements the Complex Network Analysis led by University of Laval researchers in the Sentinel North project as well as Ontario's Forestry Future Trust.

Habitat Management

NRCan collaborative research has demonstrated that reduced herbicide application supports better terrestrial lichen growth. In addition, NRCan continues to work with partners to test forest reclamation approaches that best restore quality habitat for caribou and supports the development of a widely accessible database of restoration best practices.

Protected Areas

The PCA has provided legal protection to boreal caribou critical habitat in Prince Albert National Park of Canada, Wood Buffalo National Park of Canada, and Nahanni National Park Reserve of Canada. The PCA will continue to work with Canadians to protect boreal caribou critical habitat in protected heritage places administered by the Agency.

The PCA is in the final stages of establishing a national park reserve in the Mealy Mountains of Labrador, which will protect 10,700 km^2 (~1/3) of the range of the Mealy Mountain herd (NL3). All agreements have been completed and the Government of Canada accepted transfer of the lands from the province of Newfoundland and Labrador to on July 10, 2017. Inscription into Schedule 2 of the Canada National Parks Act as Akami-Uapishq^{u}-KakKasuak-Mealy Mountains National Park Reserve of Canada is anticipated in the near future and legal protection of boreal caribou critical habitat in the park will follow (see Appendix C).

The PCA has been involved in monitoring human disturbance patterns, wildfires and prescribed burns within caribou habitat and outreach activities for visitors to Parks Canada protected heritage places.

Population Monitoring

The PCA has conducted population monitoring in collaboration with provincial governments to better understand population structure, size, and trend, as well as the use of Agency lands by boreal caribou.

Range delineation (and connectivity)

Approaches to define local populations and the range boundaries associated with a local population vary across Canada. In addition, new technology (e.g. genetics) offers potential new approaches to range delineation. Research is currently underway, in collaboration with provinces and territories, to inform development of scientifically robust standards for the delineation of range boundaries. This research will be considering the entire distribution and will also be looking at the impact of different types of natural and anthropogenic disturbances on population connectivity.

Monitor health and condition

NRCan and partners have completed work to examine the forage value of different forest types for boreal caribou and found that lowland forage provides the same quality and quantity as upland forest in the study area (Thompson et al., 2015).

British Columbia

In 2011, the government of BC released the Boreal Caribou Implementation Plan (BCIP). The intent of the BCIP was to balance the need for improved caribou habitat protection with socio-economic implications. The goals of the plan were to reduce the expected rate of decline in the boreal caribou population and reduce the risk of herds being extirpated over the next 50 years. Since 2011, provincial agencies have implemented actions identified in the BCIP to improve the level of habitat protection and restoration, and invested significantly in science and monitoring to better understand what actions could improve recovery efforts and outcomes.

The BC Boreal Caribou Research and Effectiveness Monitoring Board (REMB) was established in 2011 to support the BCIP. Enabled by a Memorandum of Understanding (MOU) between BC, the Canadian Association of Petroleum Producers and the Explorers and Producers Association of Canada, a levy was placed on oil and gas permitting and production to fund REMB activities. Funds are administered by the BC Oil and Gas Research and Innovation Society (BC OGRIS)[1].

After five years of implementation, and with new science and monitoring information, BC initiated a process to revise the BCIP to incorporate new science and improved understanding of boreal caribou ecology, address policy and regulatory gaps, and better align the BCIP with federal policy under the federal boreal caribou recovery strategy. The revised 2017 draft BC Boreal Caribou Recovery Implementation Plan (BCRIP) sets long-term recovery goals and associated management for boreal caribou recovery in BC (Ministry of Environment and Ministry of Forests, Lands, and Natural Resource Operations, 2017). The BCRIP was posted for public comment from April 1 to May 31, 2017, and will be subject to further consultation and reviews with First Nations and stakeholders, prior to being finalized and moving forward for provincial government approval.

The following information summarizes the actions taken to support caribou recovery for the last five years in alignment with the broad strategies identified in the federal *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada – 2012*, and highlights next steps as BC moves forward with their draft BCRIP.

Landscape Level Planning

The draft 2017 BCRIP sets long-term habitat and population recovery goals and associated management actions for boreal caribou recovery in BC.

Industrial Development

The draft 2017 BCRIP outlines the Province's plan to revise existing habitat protections under the *Forest and Range Practices Act* along with the *Oil and Gas Activities Act* based on an increased understanding of boreal caribou habitat use and distribution

[1] http://www.bcogris.ca/

gained through the work of the REMB. Current protection Orders have explicit management provisions such as prohibition of new road construction and forest harvesting, or conditional harvest under specific conditions. These revisions will include shifts in location of existing protection measures to better align with caribou use, as well as net-new protection measures.

Natural Disturbance
Fire is the dominant disturbance agent in boreal caribou habitat. Fires generate forage for other ungulate species, resulting in increased wolf populations and an increase in wolf predation on caribou. The impact of fire on caribou habitat is recognized by the BC Wildfire Service and work has started to develop a fire response/suppression strategy to reduce the impacts to caribou habitat which are included in the draft 2017 BCRIP.

Habitat Management
Management of the amount, type and distribution of habitat was considered in the BCIP, with particular emphasis on reducing impacts from natural resource development while recognizing effects of natural disturbance (e.g. wildfire).

Habitat restoration
Disturbance levels in all ranges exceed the objectives established in the federal Recovery Strategy. Under REMB sponsorship, the province has developed a number of tools to direct and manage boreal caribou habitat restoration efforts.
These include:

- A toolbox of restoration methods for potential application to conditions in Northeast BC;
- A monitoring and tracking framework for restoration activity; and
- A strategic framework to assess and identify where restoration activities should be applied in the Parker herd.

During the winter of 2016/17, the first phase of the Parker herd pilot habitat restoration strategy was implemented. Over 61 km (33 ha) of historical linear features were subject to restoration treatments, with plans developed for further restoration in the future. The 2017 draft BCRIP builds on this learning and identifies habitat restoration planning opportunities for implementation in the different herd ranges.

Mortality and Population Management

Managing predators and primary prey
Best available data indicates that the majority of boreal caribou mortalities are related to wolf predation. Radio-collared wolves and wolf census surveys found that the density of wolves exceeds the recommended density of 3 wolves/1,000 km^2 in all surveyed areas.

The REMB has sponsored research on the primary prey of wolves. In partnership with researchers at the University of Northern British Columbia, sixty moose in boreal caribou range were radio-collared in 2014 and 2015 to determine how moose use of caribou ranges affects boreal caribou survival. Management of predators and primary

prey has been very limited to this point in time, with the focus being on research to inform future management decisions.

Manage direct human-caused mortality of boreal caribou
BC has prohibited the legal harvest of boreal caribou. This does not preclude a Treaty right to sustenance harvest; however, First Nations' voluntarily imposed a hunting moratorium. Other sources of direct mortality are considered to be low risk.

Population Monitoring

Conduct population studies to better understand local population structure, trends and distribution
Since 2011 the REMB has conducted research focused on improving understanding of boreal caribou population status. Since December 2012, BC has maintained 160 active collars on adult female caribou per year. Recruitment surveys and minimum population counts have been conducted annually since 2013, in addition to investigation of all mortality events and collection of biological samples.

Monitor caribou health and condition
Infectious diseases and other health determinants may negatively impact caribou populations through direct and indirect effects on survival and reproduction. The REMB supported the Boreal Caribou Health Research Program (2013-2016) which evaluated biological samples for a suite of bacterial, viral and parasitic diseases. Other aspects of caribou health have also been explored including nutrition, body condition, chronic stress levels and selected indicators of immune status.

Indigenous Factors
BC has engaged with First Nations' communities to include their interests in the BCIP's implementation. Invitations were consistently extended for paid participation on surveys and capture flights, when safe to do so. Until last year, the Treaty 8 Wildlife Board reviewed boreal caribou projects requiring provincial permits. A periodic newsletter has been and continues to be drafted and circulated to stakeholder groups, as well as, First Nations' administration on boreal caribou initiatives, especially research projects. The province hosted a First Nations' Summit in 2014 to provide a showcase for works underway on boreal caribou and solicit input, advice and interests from First Nations' communities for research. The province and the REMB worked with the Blueberry River First Nations on a Traditional Ecological Knowledge project in their traditional area. The REMB will continue to seek the perspective of local First Nations in the design and delivery of caribou research and management.

Conclusion
BC has initiated a concerted program to enable boreal caribou recovery. Over the last five years, BC's management efforts have been guided by the 2011 BCIP. Since then, management action has been informed and refined through the work completed by the REMB. The information and knowledge gained through the REMB has informed the development of a revised draft 2017 BCRIP. Recovery efforts for boreal caribou will be

integrated with a comprehensive provincial caribou recovery program announced in February 2017 (with initial funding support of $27 million over three years) that will further support and refine the work accomplished thus far and drive further knowledge and management actions that support boreal caribou recovery across their ranges in BC.

Alberta

Caribou Management Objectives

The Government of Alberta is committed to stabilizing, recovering, and ultimately achieving naturally self-sustaining caribou populations across the 15 ranges that fall under provincial jurisdiction. This will include ensuring that long-term habitat requirements for woodland caribou are met within Alberta's caribou ranges.

The province continues to build on the foundation of work since the release of the Alberta Woodland Caribou Recovery Plan (Alberta Woodland Caribou Recovery Team, 2005) and A Woodland Caribou Policy for Alberta (Government of Alberta, 2011). In recent years action on caribou recovery has been accelerated to meet federal requirements and timelines provided in the recovery strategies.

As Alberta navigates between species protection and economic sustainability for communities within or adjacent to caribou ranges, the province is identifying ways in which to recover caribou while being sensitive to Indigenous values and the socio-economic impact on communities. The end goal is to recover caribou populations while making life better for Albertans. Alberta will do this through a combination of habitat and landscape management planning, population management, monitoring and research.

Habitat Management

Habitat restoration is a critical component to support caribou recovery, and restoration work has already begun. In October 2016, the government established a partnership with the oil and gas industry to restore 10,000 linear kms of legacy seismic lines in the Little Smoky caribou range. In the 2017-2018 fiscal year alone, over $5 million has been allocated for habitat restoration efforts, including a pilot project in the Little Smoky range to deactivate 70 km of legacy seismic lines and plant 100,000 trees along them.

In 2016, Alberta accepted the recommendations of an independent mediator retained to address competing interests in western caribou ranges. His report, "Setting Alberta on the Path to Caribou Recovery", proposed protected areas in the northwest. Alberta is currently working with municipalities and First Nations on what these areas will contain.

Since 2012, Alberta has made changes to a number of regulations and procedures to mitigate impacts of industrial activity on caribou habitat. The government partnered with energy companies and associations to adopt the Enhanced Approval Process, which is used by the Alberta Energy Regulator in reviewing surface land-use applications. This process includes standards, conditions and guidelines that must be considered in industrial development applications within caribou ranges. In 2016, the province implemented an interim restriction on the sale of mineral rights within all caribou ranges, which applies to petroleum and natural gas, oil sands, coal, metallic and industrial mineral rights. The restriction will remain in place until new operating practices have been defined through directives or upon approval of a final range plan. Alberta has also

implemented standard operating conditions for seismic exploration activity in the Little Smoky caribou range.

In 2012/13, in consideration of the potential implications of a forest management plan submitted to government, a deferral was placed on forest harvesting in the portions of the Little Smoky range that are outside of areas with previous logging footprint. This is to remain until decisions and direction on forest management are made in the caribou range plan. In addition, the mediator indicated that care and attention be paid to how forest harvesting is arranged on the landscape, to minimize the increase in disturbed caribou habitat. Alberta has followed this recommended approach.

Landscape Level Planning

Alberta recognizes that there is an urgent need to address the factors adversely affecting woodland caribou in the province. Range planning was initiated in 2013 with the intent of minimizing the intensity of industrial disturbance on the landscape, and contributing to the conservation and recovery of their caribou populations.

The draft Little Smoky and A La Peche Caribou Range Plan was released for public consultation in June 2016 (Government of Alberta, 2016). Broad public engagement on provincial range planning occurred in summer 2017. This input is currently being incorporated into a draft provincial range plan which is expected by December 2017. The draft range plan will consider each identified caribou range to meet federal recovery strategy requirements. The range plan will be built on a foundation of knowledge and monitoring, will consider range-specific opportunities and constraints, and will be adaptive to future conditions and pressures.

The government is currently working with industry stakeholders to develop a coordinated forestry and energy access management plan that will form the foundation for mandatory Integrated Land Management (ILM). ILM provides an opportunity to reduce the amount of industrial access while restoration efforts remove legacy and unused footprint. These ongoing discussions will be critical to achieving the goals of the range plan and also focus on aggregation of industrial footprint, restoration planning and priority setting.

Mortality and Population Management

Many caribou ranges are experiencing high levels of predation that are facilitated by habitat modification from industrial development. For this reason, wolf populations have been managed in some ranges with local caribou populations at greatest risk of extirpation to reduce caribou mortality. Wolf population reductions are enabled through, and in line with, the Alberta Wolf Management Plan (Alberta Forestry, Fish and Wildlife, 1991), the Alberta Woodland Caribou Recovery Plan (2004/2005), and the Alberta Caribou Policy (2011). In 2017, Alberta initiated a pilot program for camera-based wolf population monitoring in two ranges where wolf management is being implemented.

To increase the Little Smoky population and reduce reliance on wolf control, the 2016 independent mediator’s report recommended a caribou-rearing facility. Just over $2.5

million has been allocated in the 2017/18 budget towards building this facility, currently focused on design work.

Alberta manages populations of other ungulate species (moose, deer, elk) in caribou ranges, with particular attention to addressing the increase in numbers of these species which result from wolf population reductions and ongoing habitat change. Management of moose, deer and elk will be achieved through a combination of harvest by Indigenous peoples, and general and special hunting licence opportunities.

First Nations are able to harvest caribou in Alberta under rights identified in treaties. Some communities, however, have announced voluntary cessation of woodland caribou hunting. There is no licenced recreational harvest of caribou in Alberta and few known occurrences of poaching. Other sources of direct human-caused mortality (for example, vehicle collisions) are believed to be relatively rare.

Population and Footprint Monitoring

Alberta has monitored caribou populations through collaring of adult female caribou since the early 1980s. This collaring program, together with annual surveys of calf survival, enables all caribou populations to be monitored for their growth rate. The extensive annual radio-collaring program delivered by Alberta enables collection of data on caribou occurrence, distribution and movement patterns and delineation of caribou home ranges.

In addition to monitoring caribou populations via radio-telemetry collars, the province began estimating total population size using DNA from non-invasive fecal sampling. From fecal DNA, abundance is estimated using capture-mark-recapture methods. This work also provides information on the number of male and female caribou in each population. Consideration is being given to assessing pedigree relationships within caribou populations, to assess the effective (breeding) population size. To date, the province has completed DNA sampling for five populations: East Side of the Athabasca River (2013), Cold Lake (2014), West Side of the Athabasca River (2015), Little Smoky (2015), and Red Earth (2017).

As of 2016, caribou population monitoring indicated that of the 12 boreal woodland caribou populations, one was stable, four were stable to declining, five were declining, and data were not sufficient to determine the status of two populations.

Alberta will continue to estimate annual population growth rates to monitor population trends for all 15 Woodland caribou populations, boreal and southern mountain, in the province using the above methods. To estimate adult survival and calf recruitment, radio-telemetry collar sampling sizes and flight frequency will remain similar to previous years. As funding, capacity and refined methodologies for estimating abundance for caribou permit, DNA-based abundance estimation will continue where feasible.

Alberta does not monitor woodland caribou health and does not monitor potential sensory disturbance. Some aspects of the industry regulatory approval process are designed to reduce potential sensory disturbance of caribou from industrial operations.

Research

In addition to work undertaken by the Government of Alberta personnel, the province maintains and supports ongoing relationships with a variety of caribou researchers, related to work both inside and outside of the province. In addition, the province has a robust process to make available caribou data to researchers and other parties.

Saskatchewan

Following the release of the federal recovery strategy in October 2012, the Saskatchewan Ministry of Environment initiated a Woodland Caribou Range Assessment and Range Planning Program to:

- provide a better understanding of woodland caribou ecology;
- help meet objectives identified in ECCC's recovery strategy and the provincial recovery strategy; and
- help the province manage the species and related habitat.

Range assessment and planning activities have been divided into the Boreal Shield (SK1) and Boreal Plain (SK2) conservation units as identified in the provincial and federal strategies. Saskatchewan considers the woodland caribou range assessment and planning processes to be part of a broader cumulative effects assessment and management strategy for provincial Crown lands. This approach recognizes the variation of fire regimes, ecological conditions, land use activity, and human-caused disturbance across Saskatchewan's boreal forest.

Since 2012, the ministry has focused on several key areas: range planning; range assessment and research including Indigenous traditional knowledge; population genetic analysis; and legislative review and potential management options. To provide continuity and connection between the many areas of focus, the Ministry has employed four fundamental principles that guide development of range plans. They are:

1. collaboration, consultation and transparency with participants;
2. incorporating a balanced approach;
3. using the best available information; and
4. leveraging current tools and processes and creating new ones as required.

Range planning is a foundational component of this program and is focused on engaging stakeholders from industry, non-government organizations and municipalities, as well as First Nations and Métis communities in the planning process. Range planning was initiated in the central Boreal Plain conservation unit in 2015, and in 2016, the range planning process was initiated in the western Boreal Plain. Saskatchewan will be posting the range plan for public and stakeholder review starting in October with the SK2 Central unit and will be followed with the SK2 West, SK2 East, and SK1 unit plans upon their completion.

As part of the range planning process conducted to date, Saskatchewan has identified four primary management strategies that can be used to reduce landscape disturbance. These strategies include: 1) reclamation, 2) mitigation off-sets for new disturbances, 3) forest harvest patterns and 4) access management.

The management strategies identified in the range plan are supported by existing statutes and can be implemented within the context of current legislation, but will require development of new associated regulations and policies. The primary legislative tools

and processes to support protection in a manner that contributes to the long-term viability of woodland caribou and supports continued economic development include:

- *The Environmental Management and Protection Act, 2010*;
- *The Forest Resources Management Act, 1996*;
- *The Provincial Lands Act, 2016*; and,
- updates to the Environmental Code.

As part of the program, a number of assessment and research activities have also been initiated, completed or are underway. Key assessment work focused on landscape level planning include: habitat potential, burn severity, disturbance levels, and legislative review of statutes supporting protection. Research projects supporting population monitoring are examining caribou population status, structure and distribution, and habitat availability and use.

Saskatchewan is committed to ongoing assessment and research in order to support adaptive management and inform habitat indicators and targets, and will do so in collaboration with appropriate researchers, communities, and agencies to deliver on these research priorities.

Saskatchewan will report on a five year basis to ECCC and to the public on range plan implementation, habitat condition, population trends and protection measures. With this monitoring Saskatchewan will be in a position to update range plans as required in response to the management strategies deployed and the outcomes attained.

The development of a Saskatchewan-based solution to best manage the landscape for both a sustainable caribou population and continued economic development is the key focus for the province.

Manitoba

Caribou management efforts and monitoring projects have occurred within Manitoba for over 40 years and have been instrumental in survival of the species. The intent of these efforts has been to enhance the knowledge base for the species, to generate baseline data for furthering the province ability to mitigate development impact and to ensure the species remains as an integral component of Manitoba's wildlife mosaic. Significant input on management issues and core funding has been provided by partners through Regional Boreal Caribou Committees.

In October 2015, Manitoba released an updated Boreal Caribou Recovery Strategy (Manitoba Boreal Woodland Caribou Management Committee. 2015). The new strategy outlined a new comprehensive management plan that will help ensure the long-term persistence of boreal caribou in Manitoba. The strategy presented a policy shift that began undertaking long-term, landscape scale planning for caribou habitat across the boreal forest in Manitoba. The recovery strategy also provided a new framework for the development and implementation of boreal caribou management unit/range action plans.

Landscape Level Planning

As part of the 2015 recovery strategy, Manitoba delineated 9 boreal caribou management units that represented geographic areas within which one or multiple local caribou populations exist. Implementing a management unit approach ensures that the net outcome of cumulative resource management and land use planning decisions sustain sufficient quality and quantity of boreal caribou habitat. Boreal caribou management units and ranges will form the basis for identifying and evaluating habitat condition and assessing caribou population trend.

The management unit framework that was introduced in the new strategy laid the ground work for undertaking ongoing disturbance assessments, cumulative effects assessment/monitoring and determining the amount and arrangement of habitat within caribou range.

Range Planning

Manitoba intends to develop Management Unit (MU)/Range plans for all 9 management units that have been delineated. By 2018, Manitoba's goal is to have completed 5 of the 9 plans. The first 5 plans will be for MUs that have been assessed as high conservation concern. Plans will include assessments of the state of populations, habitat, occupancy and genetics. The overall goal of the assessments will be to lead to an overall statement on the condition of the management unit from a boreal caribou perspective. With respect to habitat, plans will identify recovery habitat, as defined in Manitoba's strategy. These areas will include, but will not be limited to, core use areas. Recovery habitat includes year round refuge habitat along with areas that provide required habitat for calving/rearing and wintering. Recovery habitat will also include unoccupied areas that will be required to provide future habitat. Based on the assessment work that will be

presented in MU plans, plans will draw conclusions and present detailed management actions/recommendations that will be required for the conservation of boreal caribou.

Coordinated Land use planning Initiatives

First Nation communities along the east side of Lake Winnipeg have undertaken land use planning as part of the nomination process for the World Heritage Site (WHS) designation that is being jointly sought by Ontario, Manitoba and local First Nations. Under the respective community land use plans, communities have designated broad areas as non-development zones which carry protections from resource development. In delineating these non-development zones, caribou habitat and use areas played an important role in identifying the zones. Whether the WHS nomination is successful or not, caribou habitat on the eastside of Lake Winnipeg will have an added layer of protection through the community land use plans which are supported through legislation. Additional communities across caribou range are beginning to explore land use planning and start working on community plans. As these plans develop, it is likely that additional habitat protections for caribou will be incorporated into community land use plans.

Habitat Management

Manitoba's recovery strategy committed the province to manage the quantity, quality and distribution of boreal caribou habitat within caribou ranges and across management units (Manitoba Boreal Woodland Caribou Management Committee, 2015). Where habitat is sufficient to support self-sustaining populations, the goal will be to maintain the existing quantity, quality and distribution of habitat. Where habitat is insufficient, the goal will be to increase the quantity, quality and appropriate distribution of habitat. Manitoba made a broad commitment to protect and manage 65-80 percent intact suitable boreal caribou habitat in management units.

Forest Harvesting

Across Manitoba, review of annual operating plans and timber permits allows for protection of core habitat areas from forest harvesting. Habitat protection focuses on maintaining habitat by not allowing development within core use areas identified through collaring programs. These collaring programs have been collaborative with government, industry, non-government organizations and First Nation Communities. Collar data has provided information that allows current use (core use areas) to be protected from development. In the Owl-Flintstone range, an additional measure (the 2/3rds rule) was implemented to help maintain potential future habitat. The two-thirds rule established that caribou were using approximately 1/3rd of the available habitat. It seemed reasonable that to maintain future habitat, twice as much habitat should be preserved for future use. Therefore, through time, two-thirds of the landscape has to be maintained as useable caribou habitat.

Natural Disturbance

Recognizing that caribou and fire have a long/natural history across the boreal forest, we must also recognize that with climate change, fire frequency and severity will likely increase. In some situations, it may be necessary to aggressively fight fires in areas that

were previously allowed to burn if we are to maintain boreal caribou habitat in the short-term. Manitoba has begun looking at incorporating boreal caribou habitat considerations as part of forest fire management. In areas where human disturbance is relatively high, assessing impacts of natural disturbance provides a short-term opportunity to maintain caribou habitat necessary for recovery. To implement this initiative, maps have been developed that outline currently used habitat that is important to protect from fire. When fires ignite in these areas, caribou habitat considerations will be included in decisions around the appropriate management response.

Industrial Development
Within caribou ranges the impacts of forestry, hydro, road and other industrial development will continue to be evaluated, managed and mitigated. At the request of government, industry has undertaken extensive caribou collaring and population monitoring programs to collect pre-development data used to mitigate impacts to caribou and caribou habitat. Environmental Licenses that have been approved have contained conditions that outline continued monitoring for boreal caribou to capture potential impacts during and post development. The intent is that this data can be used to assess actual impacts and use the information to mitigate potential future impacts. Reviewing all development proposals enables protection of key habitats through negotiations with industry to re-route linear features or to undertake activities in alternate areas to minimize impacts to boreal caribou.

Sensory Disturbance
To reduce impacts from sensory disturbance, Manitoba has imposed timing restrictions on industry to limit noise and access during certain periods such as the calving season. Generally, the restrictions have been on activities such as blasting in or near, or low level flying over, known calving areas. The restricted period is either May 1 to July 1 or May 1 to July 31, depending on the area. There have also been instances where longer time periods have been implemented if the area is also known to be an important migration corridor. In these cases, the restricted period is April 1 to July 31. Manitoba will continue to impose such restrictions and adjust them as necessary. These types of restrictions will be outlined in management unit/range plans.

Mortality and Population Management

Manage predators and alternate prey
Habitat change and access are the main factors leading to increases in other ungulate species and predators such as wolves. Resource development activities and natural disturbances that produce early seral forests with new browse and linear features are important components of habitat change. Areas of high wolf and primary prey densities that overlap caribou range are known to impact caribou populations. Manitoba will manage populations of predators and ungulate prey species through habitat and access management to maintain natural densities within caribou range. It is Manitoba’s intent to only consider initiating population control measures when there is certainty that caribou populations are in trouble and that these efforts will increase caribou survivorship and population stability.

Manage direct human-caused mortality of boreal caribou

There is no licenced hunt for boreal caribou across Manitoba. This does not preclude Aboriginal treaty rights holders to hunt boreal caribou. Indigenous Communities recognize the vulnerability of boreal caribou and generally volunteer to not exercise their right to hunt boreal caribou. Specific to Game Hunting Area 26 (Owl-Flintstone range), a Boreal Caribou Hunting Regulation under the Wildlife Act has been in place since 1991. The Regulation prohibits hunting, trapping and possession of boreal caribou by all people, including Indigenous peoples.

Mortality due to vehicle collisions is a relatively low threat to boreal caribou across Manitoba because the majority of caribou habitat is remote with few to no roads. Warning signs indicating potential caribou crossing areas have been installed in the few areas known to have such mortality.

Population Monitoring

Over the past 5 years, Manitoba has monitored boreal caribou through many projects with a focus on improving the understanding of boreal caribou population status, distribution and important use areas. Since February 2011, Manitoba has deployed 503 radio-collars on adult female boreal caribou (in coordination with project partners) across many of the identified boreal caribou ranges. Recruitment surveys and minimum population counts have been conducted in many of the ranges.

Of the 15 caribou ranges[2] within Manitoba, 13 have had some level of monitoring undertaken to estimate population size, trend or distribution. Management Unit/Range plans, when completed, will contain specific recommendations for future monitoring. These recommendations will form the basis for a provincial monitoring strategy for Manitoba.

[2] Manitoba has revised range boundaries since the federal Recovery Strategy was published in 2012 and now recognizes 15 ranges.

Ontario

Background Information

Caribou (Boreal population) are designated as threatened in Ontario and receive species and habitat protection under Ontario's *Endangered Species Act*, 2007 (ESA).

Released in 2009, *Ontario's Woodland Caribou Conservation Plan* (CCP) outlines actions the province intends to take to protect and recover caribou (MNR, 2009). The goals of the CCP are to: maintain self-sustaining, genetically-connected local populations of woodland caribou where they currently exist, strengthen security and connections among isolated mainland local populations, and facilitate the return of caribou to strategic areas near their current extent of occurrence.

The CCP provides broad strategic direction on the following eight key areas that align with Canada's national recovery strategy: enhance caribou science; adopt a range management approach; improve planning; enhance caribou habitat; manage the wildlife community; focus on geographic priority areas; improve outreach and stewardship; and integrate Indigenous traditional knowledge.

While Ontario has been working to conserve caribou since well before the CCP's release, this summary details the actions taken to support caribou recovery over the last five years in relation to the broad strategies identified in the *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada* (ECCC, 2012).

In 2014, Ontario released a five-year report on the implementation of the CCP. The *State of Woodland Caribou Resource Report* highlights progress made, provides technical details of monitoring and assessment work, and gives a technical summary of the collaborative research program (MNRF, 2014a).

Landscape Level Planning

Range Delineation

Ontario has refined the delineation of its caribou ranges from those identified in the CCP and the national recovery strategy. This includes the re-delineation of the Far North range into six ranges (Swan, Spirit, Oshiski, James Bay, Missisa, Kinloch). The approach to range delineation was adapted from the *Scientific Review for the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada* (Environment Canada, 2008). Fourteen ranges have been delineated and form the basis for management, monitoring and recovery efforts.

Range Assessment

Integrated range assessment surveys were conducted between 2010 and 2013 following the *Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario*. Data collected was used to calculate population size, recruitment rates, survival, population trend and probability of occupancy. Eight reports (the six Far North ranges

were combined into one report) were released in 2014, providing a snapshot assessment of range condition, i.e., the ability of the range to sustain caribou populations (MNRF, 2014b; MNRF, 2014c; MNRF, 2014d; MNRF, 2014e; MNRF, 2014f; MNRF, 2014g; MNRF, 2014h; MNRF, 2014i). This information supports the implementation of Ontario's range management approach.

Range Management Policy
In 2014, Ontario released its *Range Management Policy in Support of Woodland Caribou Conservation and Recovery* (RMP). The RMP is Ontario's method of implementing the range management approach. It describes how the ministry will make coordinated planning decisions to maintain or improve range condition, as opposed to developing range specific plans (MNRF, 2014j).

The policy includes three principles: 1) Ranges will be managed such that the amount of cumulative disturbance remains at or moves towards a level that supports a self-sustaining caribou population; 2) The amount and arrangement of habitat within a range will be managed consistent with the level that has been estimated to occur in natural landscapes; and 3) Forest composition, pattern and structure will be managed to promote the maintenance of the ecological function of sub-range habitat features.

Lake Superior Coast Range
The Lake Superior Coast Range, located along the Lake Superior shoreline, differs from the other 13 ranges due to its size, shape, location, and large off-shore islands. Given these differences, the RMP and Integrated Range Assessment Protocol do not apply to this range. Work to develop a specific management approach consistent with direction in the CCP has been ongoing since 2016.

Community Based Land Use Plans
The *Far North Act* provides for community-based land use planning in the Far North of Ontario. First Nations and Ontario are working together to identify dedicated protected areas where no industrial activity can occur. These areas include valuable caribou habitat. As of summer 2017, five plans have been approved and eight more are under development.

Habitat Management

Habitat Amount and Arrangement
Managing caribou habitat to emulate the natural forest condition is assumed to contribute to a range condition that supports caribou. The simulated ranges of natural variation (SRNV), is a science-based simulation model that estimates the natural forest condition (forest age and composition, distribution and connectivity). It supports implementation of the RMP. The SRNV is available for the Area of the Undertaking[3] and

[3] In Ontario, the portion of the province where forest management is permitted on Crown land and is subject to approvals under the ESA is called the Area of Undertaking.

used in Forest Management Planning. For ranges in the Far North, other information would be used to support decisions regarding habitat amount and arrangement.

Caribou Screening Tool– Cumulative Disturbance
This tool uses a comprehensive data set to track disturbance across caribou ranges. New disturbances are entered as they occur. Range disturbance calculations support the implementation of the RMP.

Sub-range Habitat Features
Ontario released the *General Habitat Description for Woodland Caribou* (GHD) in 2013. It describes the multi-scaled aspect of caribou habitat and provides guidance on the categorization of sub-range habitat features (MNR, 2013). Category 1 includes nursery areas, winter use areas, and travel corridors. Category 2 includes seasonal ranges. Category 3 includes remaining areas within the range. Within the context of the RMP, habitat categorization maps inform potential impacts to sub-range habitat features and options to address these impacts.

Forestry
The Forest Management Guide for Boreal Landscapes (2014), under the authority of the *Crown Forest Sustainability Act* (CFSA), includes caribou-specific habitat objectives that direct forest managers to manage the quality, quantity and arrangement of caribou habitat (OMNR, 2014). A mapped schedule, called a Dynamic Caribou Habitat Schedule, lays out large landscape patches to be managed to ensure a sustainable supply of caribou habitat over space and time.

There is an exemption under the ESA that requires forest management plans to incorporate direction from approved forest guides which contain prescriptions and management objectives to avoid or minimize adverse effects to species at risk and their habitat, including caribou habitat provisions. The exemption expires on June 30, 2018. Ontario has been exploring approaches to integrate requirements of the ESA and CFSA that will protect species at risk, including caribou, and their habitat, minimize impact on forest operations and wood supply, and create a climate of certainty for the forest industry. New direction is expected by July 1, 2018.

Other Industry
Ontario released *Best Management Practices* (BMPs) in 2014 which provide guidance for industrial activities related to energy, mineral exploration, aggregate extraction and tourism. The BMPs encourage stewardship of caribou habitat among industries, interest groups, and Indigenous communities and organizations.

A regulatory exemption under the ESA was established in 2013 for early exploration mining activities, which includes caribou specific provisions. It is available to individuals with either an approved exploration permit or plan under the *Mining Act*.

Research

Ontario has invested significantly in caribou science to support decision making, most notably through the Collaborative Provincial Caribou Research Program. Researchers have contributed expertise to over 50 past and current research projects. Ontario also provided funding through its Species at Risk Research Fund to support 20 caribou-related research projects.

Quebec

Background information

In Quebec, the woodland caribou, forest-dwelling ecotype ("boreal caribou"), has been listed as a vulnerable species under the Act respecting threatened or vulnerable species since 2005. Quebec has established the forest-dwelling caribou recovery team in Quebec, bringing together caribou experts from different organizations. The primary mandate of the recovery team is to provide recommendations to the Quebec Minister of Forests, Wildlife and Parks.

In April 2016, the Government of Quebec released its action plan for the management of forest-dwelling caribou habitat (MFFP, 2016). To meet the considerable challenge of sustainable forest management, the Government of Quebec intends to implement a weighted approach in which the bulk of the protection effort is focused on the key elements of caribou habitat, in places where the chances of success are the greatest.

The Government's action plan is divided into two phases. The first phase includes specific actions to be taken immediately, in order to maintain the essential components of caribou habitat. The second phase aims at analyzing in detail the socioeconomic consequences of the measures under consideration, consulting those who are concerned and identifying alternative sources of timber. In view of these analyses, and taking into consideration all the optimization efforts deployed, the Government will adopt a long-term strategy for forest-dwelling caribou habitat management, including population monitoring.

The strategy to be developed will enhance the protection measures that have been in place for almost 10 years throughout the forest-dwelling caribou's entire range, particularly the large forest tracts that are temporarily protected and specific forestry techniques that minimize impacts on the caribou. Measures limiting recreational development in the forest are also in effect in some areas that are sensitive for caribou.

Landscape-level planning

The forest-dwelling caribou recovery team in Quebec produced several documents during the 2012-2017 period that provided recommendations for a landscape planning approach to benefit caribou conservation. These documents include:

- *Plan de rétablissement du caribou forestier au Québec (2013-2023)* [Recovery plan for the forest-dwelling caribou in Québec (2013-2023)] (Équipe de rétablissement du caribou forestier du Québec, 2013a)
- *Lignes directrices pour l'aménagement de l'habitat du caribou forestier (2013)* [Guidelines for forest-dwelling caribou habitat management (2013)] (Équipe de rétablissement du caribou forestier du Québec, 2013b)
- *Identification de secteurs prioritaires à la conservation du caribou forestier* [Identification of priority areas for conservation of forest-dwelling caribou] (Groupe de mise en oeuvre sur les aires protégées de l'équipe de rétablissement du caribou forestier au Québec, 2012)

- Various summaries of information regarding impacts of various threats on forest-dwelling caribou

In order to implement the second phase of Quebec's action plan, the Ministry of Forests, Wildlife and Parks (MFFP) started analyzing socio-economic impacts of implementing plans and guidelines developed by the recovery team. A report was published in 2015 quantifying impacts of those guidelines on allowable cuts (MFFP, 2015a). The MFFP is now working on different habitat management scenarios while evaluating their impacts on allowable cuts and other socio-economic aspects.

Habitat management

Adjustments to the northern boundary for timber allocations
A new boundary was adopted in October 2016, based on the recommendations of a scientific committee responsible for examining the northern boundary for timber allocation. Roughly 75% of suitable caribou habitat is now located above the northern boundary, and roughly 25% below it. The new boundary will enter into force on April 1, 2018.

Habitat restoration
A trial program to dismantle forest roads and test new forestry techniques for minimizing the permanent footprint of the disturbances began in 2017. Quebec has also participated in an experimental habitat restoration project in disturbed areas, in collaboration with the Innu community of Essipit (Côte-Nord and Lac-Saint-Jean) in the last three years.

Protected areas
Two new protected areas are planned by the Government of Quebec for the protection of forest-dwelling caribou habitat. While awaiting legal protection, the two areas are receiving administrative protection. Quebec has announced the creation of a protected area in the Broadback River valley (roughly 9,000 km^2) in the Nord-du-Québec region and is working to delineate other protected areas.

Mortality and population management
Quebec has enforced a total ban on forest-dwelling caribou hunting since 2001; however, the species' situation continues to be a cause for concern due to unauthorized harvesting. Monitoring by wildlife officers has been increased since 2016, and the education and outreach program for the species has been enhanced to prevent illegal harvest.

In order to control predators, trapping pressure was increased in the isolated ranges of Val d'Or and Charlevoix, where caribou populations are the lowest. In 2014 and 2015, Quebec also implemented maternal penning in the Val d'Or range to increase calf survival rates.

Population monitoring and scientific support

The government of Quebec, through the MFFP, has carried out some studies on forest-dwelling caribou and their habitat (e.g. Heppell 2015; MFFP 2015a; MFFP 2015b; Dussault 2013; Heppell et al., 2013) and has contributed to dozens of studies undertaken by Quebec universities and published in peer-reviewed journals. Discussions are underway with university and government researchers to confirm the scientific validity of the habitat management plan for the caribou that Quebec is developing. In addition, in April 2017, the Government of Quebec announced a budget of $7 million over three years, which will pay for implementation of a rigorous program for monitoring forest-dwelling caribou populations. The scientific input and the recent population monitoring data will guide implementation of the long-term stewardship strategy for forest-dwelling caribou habitat using an adaptive management approach.

Engagement of stakeholders and Indigenous communities

To ensure that partners and stakeholders are engaged and able to discuss their concerns, Quebec's Minister of Forests, Wildlife and Parks has established a partners' committee for implementation of the action plan for the management of forest-dwelling caribou habitat. The forestry industry, unions, municipalities, environmental groups and Indigenous communities are represented. The provincial action plan will respect existing Aboriginal rights – ancestral or treaty-based – and could therefore be the subject of specific, responsive consultations.

Newfoundland and Labrador

Background information

The province and its partners have continued to implement the provincial recovery strategy “The Recovery Strategy for Three Woodland Caribou Herds (*Rangifer tarandus caribou*; Boreal population) in Labrador” (Schmelzer et al., 2004). This plan was released in July, 2004 and was the first recovery document for Boreal Caribou in Canada; it was drafted by a formal recovery team established under the *Endangered Species Act* (ESA). The Indigenous communities, organizations, and governments, industry representatives, NGOs, government officials and experts involved with this team focus on stewardship activities, mortality reduction, habitat research, population monitoring, and informing decisions regarding anthropogenic activities within caribou ranges.

The province did not initiate a range planning exercise as recommended in the 2012 federal recovery strategy, opting to focus provincial resources on the completion of an updated provincial recovery plan and identification of critical habitat under the provincial ESA.

Landscape Level Planning

No formal landscape level planning process has been initiated in Labrador within the time frame of the 2012 recovery strategy; however, there have been several landscape level developments and initiatives, either completed or started within the last 5 years, which have considered caribou and their conservation in the project or program.

In 2011, the Government of Newfoundland and Labrador partnered with the Nature Conservancy of Canada and others to develop a Conservation Blueprint for Labrador. This project, funded through the Province’s Northern Strategic Plan, provided baseline data and a redefinition of Labrador’s natural region boundaries to support aspects of landscape level planning, and long-term biodiversity conservation. This includes protected areas planning. The science-based initiative identified areas of high conservation value throughout Labrador including those that would benefit Boreal Caribou. Final products were released in 2013 in the form of a "Labrador Nature Atlas" that maps the special areas and features of a region. This information continues to be used to help land use planning, protected areas planning and resource management decisions.

In 2012, the Lower Churchill Project was released from Environmental Assessment. Further to the release, Nalcor Energy developed a Species at Risk Impacts Mitigation and Monitoring Plan in order to receive a Section 19 Economic Activity Permit under the ESA. This plan outlined measures that Nalcor Energy would take to protect caribou and mitigate for harm to Red Wine Mountain Caribou (RWMC) within the project area (Nalcor Energy, 2013). This plan included a collaring program, winter surveys and work limitations during sensitive time periods for animals. The company developed a similar plan for the Labrador Island Transmission Link, which considered both RWMC and

Mealy Mountain Caribou (MMC). Both plans undertook a cumulative effects assessment that will be valuable for assessing future development proposals.

Forest Harvesting
Forestry activity across the three Boreal Caribou ranges in Labrador is limited and has a very minor impact on the landscape. Specifically, in District 19, coordinated forestry planning with the Innu Nation has put special measures in place to conserve forested areas within the RWMC range. RWMC Reserve is located in a large, highly variable lichen scrub and bog dominated area in the western portion of District 19. The reserve under the forestry planning process serves to connect more heavily forested areas to the east and south of the Red Wine Mountains. There are no commercial forestry activities, silviculture or roadbuilding permitted within the reserve, and some small scale domestic harvest is permitted. This reserve was set aside for the 2013-17 plan and is proposed again for the 2018-2022 forestry planning cycle.

The limited forest harvesting that occurs is not permitted in commercial blocks during the most sensitive period for caribou of May 30 – July 15. Conditions are also applied on domestic permits for areas which intersect the core use areas for the RWMC. Cut blocks are often amended or removed from forestry plans to ensure they do not impact Boreal Caribou wintering or calving/ post calving habitat.

Protected Areas
Protected Areas planning is still underway in Labrador. The Labrador Blueprint project provided initial areas of interest based on the data that was analyzed and the information gathered. Provincial Natural Areas officials will be working within the newly formed Fisheries and Land Resources Department to continue exploring options for a network of protected areas in Labrador.

A significant portion of the range of MMC, including key habitat along the coast and on offshore islands has been protected with the establishment of the Akami-Uapishq^{u}-KakKasuak-Mealy Mountains National Park Reserve. The land transfer from the provincial to federal governments was signed by the province in July of 2015.

Habitat Management
According to the 2012 Recovery Strategy, the three Boreal caribou ranges within Labrador are between 92-98% intact, and 70% of the landscape disturbance that exists was due to forest fires. This far exceeds the 65% threshold of intactness required under the 2012 strategy.

The identification of critical habitat within the three ranges in Labrador was identified as a priority in the 2004 recovery plan. To begin the identification of critical habitat (as defined by the NL *Endangered Species Act*) several years of analyzing movement patterns and caribou presence was required. An integrated science-based approach which characterized habitat selection, availability, and spatial configuration for caribou conservation was undertaken. This five part analysis, which took over 5 years to finalize, delineated caribou ranges, developed an ecological land classification for

Boreal Caribou in Labrador, determined seasonal habitat use/selection, delineated ranges for the sensitive periods of winter and calving/post calving and identified core areas for each subpopulation identified through population monitoring referenced below. This analysis is currently being integrated into an updated provincial recovery plan, which will identify areas critical to the survival of Boreal Caribou (based on the ESA definition). Work identifying recovery habitat is also completed. The critical and recovery habitat analyses if approved by the Boreal Caribou Recovery team will be included in the updated provincial recovery plan. This plan will be presented to the Minister of Fisheries and Land Resources (FLR) once completed. Following the release of the recovery plan FLR officials will develop guidelines for the protection and use of the habitat.

Mortality and Population Management

Manage direct human-caused mortality of boreal caribou
Under the ESA it has been prohibited to take kill or harass any boreal caribou in Labrador since 2002. Seasons for the RWMC and Lac Joseph caribou were eliminated in 1970's and later in the 1980's for the MMC range. Stewardship activities, engaging all communities in Labrador, have been undertaken in the last 5 years given the continuing decline of all caribou populations in Labrador. Extensive information sharing sessions have been conducted within Indigenous Communities in Labrador and north eastern Quebec to discuss caribou population status and continued harvesting. Enforcement activities including patrols and investigations related to reported or collated boreal caribou mortalities have continued over the 5 years since the federal recovery strategy was published.

Population Monitoring
A Labrador Boreal Caribou monitoring plan was drafted in 2015, the plan has yet to be finalized and approved. The purpose of the Labrador Boreal Caribou Monitoring Plan (LBCMP) is to provide support and direction to government officials in planning, coordination, funding, and execution of the field work necessary to meet long term research and monitoring goals of Boreal Caribou Recovery. The LBCMP will additionally support current Memorandum of Understanding between the Government of Newfoundland and Labrador and the Department of National Defense respecting ongoing caribou mitigation requirements for various military flying operations. This MOU was necessary given the closure of the Institute for Environmental Monitoring and Research in 2015. The LBCMP will also assist with coordination of field research activities and management considerations among partners, including Indigenous Organizations or Governments, the Quebec Government, and industry partners.

Aspects of the monitoring plan are currently being implemented. This monitoring plan included rotating recruitment surveys for each of the three populations every three years, a collaring program for each population, rotating transect for each of the three populations every six years and continuations of sample collection. Biological samples during collaring efforts continue to support studies on health indices, parasite loads, diseases, and genetic meta-population structure. The priority deliverables from the

monitoring plan included three year average female survival rates and late winter recruitment estimates, which combined with data from transect surveys, will be used to estimate population abundance and trend between census years.

Conclusion

Newfoundland and Labrador has continued with a concerted recovery program for Boreal Caribou over the five year period of the recovery strategy. During that time frame the province has focused efforts on information gathering to support population abundance and trend analyses as well as completing several analyses to support critical habitat identification and delineation. Given the ongoing declines of George River Caribou (Eastern Migratory Unit) and Torngat Mountain Caribou and their pending listings of endangered under provincial and federal legislation the province will likely review how it implements recovery programs for caribou as a whole in Labrador, as they move forward with their partners including Indigenous Communities, Quebec and the federal government.

Northwest Territories

Background information

The Northwest Territories' population of boreal caribou (called NT1) is shared with north-eastern Yukon. The NT1 range is continuous with ranges in northern Alberta and British Columbia, although boreal caribou there are considered different populations for management purposes. The NT1 population is considered to be likely self-sustaining. It is estimated that there are roughly between 6000 and 7000 boreal caribou in the NT. Boreal caribou in the NT inhabit an extensive area (about 441,000 km^2) of relatively intact boreal forest. Natural disturbance (forest fires) accounts for most of the habitat disturbance in the range. As of fall 2016, 33% of the NT1 range is disturbed according to definitions in the national recovery strategy. About 27% of the disturbance is due to fire and the rest is primarily due to seismic lines and roads.

Since 2010, the Government of the Northwest Territories (GNWT) has been working with co-management partners to implement the Action Plan for Boreal Woodland Caribou Conservation in the Northwest Territories 2010-2015 and its Implementation Plan (Environment and Natural Resources, 2010). The status of boreal caribou in the Northwest Territories was assessed as Threatened in 2012 and listed as Threatened in 2014 under new territorial legislation, the *Species at Risk (NWT) Act*. A Recovery Strategy for the Boreal Caribou *(Rangifer tarandus caribou*) in the Northwest Territories was then developed with co-management partners and published in February 2017 (Conference of Management Authorities, 2017). The Conference of Management Authorities is currently developing a consensus agreement that will lay out the actions that Management Authorities[4] in the NT intend to undertake to implement the recovery strategy. This implementation agreement will be released in November 2017.

The goal of the NT recovery strategy is to ensure a healthy and sustainable boreal caribou population across their NT range that offers harvesting opportunities for present and future generations. The recovery strategy recommends objectives, approaches and actions for the conservation and recovery of boreal caribou in the NT. The recovery strategy recognizes species at risk requirements under the federal *Species at Risk Act* that must be met in the NT, as well as work that is already underway or planned to meet those requirements.

This includes an objective to ensure recovery obligations for protecting critical habitat and maintaining a self-sustaining population are met or exceeded in NT.

[4] The Conference of Management Authorities, established under the *Species at Risk (NWT) Act*, is the group of wildlife co-management boards and governments that share management responsibility for the conservation and recovery of species at risk in the NT. The Management Authorities are the individual members of the Conference. Management Authorities for boreal caribou are: Government of the Northwest Territories, Wildlife Management Advisory Council, Gwich'in Renewable Resources Board, Sahtú Renewable Resources Board, Wek'èezhìı Renewable Resources Board, and theTłı̨chǫ Government.

Landscape Level Planning

In 2014 there was a devolution of powers from the federal government to the GNWT in which the GNWT became responsible for managing public land, water, and resources in the NT. That same year the GNWT finalized its Land Use and Sustainability Framework, a vision document that sets out the GNWT's thinking about land use in the NT (Government of the Northwest Territories, 2014). This vision guides GNWT's participation in various land use decision-making processes including the management of boreal caribou habitat.

Regional land use plans contribute to conservation of boreal caribou habitat in the NT through mechanisms such as conformity requirements, land protection directives, and zoning that regulates or restricts industrial development activity in certain areas. Approved land use plans are implemented through comprehensive land claim agreements and the *Mackenzie Valley Resource Management Act*. A land use plan has been in place for the Gwich'in Settlement Area since 2003 and is being updated (Gwich'in Land Use Planning Board, 2003). During the last five years, land use plans were completed for the Sahtú Settlement Area and for Tłı̨chǫ Lands (Sahtu Land Use Planning Board, 2013; Tłı̨chǫ Government, 2013). A draft interim land use plan for the Dehcho region is currently under review by governments. In the Dehcho region, interim land withdrawals are in places that remove certain areas from disposal and mineral staking. Together, completed and draft land use plans apply to approximately 80% of the NT1 boreal caribou range. Additionally, community conservation plans formalizing conservation priorities for the Inuvialuit Settlement Region have been in place since 2008 and are being updated.

Boreal caribou habitat in protected areas is protected from most types of disturbance due to human activity. Between 1999 and 2014, the GNWT participated in collaborative implementation of the NT Protected Areas Strategy which facilitated the advancement of several areas of interest for protection. There are currently five established protected areas that overlap with the NT1 range. Seven additional 'candidate areas' overlapping with the range have been proposed and currently have interim protection through land withdrawals or land use plans. In 2016, the GNWT released *Healthy Land, Healthy People: GNWT Priorities for Advancement of Conservation Network Planning 2016-2021*. This five-year work plan outlines how the GNWT is moving forward collaboratively with conservation network planning in the NT (Environment and Natural Resources, 2016). It sets two clear conservation network planning priorities to be achieved by 2021 in partnership with Indigenous governments and other partners:

- Conclude the planning and decision-making for each of the existing candidate areas; and
- Develop a renewed strategy for conservation network planning.

In response to the national recovery strategy's call for boreal caribou range plans, the GNWT has been developing a framework that will outline its approach to range planning. The framework will likely be publicly released for engagement and consultation in the fall of 2017. Since 2012, the GNWT has been meeting with the

Dehcho Boreal Caribou Working Group, and communities in the Dehcho and South Slave regions to discuss range planning and collect local knowledge on important areas for boreal caribou. The framework for range planning and future development of regional range plans will be informed by this work as well as other discussions that have taken place since 2012 with co-management partners about caribou habitat and range planning in the NT context.

Habitat Management

The regulatory system in the NT provides a process for the impacts of development on boreal caribou and their habitat to be identified, considered, mitigated and monitored. The GNWT and other management authorities provide comments during environmental screening and review processes regarding the monitoring and mitigation of impacts of development on boreal caribou or their habitat. GNWT Environment and Natural Resources is required by the *Species at Risk (NWT) Act* to make a submission through the regulatory system regarding potential impacts when a proposed development, permit or license application could affect boreal caribou or their habitat. This came into effect in 2012 when boreal caribou was assessed as Threatened in the NT.

A new *Wildlife Act* for the NT came into force in 2014. The *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. Regulations and guidelines are currently under development to implement the *Wildlife Act* requirement for wildlife management and monitoring plans.

Mortality and Population Management

Boreal caribou are lawfully harvested by Indigenous people and resident hunters in the NT. Under the Big Game Hunting Regulations there is a harvest limit of one woodland caribou per year (either boreal or northern mountain caribou) for resident hunters. It is estimated that, on average, resident hunters take approximately 22 boreal caribou per year in the NT. Non-residents are not allowed to hunt boreal caribou in the NT. There are no restrictions on Indigenous harvest of boreal caribou.

Management of boreal caribou harvest to date has been based on the understanding that harvest levels are low because boreal caribou harvest tends to be opportunistic. However, concerns have been raised that harvest may have been underestimated and harvest levels may be increasing. The GNWT continues to estimate harvest levels of resident hunters through the annual NT Resident Hunter Survey and is working with its partners to develop reporting systems for Indigenous harvest of boreal caribou that are respectful of treaty and Aboriginal rights and maintain harvester privacy. GNWT wildlife management staff are involved in educating people on the importance of reporting harvest, encouraging harvesting practices that minimize negative impacts on the population, and promoting compliance with hunting regulations. A review of the hunting regulations for woodland caribou has recently begun.

Population Monitoring and Research

The GNWT is currently monitoring boreal caribou populations in 6 study areas within the NT and monitoring data is shared with ECCC. GPS radio-collars are deployed annually on adult female caribou. Collars combined with visual surveys provide long-term monitoring data on adult female survival, calf recruitment, and habitat use. Long-term monitoring continues in Dehcho North, Dehcho South and Hay River Lowlands study areas (2004-2017), and new monitoring programs were recently initiated in the Pine Point/Buffalo Lake (2015), Mackenzie Bison Sanctuary (2015) and Wek'èezhìı (2017) study areas. These new study areas will help to provide relatively continuous spatial coverage in the southern portion of the NT1 range.

The GNWT has been working to develop and improve approaches to population monitoring that can be applied in the very large NT1 range. Products developed since 2012 include a literature review and recommendations report on how to obtain range-wide estimates of boreal caribou population trend, as well as a review of Traditional Knowledge based wildlife monitoring methods that could be applied to boreal caribou.

The GNWT is also working with partners, or has completed, research and monitoring projects to better understand boreal caribou habitat selection and forage availability, population structure based on genetic analyses, distribution and abundance of wolves, patterns and rates of vegetation recovery on seismic lines, projections of fire disturbance under climate change, and compiling and updating human disturbance data. GNWT has also supported a number of traditional knowledge-based studies on boreal caribou conducted by wildlife co-management boards and Indigenous governments.

Yukon

Boreal caribou in Yukon occur in a small area of the northeast portion of the territory in the Peel River watershed. These boreal caribou are part of the larger NT1 conservation unit found throughout the Northwest Territories. The number of boreal caribou occurring in Yukon is unknown and it is unlikely that it exceeds 100 animals.

This area of Yukon is very remote and relatively inaccessible. There are no restrictions on licensed (i.e., non-First Nation) harvest of boreal caribou in Yukon and First Nation harvest of caribou in Yukon is not regulated. Due to the remote nature of this area, harvest of caribou is believed to be exceedingly rare, if occurring at all.

Land use planning for this area is developed under the Peel Watershed Regional Land Use Plan which was adopted by the Yukon Government in 2014 (Peel Watershed Planning Commission, 2011). This Plan was subsequently challenged in court in 2014, and the case was heard before the Supreme Court of Canada in March 2017. Until their decision is reached land use planning in this area is on hold. Since 2010, the Yukon Government has implemented a temporary mineral claim staking withdrawal, prohibiting the staking of new mineral claims until 1 January 2018. New oil and gas rights are also not issued during this withdrawal period.

Research and monitoring on these caribou has not occurred since a 2003/2004 study lead by the Department of Environment and Natural Resources, Government of the Northwest Territories. Current disturbance levels are below the threshold identified in the 2012 Federal Recovery Strategy and these caribou are classified as self-sustaining. Conservation threats to these caribou in Yukon are believed to be limited. Natural forest fire disturbance is the dominant disturbance factor in this area with some historic human features (e.g., seismic lines). Yukon's Department of Energy, Mines and Resources is currently developing a fine-resolution disturbance model for northern Yukon which may be used to quantify current human disturbances in this area and assess the recovery of those disturbances.

Yukon may collaborate with the Government of the Northwest Territories on a range plan for these caribou once their territorial planning process begins for this region.

Appendix C: Wildlife Management Boards, Indigenous Governments, Organizations and Communities - Examples of Recovery Activities from 2012-2017

While this report focuses on the effort of provincial, territorial, and federal governments with management responsibility for boreal caribou, Indigenous peoples, stakeholders, and all Canadians play an equally important role in the conservation of boreal caribou. In acknowledgement of this, the section highlights examples of the work undertaken by Indigenous peoples over the last five years. All summaries and project overviews are included in this Progress Report with consent of the organization.

Tłı̨chǫ Government (Northwest Territories)

Tłı̨chǫ people distinguish between two types of caribou: tǫdzı (boreal caribou) and ekwò (barren-ground caribou). Tłı̨chǫ elders describe tǫdzı as darker as and larger than the ekwò, and as having different hoofs: the hoofs of the boreal caribou have a pointed shape, while barren-ground caribou have a rounder shape. Both ekwò and tǫdzı are critical animals to the culture and way of life of Tłı̨chǫ people (Tłı̨chǫ Government 2014, Tłı̨chǫ Government 2016).

The Tłı̨chǫ Government is the governing authority within Tłı̨chǫ Lands, and has the powers and authority to manage and protect their lands, resources and wildlife. Between 2012 and 2017, the Tłı̨chǫ Government undertook a number of initiatives toward the recovery of tǫdzı (boreal caribou).

Land Use Planning

As a result of extensive community consultation spanning seven years, with Tłı̨cho language as the priority and Traditional Knowledge to inform the planning process, the Tłı̨cho Wenek'e (Land Use Plan)[1] connects the land as a living entity, including culture and history to help preserve the 'collective memory' of the Tłı̨cho (Tłı̨chǫ Government, 2013). Finalized in 2013, the approval of the Tłı̨chǫ Wenek'e coincided with the lifting of a moratorium on all Tłı̨cho lands.

In support of tǫdzı recovery, the Tłı̨chǫ Land Use Plan contains several Directives for the Tłı̨chǫ Government, proponents of development on Tłı̨chǫ lands and partners in the management of Tłı̨chǫ lands. For example:

> **6.1.** In order to ensure the protection of Tłı̨chǫ culture and heritage, through continued care and attention to the environment, proponents of development or land use activity on Tłı̨chǫ lands may be required to show that any proposed development has minimal impact on: a) wildlife and their habitat, including habitat for migratory birds; and b) trap lines and winter trails.

[1] https://www.tlicho.ca/sites/default/files/105-LandUsePlan_FINAL%20VERSION%5B2%5D.pdf

6.2. The Tłı̨chǫ Government will develop a strategy of permitting and managing land uses within seasonal caribou ranges that link disturbances to the land, best management practices and recommended mitigation with the type of activity that is undertaken. The strategy will seek to minimize impacts to caribou and caribou habitat, and consider, in part, the herd's status and levels of disturbance at larger spatial scales (for example the entire herd range).

The Tłı̨chǫ Government and the Government of the Northwest Territories have been working collaboratively since 2014 in scoping options to establish a land use planning mechanism for public lands in Wek'èezhìı with parties to the Tłı̨chǫ Agreement. Following careful consideration between governments, an approach was developed to engage with elders, community members and leadership – to model the scoping study after the Tłı̨cho Wenek'e planning process to as great of a degree as possible. The Scoping Study was completed in September, 2015.

Community Consultations
Consultations on tǫdzı (boreal caribou) with Tłı̨chǫ communities were completed jointly with Wek'èezhìı Renewable Resources Board (WRRB) in May 2015 (as per the Consensus Agreement on Accepting a Recovery Strategy for Boreal Caribou in NT; Conference of Management Authorities, 2016).

Collaborative Research
The Tłı̨chǫ Government supports the ongoing research undertaken by the WRRB (led by Dr. Allice Legat to gather information and better understand the impacts of fire on tǫdzı habitat and to monitor when tǫdzı return to burn areas) and the research of Wilfrid Laurier University (a scientific study on vegetation communities associated with tǫdzı and ʔe*kwǫ̀* (barren-ground caribou) habitat that has been disturbed by forest fire). The Tłı̨chǫ Government collaborates with the WRRB to collect ecological information on tǫdzı from Tłı̨chǫ elders, harvesters and scientific research and this support is demonstrated through in-kind contributions of administrative and staff support towards the projects.

Wek'èezhìı Renewable Resources Board (Northwest Territories)

The Wek'èezhìı Renewable Resources (WRRB) is responsible for managing wildlife and wildlife habitat in the area known as Wek'èezhìı. Tłı̨chǫ elders and harvesters have been concerned about the ever increasıng size and intensity of forest fires, and how these fires are impacting the habitat of the animals they depend on. They are particularly concerned with how these fires are impacting tǫdzı (boreal caribou).

The WRRB's boreal caribou project includes collecting ecological information on *tǫdzı* (boreal woodland caribou) from Tłı̨chǫ elders and harvesters, as well as from available scientific research. To date, research on boreal caribou in the NT has been limited. Tǫdzı are known to be sensitive to their environment. In this project, the WRRB is hoping to learn more about the tǫdzı's habitat and habitat requirements. How do tǫdzı use their habitat now? Which areas do they prefer? What are their movements throughout the year? How do natural disturbances such as forest fires affect their

habitat use and movements? And how might their behavior and use of habitat be changed if there are changes in their environment? This ongoing project, initiated in 2011 by the WRRB in collaboration with the Tłı̨chǫ Government, will assist the WRRB and its wildlife management partners in effective management and protection of tǫdzı in Wek'èezhìı. Two reports were produced during the project (Legat and Chocolate, 2012; Legat and Wetrade, 2013), as well as a poster showing tǫdzı anatomy in Tłı̨chǫ (Figure C1).

Two research projects are currently underway to collect Tłı̨chǫ and scientific knowledge on caribou habitat and habitat use after forest fire. A WRRB research project, led by Dr. Allice Legat working with Whatì community researchers and elders is gathering information to better understand the impacts of fire on tǫdzı habitat and to monitor when tǫdzı return to burn areas[2]. In the second project, a research team from Wilfrid Laurier University is conducting a scientific study on vegetation communities associated with tǫdzı and ʔekwǫ̀ (barren-ground caribou) habitat that has been disturbed by forest fire[3].

[2] http://wrrb.ca/news/when-do-caribou-return-impacts-wildfire-todzi-boreal-caribou
[3] http://wrrb.ca/news/impacts-wildfire-extent-and-severity-caribou-habitat-woodland-barren-ground

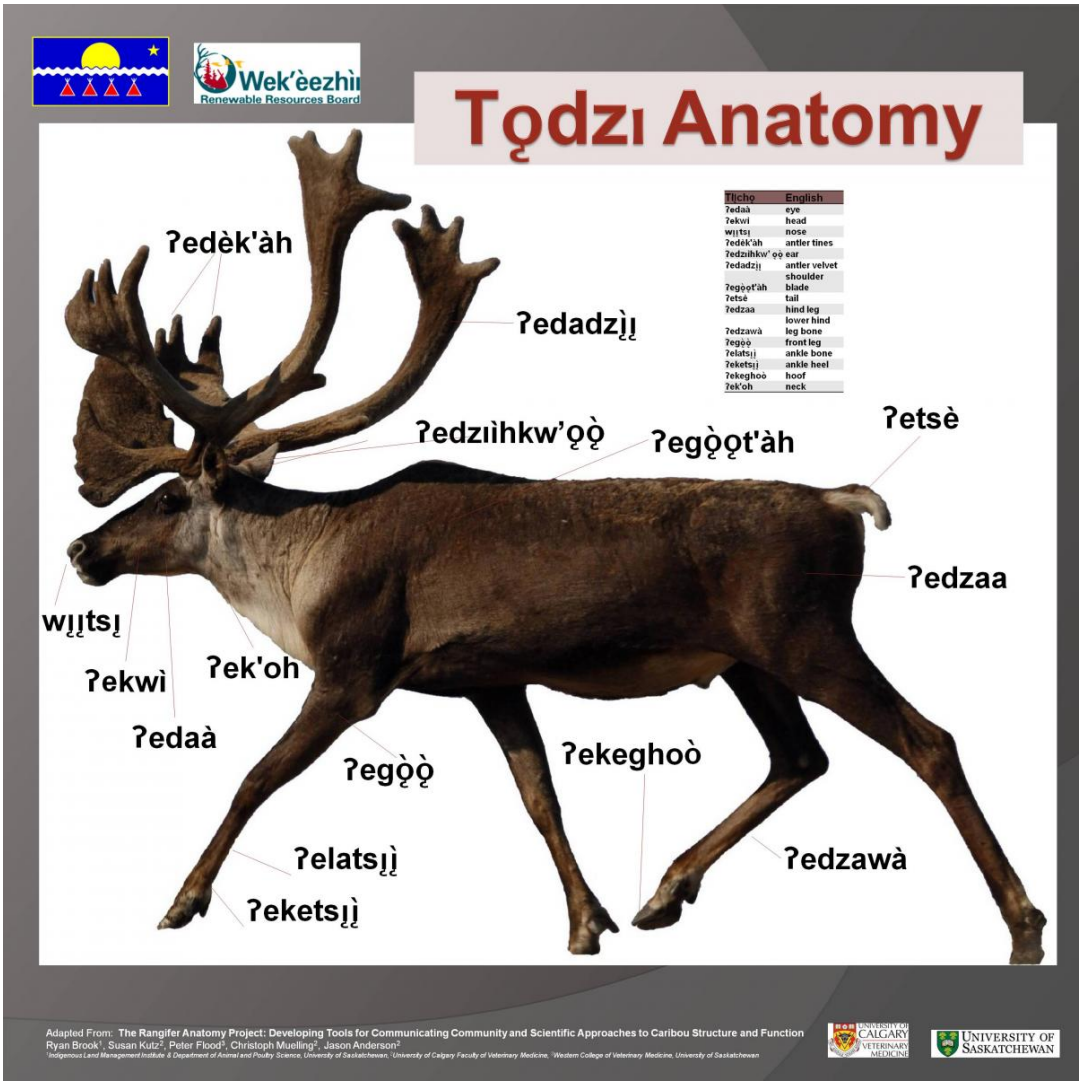

Figure C1. Tǫdzı anatomy poster in Tłı̨chǫ (© Wek'èezhìı Renewable Resources Board).

Gwich'in Renewable Resources Board (Northwest Territories)

The Gwich'in Renewable Resources Board (GRRB) is the main instrument of wildlife, fish and forest management in the Gwich'in Settlement Area. Woodland caribou, boreal population occur throughout a large portion of the Gwich'in Settlement Area. Although not harvested as often as other types of caribou they still form an important food source and are recognized as a culturally valuable species by the Gwich'in.

The GRRB has been actively involved in the conservation of Boreal Caribou on their land. In 2012, GRRB contributed to the development of the Species Status Report for Boreal Caribou in the NT. Following this assessment, Boreal Caribou was listed as Threatened. This legal designation commanded the preparation of the Recovery Strategy for Boreal Caribou in the NT. The GRRB contributed in every step of this

process from the development of the recovery strategy and its framework, to the consultations of the communities in 2014 and 2015. Based on the actions identified to be taken to meet the goals for the recovery of the species in the NT, GRRB, as a Management Authority, has agreed to implement specific actions through a consensus agreement signed in 2017. Some of these actions are directly linked to recovery approaches identified in the Federal Recovery Strategy for Boreal Caribou. The GRRB is currently implementing these actions to help the recovery of Boreal Caribou:

1. Ensure that there is adequate habitat across the NT range to maintain a healthy and sustainable population of boreal caribou

    - Monitor landscape change annually
    - Manage human-caused landscape disturbance

2. Ensure that harvest of boreal caribou is sustainable

    - Measure harvest levels
    - Manage the harvest to ensure it is sustainable

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

    - Improve the understanding of boreal caribou ecology in the NT, and incorporate community and traditional knowledge on an ongoing basis

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

    - Annually review boreal caribou management and any new information, and adapt management practices as necessary
    - Work with other jurisdictions to share information and coordinate cross-boundary planning, monitoring, and management
    - Work with other co-management partners, Indigenous governments and organizations, communities, resident hunters, non-governmental organizations, and industry to share information and collaborate on management actions
    - Increase capacity, both human and financial, to implement management actions in this recovery strategy

5. Exchange information with NT people about boreal caribou in all regions

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

Several educational activities related to caribou are also provided by the GRRB to the communities, such as in schools and in science/career fairs.

Sahtú Renewable Resources Board (Northwest Territories)

The Ɂehdzo Got'ıne Gots'ę Nákedı (Sahtú Renewable Resources Board - SRRB) is responsible for wildlife, habitat and harvesting within the Sahtú region, which covers 280,238 km² in central Northwest Territories, Canada. The SRRB works collaboratively with local Ɂehdzo Got'ıne (Renewable Resources Councils), guided by a community conservation planning and biocultural Dene Ts'ılı (Dene way of life) approach. Dene and Métis peoples in the five Sahtú communities maintain strong social-cultural connections to the land and wildlife. They refer to boreal woodland caribou as tǫdzı.
SRRB recovery actions have been to focus on building a traditional knowledge and scientific knowledge base about tǫdzı. Consequently, the SRRB has participated to several research projects that will be a basis for increasing the effectiveness of conservation strategies in Canada. Results from their work stress the importance of assessing multiple criteria and methods simultaneously when:

- Determining population boundaries and characterizing population structure, which directly contribute to the mapping of the boreal woodland caribou range, and provide guidance on the delineation of units (subspecies, ecotypes or Designable Units) for caribou in Canada.
- Conducting environmental assessments, which strengthen evidence-based decisions.

Their results also suggest practical approaches toward the inclusion of Traditional Knowledge in the development of policies related to SARA, and emphasize the importance to focus on large-scale eco-evolutionary processes when developing conservation policies.

SRRB is currently developing a cumulative effects modelling and decision-support tool (using ALCES – A Landscape Cumulative Effects System[4]) for areas used by tǫdzı, integrating existing traditional and scientific environmental information. This tool should facilitate the collaboration and integration of past, ongoing and planned research into the future and will be used for Caribou range planning, Protected areas planning, Community conservation planning, Resource development planning and Climate change impact assessment. As an example, preliminary results using the ALCES decision tool indicate that increases in wildfire associated with climate change may be a key driver affecting Boreal Caribou Disturbance in the Sahtú Region (see Figure C2).

[4] https://alces.ca.

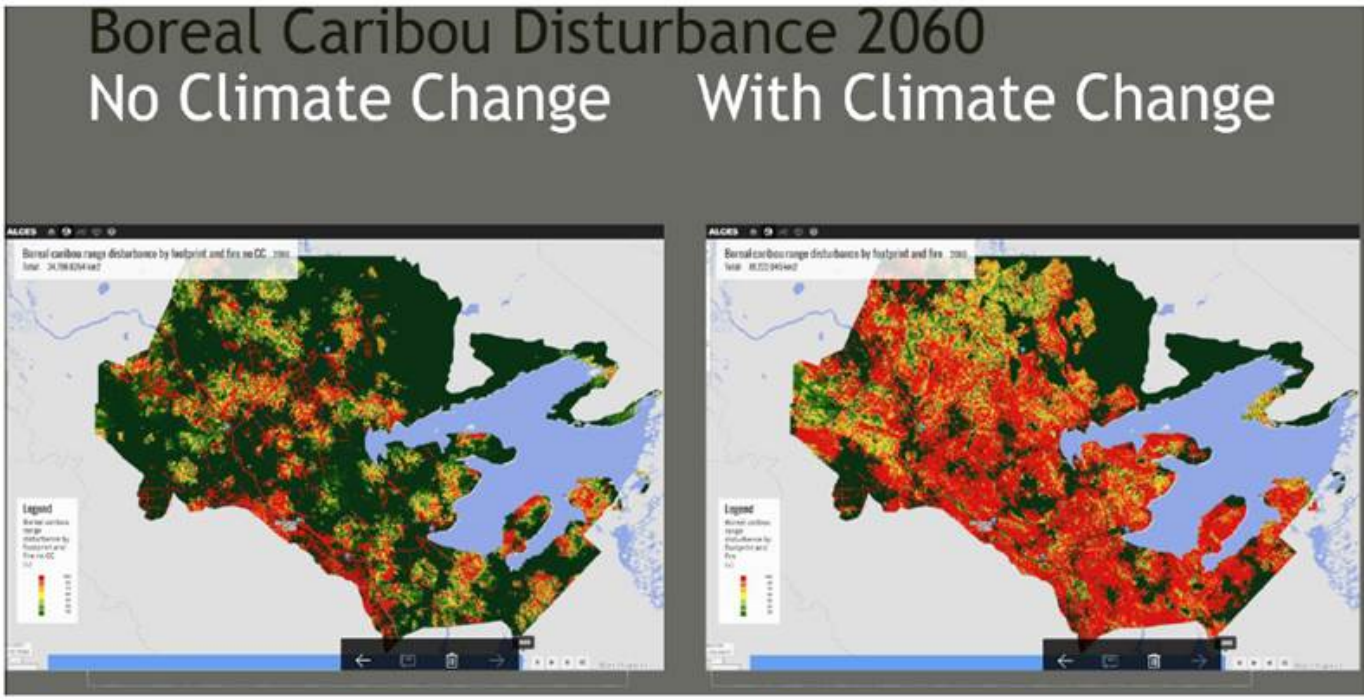

Figure C2. Preliminary results from the ALCES decision tool showing increased in fires as a result of climate change in the Sahtú Region.

The SRRB is also in the process of developing a Caribou Atlas facilitated by Jean Polfus (Liber Ero Fellow, Trent University) and with technical support from Carleton University's Geographic and Cartographic Research Centre as part of postdoctoral research to explore approaches to communicating science and traditional knowledge. The atlas will involve collaborations with community researchers, and will include curated multimedia representations of knowledge about tǫdzı and their biocultural landscape.

Projects undertaken by SRRB as described above are directly linked to the Consensus Agreement on Implementing the Boreal Caribou Recovery Strategy in NT. Some others SRRB commitments include:

- Ensure that harvest of boreal caribou is sustainable.
- Improve our understanding of boreal caribou ecology in the NT.
- Manage boreal caribou collaboratively, using adaptive management practices and the best available information.
- Encourage flow of information between communities, caribou hunters, caribou management authorities, industry, non-governmental organizations, and the interested public within and across all regions.

Wildlife Management Advisory Council (Northwest Territories)

The Wildlife Management Advisory Council (Northwest Territories) (WMAC (NT)) is a co-management board made up of Inuvialuit and government (federal and territorial)

appointees; the Council provides “advice to the appropriate ministers on all matters relating to wildlife policy and the management, regulation and administration of wildlife, habitat and harvesting for the Western Arctic Region.” (IFA 14.(60)). Boreal caribou occur in the southern part of the Inuvialuit Settlement Region, and although there is not a lot of Inuvialuit harvest of boreal caribou, caribou are an integral part of Inuvialuit culture.

WMAC (NT) has been involved in the assessment (2012), listing (2014), and recovery planning of Boreal Caribou under the *Species at Risk (NWT) Act.* This has involved reviewing the *Species Status Report for Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories*, leading community consultation meetings on the listing of boreal caribou as Threatened in the NT, and participating in the development of the *Recovery Strategy for the Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories* as well as the development of the Consensus Agreement on Implementing the Boreal Caribou Recovery Strategy, to be signed in late 2017. The goal of the *Recovery Strategy for the Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories* is “to ensure a healthy and sustainable boreal caribou population across their NT range that offers harvesting opportunities for present and future generations.”

WMAC (NT) has been involved in the Government of Northwest Territories’ range planning for boreal caribou, providing regional input. Through the signature of the Consensus Agreement on Implementing the Boreal Caribou Recovery Strategy in NT, WMAC has also committed to:

- Monitor landscape change annually
- Manage human-caused landscape disturbance.
- Ensure that harvest of boreal caribou is sustainable.
- Manage boreal caribou collaboratively, using adaptive management practices and the best available information.
- Track and report on self-sustaining population status indicators established.

WMAC (NT) directs the use of Inuvialuit Final Agreement (IFA) funds for research conducted by the Canadian Wildlife Service and the Government of Northwest Territories’ department of Environment and Natural Resources. These funds have been used for research on grizzly bear and wolf populations (predators of boreal caribou) and collection of caribou harvest data via Hunters and Trappers Committees.

Hunting, Fishing and Trapping Coordinating Committee (Quebec)

The Hunting, Fishing and Trapping Coordinating Committee (HFTCC) is a co-management board established under the James Bay and Northern Quebec Agreement (JBNQA) made up of Cree, Inuit, Naskapi and government (federal and provincial) representatives. The HFTCC participates with the responsible minister of Canada or Québec in the management, regulation and administration of wildlife species in the territory covered by the JBNQA, either through decisional or consultative recommendations.

February 2016: The Native parties of the HFTCC submitted comments to the Environmental and Social Impact Review Committee (COMEX) regarding their assessment and review of two forestry roads in Eeyou Istchee James Bay. The COMEX was asked to recommend the refusal of the proposed projects given the decline of woodland caribou and the absence of a provincial recovery plan.

December 2015: The HFTCC adopted a resolution recommending a moratorium on all current and planned industrial activities in critical core habitat areas of woodland caribou.

December 2012: The HFTCC adopted a resolution supporting the creation and implementation of a conservation strategy and actions for woodland caribou.

September 2012: The HFTCC adopted a resolution supporting proposals from the Cree Nations of Waswanipi and Nemaska to create the Mishigamish and Chisesaakahiikan Protected Areas. These protected areas would include essential habitat for woodland caribou. The HFTCC further recommended that the full integrity of these areas be maintained and protected from further development until a decision has been reached regarding their long-term protection.

Establishment and Indigenous Cooperative Management of Akami-Uapishq^{u}-KakKasuak-Mealy Mountains National Park Reserve of Canada (Newfoundland and Labrador)

On July 10, 2017 lands and waters were transferred from the province of Newfoundland and Labrador to the Government of Canada for the creation of Canada's 46th national park: Akami-Uapishq^{u}-KakKasuak-Mealy Mountains National Park Reserve of Canada. Spanning 10,700 km^2 of boreal forest, alpine tundra, wetlands and coastal habitat in southern Labrador, this will be the largest national park in eastern mainland Canada. Further, the Park will protect critical habitat across 30% of the range of the Mealy Mountain local population (NL3), including key calving and wintering areas. This represents 9% of the total boreal caribou range on lands in Labrador. By protecting a large portion of the East Coast Boreal Region, the creation of this protected area also represents an important step towards the completion of Canada's National Parks System Plan.

Lands included in the Park are subject to both the Labrador Innu Land Claims Agreement in Principle and the Labrador Inuit Land Claims Agreement, and a defining feature will be the sharing of management and planning responsibilities with Indigenous peoples through cooperative management. A Cooperative Management Board consisting of members appointed by the Labrador Innu Nation, the Nunatsiavut Government, and Parks Canada will advise Parks Canada on all aspects of management of the Park. This ensures that Indigenous peoples will work as partners in the management of the Park in an atmosphere of mutual respect and trust that recognizes their special historical and cultural connection to the land. In addition to the

Cooperative Management Board, mechanisms will be in place to ensure that other important partners and interest holders, such as the NunatuKavut Community Council, the province of Newfoundland and Labrador and local communities are engaged and consulted regarding caribou management and related conservation issues.

Given that treaty rights of Labrador Innu and Inuit will be upheld within their respective land claim areas in the Park, they will have the right to harvest wildlife, including caribou, for cultural and domestic purposes. However, any such activity will be subject to conservation guidelines set out under the respective land claims agreements and the SARA, and will be guided by the advice of the Cooperative Management Board.

Similar models are being employed in other national parks established under modern land claims agreements, most notably including Torngat Mountains National Park of Canada in northern Labrador. That park has faced similar challenges with management of a small, montane caribou herd that is subject to harvesting by Inuit in the park. Cooperative management has proven to be an effective framework to ensure that Indigenous values, perspectives, and knowledge guide caribou management and conservation in the Park and are represented in broader, inter-jurisdictional discussions. Cooperative management thus offers an innovative framework that gives Indigenous people a direct role in the management of important resources such as caribou.

With respect to management of the Mealy Mountain local population, the road down which cooperative management will take the Park is not yet clear but some needs are immediately apparent. Most obviously, this will include up to date and ongoing monitoring of the local population, as well as thorough documentation of Indigenous Knowledge. As with the Torngat Mountains herd, this will require collaboration between Parks Canada, Indigenous governments, the province of Newfoundland and Labrador, and wildlife management boards created under land claims agreements. All of this will be done under the guidance of the Cooperative Management Board on behalf of the Innu and Inuit, who are the people most affected by caribou management decisions.

AFSAR Project Overviews

Deninu Kue Traditional Knowledge Study – Boreal Caribou Habitat and Habitat Use (Northwest Territories)

The Deninu Kue First Nation project was initiated to incorporate Traditional Knowledge and scientific information in the identification of critical habitat for boreal caribou in the South Slave region of the NT. The project followed a knowledge-based habitat suitability mapping approach. The specific ecology and habitat requirements of boreal caribou were used to build habitat suitability models for the winter period (November to April) and the calving period (May to June). GIS models were used to relate Traditional Knowledge and boreal caribou location data to environmental data, which included land cover mapping from satellite data, linear disturbances, and recent and historic forest fires. Preliminary habitat suitability relationships for the various land cover types were reviewed for completeness and accuracy for both the winter and calving models based

on known relationships between species and habitat attributes. External validation of the habitat models was completed based on observations of habitat attributes in the field, knowledge of Deninu Kue First Nation members, and boreal caribou observations. Resource selection function methods were followed where locations of boreal caribou, from a separate satellite collaring program, were correlated to the area-adjusted frequencies of expected caribou locations.

Traditional Knowledge was collected during individual interviews, a community workshop, and from participants during field surveys. Results of the model showed that wetland herb and shrub communities made up the majority of suitable calving habitat in the region. Treed wetlands and open coniferous forest appeared to provide suitable winter habitat. There was a strong association between the observed caribou locations and those expected by chance, which suggested that the classification of habitat in the calving and winter models was fairly accurate.

The results of the Deninu Kue First Nation project and the knowledge of the elders can provide valuable information that can be used by the Government of Northwest Territories in the development of range plans. Recommended actions by the Deninu Kue First Nation to improve the status of boreal caribou in the region included: 1) improvements to fire management; 2) a restricted or complete harvest ban, and 3) increased community monitoring efforts.

Woodland caribou conservation strategy and action plan for Blueberry River First Nations traditional territory (British Columbia)

Precipitous declines of northern and boreal caribou have occurred across Blueberry River First Nations (BRFN) territory in northeastern British Columbia for the last several decades, to the extent that BRFN members no longer practice their treaty right to hunt this animal. This two year project documented Traditional Knowledge related to caribou declines and seasonal caribou habitat preference for both ecotypes of caribou that occur in BRFN's territory (Pink Mountain and Chinchaga Range). Using Traditional Knowledge, BRFN were able to identify fine scale habitat features for boreal caribou and northern caribou in each season, and they developed a conceptual version of a Traditional Knowledge-based habitat suitability model for the Chinchaga Range. The final version of the model will be used to identify priority areas for restoration in the Chinchaga Range, which has been heavily impacted by forestry and oil and gas development. Through this project, BRFN was also able to develop guidance documents for proposed development in boreal and northern caribou habitat, which BRFNs intends to use as a minimum standard for proposed development in caribou habitat in their territory. It is anticipated that these guidance documents will raise the standard for boreal and northern caribou habitat protection in ungulate winter ranges and wildlife habitat areas in the Pink Mountain and Chinchaga ranges.

Engaging Aseniwuche Winewak Nation in the Recovery of Woodland Caribou Aseniwuche Winewak Nation (Alberta)

For decades, the Aseniwuche Winewak Nation (AWN) or "Rocky Mountain People" have witnessed the decline of the woodland caribou. Despite lobbying government and industry for increased habitat protection and following the advice of the Elders who said, "We must speak for those that have no voice", AWN was unable to effect any real change that deterred further extirpation of local caribou herds. This project has given AWN an opportunity to change that. The project provides AWN a venue to share traditional ecological knowledge and the means to employ AWN's core value of Protection and Preservation of the Environment in a hands-on, meaningful way out on the land. The environmental benefits and outcomes include:

- reducing the potential of vehicle collisions with woodland caribou on area roadways through periodic patrols;
- increasing the awareness of caribou management through education and outreach initiatives for three specific audiences: the public, industry and students;
- collecting data on wildlife sightings to improve collective knowledge of local caribou herds and other species

A significant achievement is the involvement of the public in a grassroots movement of supporting caribou recovery actions, as evidenced by use of the project website (www.cariboupatrol.ca) and social media (you can find the project on Facebook, Instagram, Twitter and YouTube).

Boreal caribou traditional knowledge-based habitat supply model, restoration and monitoring strategy for Constance Lake Traditional Territory (Ontario)

Constance Lake First Nation (CLFN) is a Cree/Ojibway community located in northern Ontario, 40 km northwest of the town of Hearst. Since the early 2010s, CLFN has been engaged in woodland caribou Traditional Knowledge studies as part of their land use planning process, compiling Traditional Knowledge regarding woodland caribou use habitat in the Pagwachuan range, including preferred habitat areas in spring, summer, fall and winter. Currently one of the few large, intact wetland-dominated habitat areas in the world, the area encompassing the northern portion of the Pagwachuan range is expected to be subjected to dramatically higher development and climate change pressures over the next decade.

Building on earlier work, in 2015-2016 CLFN developed a habitat supply model (HSM) that incorporated both data from western science (compiled from telemetry data) and information gathered from Traditional Knowledge holders. Using a Traditional Knowledge-based habitat supply model enabled the extrapolation of specific findings to a broader area, resulting in the identification of critical areas for caribou conservation within the CLFN area of interest as a whole. It also provided a way to communicate Traditional Knowledge through a tool that is familiar to provincial and federal decision makers. The project also piloted a monitoring program that successfully engaged

community members on the land and supported the transmission of Indigenous Knowledge from elders to youth, while gathering critical baseline information about woodland caribou populations and movement corridors near the Mamamattawa River.

Mitigation of the impacts of logging roads on habitat conditions for the Woodland Caribou on the Essipit Nitassinan (2012–2017) (Quebec)

This project undertaken by the Essipit Innu Council (Conseil des Innus d'Essipit) was aimed primarily at promoting the recovery of the Woodland Caribou, Boreal population, at Lac des Cœurs through direct improvements to its habitat conditions.

In order to reduce the impact of access roads on the species' habitat, some tertiary and quaternary logging roads (categories 3 and 4) were closed and revegetated. Implementing these large-scale road closures required an in-depth review of environmental, economic and social feasibility as well as close co-operation with all parties concerned.

The project started in 2012 when a strategy was developed to identify the actions and the logging roads to be prioritized, taking into consideration the roads' environmental potential and their level of use for accessing the territory. The Council then worked with the government and local stakeholders to obtain the authorizations needed for the work. Once authorizations were received, restoration work was carried out in the summer of 2016.

In all, more than 20 logging roads covering a total of about 40 km were closed permanently. In addition to closing those access roads for good, the community developed and implemented a protocol for evaluating the effectiveness of three logging-road revegetation treatments. Of the 40 km of roads closed, a section of approximately 10 km was set aside as a control site (no intervention), and each of the three treatments was also carried out on a stretch of about 10 km. The treatments tested were as follows: 1) soil decompaction alone; 2) soil decompaction plus planting of softwoods; and 3) soil decompaction plus planting of softwoods with addition of organic matter.

A three-year monitoring program is currently being carried out, with new funding from the AFSAR program, to evaluate the effectiveness of the logging-road closures and revegetation.

Appendix D: Stakeholder Examples of Recovery Activities from 2012-2017

While this report focuses on the efforts of provincial, territorial, and federal governments with management responsibility for boreal caribou, Indigenous peoples, stakeholders, and all Canadians play an equally important role in the conservation of boreal caribou. In acknowledgement of this, the following sections highlight examples of the work undertaken by stakeholders. All summaries for HSP projects were reviewed by the project recipients and approval was received to include these in this Progress Report. All summaries and project overviews are included in this Progress Report with consent of the organization.

Canadian Association of Petroleum Producers (CAPP)

Background Information
The energy industry has been involved in the design and development of management tools and habitat measures for boreal caribou conservation, including the following:

- Tenure flexibility to enable orderly development and reduce near-term footprint,
- Initiating restoration of legacy seismic lines in priority areas,
- Integrated land management within the energy sector and between sectors to minimize new industrial footprint,
- Population augmentation tools such as predator exclosure fences and maternity pens, and
- Measures to manage human access and predator movement.

In general, the energy industry has played a role in adaptive management pilots or trials, including through direct implementation of early actions and through support for research. A notable example of this has been the Parker Range Restoration Project in British Columbia that resulted in the restoration of 61 km of seismic lines using ecologically-appropriate treatments as needed. Treatments included: Tree-felling, mounding/tree-felling, seedling planting, mounding/seedling planting, tree-felling/coarse woody debris spreading, scarification, and soil mounding only.

Research and recovery action has been enabled through industry collaborative initiatives, such as: Canada's Oil Sands Innovation Alliance (COSIA)[1], the Regional Industry Caribou Collaboration (RICC)[2], the Foothills Landscape Management Forum (FLMF)[3], the Petroleum Technology Alliance of Canada (PTAC)[4] and the Research Effectiveness and Monitoring Board (REMB)[5]. Research and innovation by or with the

[1] http://www.cosia.ca/initiatives/land
[2] http://www.cosia.ca/initiatives/land/regional-industry-caribou-collaboration
[3] https://friresearch.ca/program/caribou-program
[4] http://www.ptac.org/annual-reports/
[5] http://www.bcogris.ca/boreal-caribou/about

involvement of industry has resulted in advancing the development and, in some cases, application of caribou recovery tools.

Landscape Level Planning

The energy sector is committed to working with the provinces on the development of range plans, and has actively participated in the provincial range planning processes since 2013 when they were initiated. The energy sector continues to support a science-based approach to recovery. This approach is designed to assess how to best apply habitat and population augmentation tools to meet boreal caribou objectives while maintaining a working landscape within ranges in which the energy sector operates.

- In 2011, CAPP entered into a Memorandum of Understanding with the Government of British Columbia[6] committing up to $10 million for integrated research and monitoring to accelerate the adaptive management of boreal caribou in British Columbia under the guidance of the REMB.

Industry has been enabling and engaging in collaborative partnerships with communities, municipalities and other sectors, which has resulted in the creation of meaningful relationships and in building local capacity to support caribou recovery:

- Through the RICC, the energy industry is working together with the forestry sector to advance caribou research, habitat restoration and effectiveness monitoring. For additional information refer to the RICC's 2015 annual report (ABMI, 2015).
- Through the Linear Deactivation research projects[7] and the Cenovus Caribou Habitat Restoration Project[8], Cenovus has committed to capacity building in, and use of, local First Nation's owned companies for restoration services.
- Through the FLMF, industry provides financial support to the Caribou Patrol Program[9] run by Aseniwuche Winewak Nation of Canada.
- Oil and gas companies active in Canada's frontier lands annually contribute to environmental research through the Government of Canada's Environmental Studies Research Fund[10](ESRF). The ESRF has contributed support towards several caribou research projects over the years.

Habitat Management

- Development of techniques for restoring legacy seismic lines, sharing knowledge and best practices and developing recommendations for future restoration

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6 http://www.env.gov.bc.ca/wld/speciesconservation/bc/documents/Revised%20Boreal%20Caribou%20MOU_June%202013.pdf

7 http://www.cenovus.com/mwg-internal/de5fs23hu73ds/progress?id=sZD2JXCP0KCoK4Aw0lGW0jPYYMx_vp_Nd-11DZCKor4,

8 http://www.cenovus.com/news/docs/Cenovus-caribou-project-factsheet.pdf

9 http://www.caribouparol.ca/

10 http://www.esrfunds.org/179

planning (e.g., Linear Feature Restoration in Caribou Habitat: A summary of current practices and roadmap for future programs[11]).

- Design of tools for Prioritizing Zones for Caribou Habitat Restoration in the Canada's Oil Sands Innovation Alliance (COSIA) Area[12] to ensure that restoration efforts are strategically-focused and efficient.
- Direct implementation of caribou habitat restoration at the landscape level. To date, restoration has been implemented on more than 1,000 km of legacy seismic lines in the Cold Lake and East Side Athabasca caribou ranges of northeastern Alberta.
- In 2016, Cenovus announced a $32 million commitment to a 10-year habitat restoration project, within which other oil and gas companies have participated.
- Individual company-led restoration activities have averaged upwards of $300,000 annually.

Mortality and Population Management

- Funding participant in maternity penning projects.
- Advancing the Caribou Predator Fencing Pilot[13] in northeast Alberta for consideration by the Alberta government.

Research

- The energy sector has been investigating opportunities for collaboration with governments and other agencies to address research gaps related to caribou recovery. For example, industry has established partnerships with Natural Resource Canada's Canadian Forest Service (CFS) on caribou habitat science and research including support for the CFS Restoration of Working Landscapes project, and continues to discuss work on science and research with ECCC staff.
- Through COSIA, RICC and FLMF, industry is enabling research partnerships with scientists, such as: Dr. Stan Boutin, Dr. Laura Finnegan, Dr. Rob Serrouya, Dr. Steve Wilson, Dr. Scott McNay, Dr. Glen Sutherland, Dr. Craig DeMars, Dr. Jason Fisher, Melanie Dickie, Geoff Sherman, and Dr. Scott Nielsen.
- $1 million invested by the upstream oil and gas industry into caribou research by Petroleum Technology Alliance Canada (PTAC).
- Since 2013, over $24 million has been invested by COSIA into restoration and research and development opportunities for caribou recovery.

[11] http://www.cosia.ca/uploads/documents/id24/COSIA_Linear_Feature_Restoration_Caribou_Habitat.pdf

[12] http://www.cosia.ca/uploads/documents/id43/COSIA_Prioritizing_Zones_for_Restoring_Caribou_Habitat_v2.pdf

[13] http://www.cosia.ca/uploads/documents/id40/COSIA%20Caribou%20Fence%20Pilot.pdf

Forestry Products Association of Canada (FPAC)

Background Information

The forest sector has been involved in implementing many strategies in support of caribou recovery, such as regeneration, road deactivation, linear disturbance restoration, aggregating disturbances, scheduled harvest deferrals and winter harvesting. The following are examples of collaborative projects and initiatives our members have been involved in:

Landscape Level Planning

Tolko Industries continues to pursue a foundation of collaborative management of its tenure and potentially others in northwestern Alberta. The plan also includes provisions to develop a stewardship plan for the area.

The Canadian Boreal Forest Agreement[14], which provides a collaborative framework between FPAC, industry members and ENGOs on the development of sustainable forest management practices, undertook an analysis with the Saskatchewan Research Council on the implications of climate change for regional caribou and conservation planning.

In collaboration with environmental groups, a caribou habitat plan has been developed for Weyerhaeuser's operations for the Pasquia Porcupine Forest Management Area (PP FMA) and recommendations for a new protected area in the boreal forest adjacent to the PP FMA.

Daishowa-Marubeni International Ltd. is leading an initiative in the Chinchaga (AB1) transboundary range to develop a scenario-based comprehensive modeling tool designed to test range-scale solutions.

Habitat Management

Canfor, West Fraser, and Weyerhaeuser are involved with a project, which aims to identify high-quality habitat patches, and functional movement paths that will be used to prioritize areas for restoration.

The RICC, a group of Alberta energy and forestry companies working collaboratively on caribou conservation issues across tenure and mineral lease boundaries, have collectively initiated restoration treatments on nearly 1000 km of legacy seismic lines since 2013.

Sustainable Forestry Initiative, Daishowa-Marubeni International Ltd., Millar Western, Tolko, West Fraser, and Weyerhaeuser are supporting the fRI Research Caribou Program[15] and using direct and indirect methods to determine how caribou respond to linear features at different stages of re-vegetation.

[14] http://cbfa-efbc.ca/
[15] https://friresearch.ca/program/caribou-program

Alberta-Pacific Forest Industries Inc., Alberta Environment and Parks and TransCanada Pipelines Ltd have been restoring seismic lines in caribou habitat in the newly formed Dillon River Wildlands Park in northeastern Alberta. The project has applied restoration treatments to approximately 240 km of seismic lines since 2014.

Resolute Forest Products and other companies operating in northern Ontario have implemented the Ministry of Natural Resources and Forestry Dynamic Caribou Habitat Schedule (DCHS) as part of existing Forest Sustainability Plans. A DCHS concentrates harvest areas, minimizes road densities, implements road decommissioning strategies, and develops silvicultural prescriptions to promote conifer-dominated stands (preferred caribou habitat). This strategy is consistent with the Caribou Conservation Plan developed by the Ontario government.

Population Monitoring

FPAC members have contributed to a Caribou Nutrition Research Project being undertaken by the National Council for Air and Stream Improvement. Led by Drs. John Cook and Rachel Cook, the study is researching nutritional ecology of caribou, developing methods to explore the nutritional status of wild populations, and exploring the opportunities for forest harvesting methods to help generate plant communities that will enhance the landscape's nutritional value for caribou.

Resolute Forest Products are involved in caribou collaring projects with the Quebec government and the Quebec Lumber Manufacturers Association to investigate how different managed landscape patterns would affect caribou behaviour and population dynamic in the Saguenay-Lac-St-Jean region.

Mining Association of Canada (MAC)

Population Monitoring

Saskatchewan

Research efforts have been undertaken in northern Saskatchewan (SK1) to address the schedule of studies outlined in the 2012 Recovery Strategy, with funding contributions from the mining sector (Cameco, Rio Tinto, and Saskatchewan Mining Association). Preliminary results of this research are available in the 2016 Interim Report (McLoughlin et al., 2016). Cameco has also conducted their own research program, and through both research efforts has contributed over $1.5 million to boreal caribou research in Saskatchewan.

Manitoba

In Manitoba, Hudbay is a start-up member of the Northeast and Northwest Woodland Caribou Advisory Committee, which aims to ensure the long-term sustainability of boreal caribou and their required habitats. The programs install tracking collars on caribou to chart migratory patterns and will help to plan land usage to reduce habitat

loss, degradation and fragmentation. The company has made financial contributions Manitoba since 2007. This contribution is ongoing.

Ontario

The De Beers Canada Victor Mine Wildlife Monitoring Program in Ontario is a long-term study initiated in 2001. The initial surveys were associated with the Victor Diamond Project Environmental Assessment (EA) process. The monitoring program was subsequently agreed to under the Comprehensive Study Report (CSR) by De Beers Canada, Attawapiskat First Nation and the Government of Canada under the Victor Follow-Up Program Agreement (FUPA).

The monitoring program includes continuous radio-telemetry monitoring of collared boreal caribou (*Rangifer tarandus caribou*), as well as early (December) and late (end of February/early March) winter aerial wildlife surveys every two years during the operation of the mine, or as otherwise agreed to by parties involved in FUPA. The monitoring program operates under a passive adaptive management framework where monitoring results are reviewed to assess whether modifications to survey methods are required to accommodate specific observations and possible concerns as they become apparent in the data.

Alberta

Suncor has contributed to the Canadian Oil Sands Innovation Alliance Caribou Predator Fencing Pilot[16] project (the Pilot), which is investigating technical details related to potentially establishing a fenced caribou rearing facility in northeastern Alberta. The results of this work will be provided to the Government of Alberta for consideration as a caribou recovery tool.

Habitat Management

Alberta

In Alberta, in collaboration with other industry partners, Suncor worked to restore fragmented caribou habitat across an area of land, outside of the company's actual lease areas. Restoration completed between 2012 and 2015 resulted in a total of 387 km of historic seismic lines being treated and 162,000 trees planted to help restore boreal caribou habitat within the Algar region of northeast Alberta. The work included planting in the winter months due to the abundance of bogs and wetlands as well as mounding, seeding and coarse woody material placement. Since the completion of restoration work, vegetation and wildlife monitoring has continued to track how the restoration work affects wildlife movement in the area and measure success of treatments applied through the project.

The Algar Wildlife Monitoring Project is a multi-year program that was initiated in 2015 to monitor wildlife responses to seismic line restoration within a portion of the Algar caribou herd range (within the East Side Athabasca River population). An experimental

[16] http://www.cosia.ca/uploads/documents/id40/COSIA%20Caribou%20Fence%20Pilot.pdf

sampling design was developed to assess the use of seismic lines by caribou, their predators, and other medium- and large-bodied mammals using noninvasive camera trap surveys. Protocols for camera trap deployment and data processing were also developed.

Saskatchewan

In addition to the research conducted by the University of Saskatchewan, other peer-reviewed research has been conducted in SK1in the last 5 years:

- Recovery of Terrestrial Lichens Following Wildfire in the Boreal Shield of Saskatchewan: Early Seral Forage Availability for Woodland Caribou (*Rangifer tarandus caribou*) (Skatter et al., 2014).
- Using Landsat imagery to backcast fire and post-fire residuals in the Boreal Shield of Saskatchewan: implications for woodland caribou management (Kansas et al., 2016). This research shows that traditional methods for mapping burnt areas may overestimate the percentage of fire in the Boreal Shield of Saskatchewan by including unburnt post-fire residual forest patches.
- Living in a burned landscape: Woodland caribou (*Rangifer tarandus caribou*) use of post-fire residual patches for calving in a high fire/low anthropogenic Boreal Shield Ecozone (Skatter et al., 2017). The research shows that while female caribou avoid burned areas, some may use post-fire residual patches for calving in SK1.

Summary

The mining sector has been a contributor to science related to boreal caribou and through project-specific measures to support the implementation of the Recovery Strategy over the last five years. Contributions have been made through financial contributions, in-kind support and sharing of site-specific data. In some instances, absent contributions from the mining sector provincial research programs would not have proceeded.

In addition to financial contributions, the mining sector is devoting a lot of in-kind support to the implementation of the Recovery Strategy. Company biologists and other technical experts have been involved in the range planning consultation process at the provincial level and also work through MAC to provide input into federal documents related to boreal caribou.

HSP Project Overviews

Boreal Woodland Caribou Recovery in the Northwest Territories – Engaging a Knowledgeable Public to Take Action

In 2015-2016, the Canadian Parks and Wilderness Society (CPAWS) led an outreach project in the Northwest Territories (NT) to increase awareness among the NT public that boreal woodland caribou are listed as "Threatened" in the NT and across Canada. The premise of the project was that a knowledgeable public is more likely to advocate

for or directly engage in recovery activities, which are led by the public, government, Indigenous government, or by other non-government partners and agencies. Plain language outreach materials were designed for distribution to a variety of groups including school classes, the general public and to industries whose developments are within the NT boreal caribou range. An educational pamphlet was created to distribute important information regarding boreal caribou, including habitat requirements, its status in the NT, threats, and a call to action to get people involved with stewardship activities. Educational materials for schools, including a pamphlet, poster, activities, and curriculum connections were also developed to engage students in learning about boreal caribou and their importance within the boreal ecosystem. This project created materials that are available for ongoing distribution and can be used for several years for education and outreach.

Manitoba Model Forest

Project #1: Engaging Indigenous Peoples in the Conservation and Stewardship of Boreal Woodland Caribou in Eastern Manitoba

In 2013-2014, the Manitoba Model Forest led an outreach project in Manitoba to address the need to further engage Indigenous peoples and enhance their participation in the conservation of boreal woodland caribou in Eastern Manitoba. Through collaboration with the Eastern Manitoba Woodland Caribou Advisory Committee, four community workshops were held in four separate First Nation Communities (Bloodvein, Little Grand Rapids, Poplar River and Black River) to hear community members' knowledge regarding caribou and the types of caribou conservation guidelines that should be developed to incorporate into Community Land Use Plans and Caribou Action Plans. For each workshop, an initial presentation was given to provide information on boreal caribou ecology, distribution, habitat use and the recovery planning process occurring across Canada and Manitoba.

Following the presentation, community members who participated engaged in a discussion to share knowledge regarding boreal caribou around their communities and provided insights as to the initiatives that should be incorporated into recovery planning for boreal caribou on the eastside of Lake Winnipeg. Many community members expressed the importance of conserving boreal caribou, the importance of protecting landscapes and the cultural importance that caribou represent to their people. The knowledge shared during these workshops will ensure well rounded thought is put into boreal caribou action plans and community land use plans. These workshops provided an opportunity to build on existing relationships with communities and to engage communities early on in the planning process so as to enhance their participation in the conservation of boreal woodland caribou in Eastern Manitoba. Youth presentations were also provided in those communities, which included information about species at risk and conservation efforts for boreal caribou that were happening around their communities. Community youth had the opportunity to learn about boreal caribou ecology and distribution on the eastside of Lake Winnipeg.

Project #2: Monitoring and Assessing Recruitment and Winter Occupancy for Boreal Caribou in the Owl-Flintstone Range

In 2015-2016, the Manitoba Model Forest led a project in Manitoba to address a critical data requirement for a population and range assessment that would be included in the development of the Owl-Flintstone woodland caribou action plan. The Owl-Flintstone range is situated at the southern limit of boreal caribou occurrence in eastern Manitoba. As a result of this existence, human-related threats are an ongoing concern given the relatively small number of caribou in this population. Following up on efforts occurring under a larger conservation and recovery program for the Owl-Flintstone range for the past 10-15 years through the Eastern Manitoba Woodland Caribou Advisory Committee, there was an important need to continue monitoring and assessing the status of this population to ensure the proper mitigation measures could be implemented in future management planning. The updated provincial strategy identified the need to continue monitoring caribou populations in an effort to collect minimum pieces of population data (recruitment, minimum population counts, and occupancy) to support population assessments that would help inform the development of caribou action plans and identify immediate mitigation/stewardship initiatives required to protect caribou habitat. Through collaboration with the Eastern Manitoba Woodland Caribou Advisory Committee and Manitoba Conservation and Water Stewardship, winter occupancy and calf recruitment aerial surveys were completed in February 2016. The work from past and current projects will all cumulate in the development of an action plan for the Owl-Flintstone Range.

Project #3: Boreal Caribou Action Planning in Manitoba – Developing a Land Cover Classification from Satellite Imagery for Use in Habitat Assessments

In 2015-2016, the Manitoba Model Forest led a project in Manitoba to develop an updated land cover dataset that would be used in habitat and range condition assessments in caribou action plans to be written for all caribou management units and ranges across Manitoba. Manitoba's updated Caribou Strategy outlined an initiative of conducting management unit and range assessments. These assessments would provide information on range condition, lead to the development of disturbance thresholds important for the conservation of critical habitat, and assess cumulative impacts. An integral part of range condition assessment is determining the state of habitat within management units and ranges. In Manitoba, satellite based land cover data was limited and not consistent across the area of occupancy for boreal caribou. This project was used to build a land cover classification for all boreal ranges across Manitoba and to classify satellite imagery to build the needed land cover data layer for three of Manitoba's five high conservation concern woodland caribou management units.