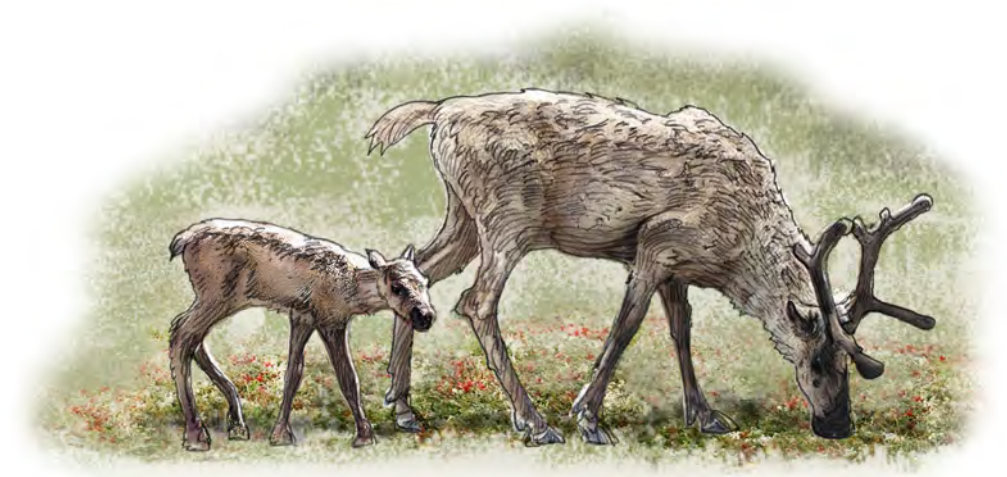


**BC BOREAL CARIBOU
RESEARCH AND EFFECTIVENESS
MONITORING BOARD**

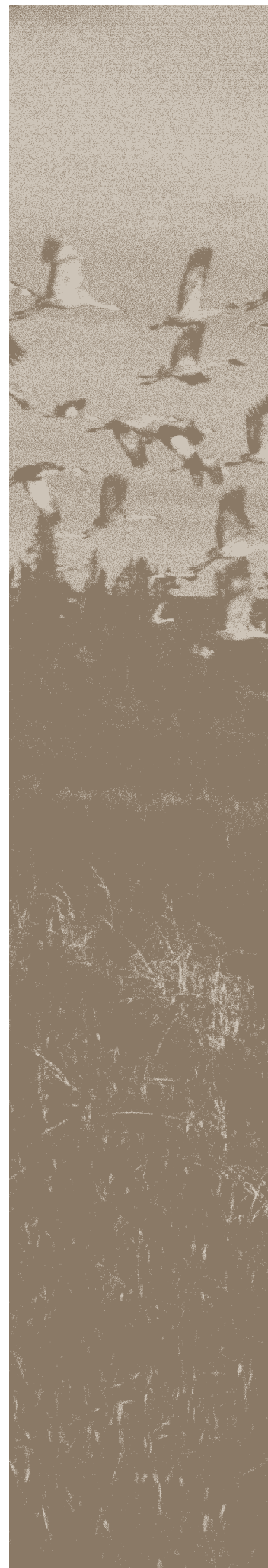
ANNUAL REPORT 2016



**BC BOREAL CARIBOU
RESEARCH AND EFFECTIVENESS
MONITORING BOARD (REMB)
ANNUAL REPORT 2016**

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HIGHLIGHTS

\$2.4M INVESTED IN 24 PROJECTS

**CARIBOU SURVIVAL AND RECRUITMENT CONTINUE
TO IMPROVE THROUGHOUT MOST OF NORTHEAST BC**

**CANADA'S FIRST RANGE-WIDE HABITAT
RESTORATION PROJECT ESTABLISHED**

**RESEARCH INVESTMENTS REDUCE UNCERTAINTY
IN CARIBOU AND HABITAT MANAGEMENT**



BACKGROUND

The BC Boreal Caribou Research and Effectiveness Monitoring Board (REMB) was established in 2011 to support the BC government's *Implementation Plan for the Ongoing Management of Boreal Caribou*. The Plan outlines measures to achieve objectives for Boreal Caribou in northeast BC, which include:

- establishing Resource Review Areas where petroleum and natural gas tenure sales are deferred for a minimum of five years;
- identifying and designating under the Oil and Gas Activities Act Boreal Caribou habitat areas where oil and gas activities are mitigated;
- establishing operating practices to be applied to oil and gas activities in designated Boreal Caribou habitat areas;
- restoring Boreal Caribou habitat;
- managing Caribou predators and their primary prey; and,
- conducting research on Boreal Caribou and their habitat.

The REMB was established through a Memorandum of Understanding signed in August 2011 by the BC Ministry of Forests, Lands and Natural Resource Operations, BC Ministry of Energy, Mines and Natural Gas (now Natural Gas Development), BC Ministry of Environment, the Canadian Association of Petroleum Producers, and the Explorers and Producers Association of Canada.

Industry partners support the REMB through a levy on oil and gas permitting and production, which provides a maximum of \$2 million annually for up to 5 years. Funds are administered through the BC Oil and Gas Research and Innovation Society.

This report presents highlights of the REMB's work conducted to March 2016.



THE CHALLENGE OF BOREAL CARIBOU RECOVERY

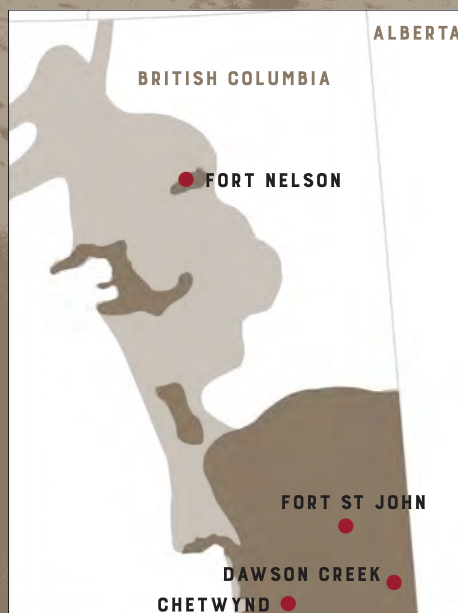
Boreal Caribou are an ecotype of Woodland Caribou (*Rangifer tarandus caribou*), which range throughout the boreal forest from Alaska to Newfoundland. They are closely related to the Barren Ground Caribou of northern Canada and Alaska and also to Reindeer, which are native to northern Scandinavia and Russia. Woodland Caribou occur in small groups and predominantly use lowland bog and fen habitats that are characteristic of Canada's boreal plains. Traditionally, these habitats have provided a refuge from predation for Caribou because Wolves, their primary predator, tend to remain in upland areas and hunt Moose and other locally abundant ungulates.

Scientists believe that changes in the boreal forest, caused by industrial development, wildfire, climate change and other stressors, are altering both the abundance and distribution of Wolves and their primary prey, and that these changes are leading to more frequent encounters between Wolves and Caribou (see illustration on the following page).

A warming climate generates larger and more frequent forest fires. This increases the abundance of young forests that are generally characterized by abundant shrubs and forbs. These are attractive to Moose, Elk and Deer, and their numbers tend to increase when more food is available. As winters become less severe, larger populations of Moose, Elk and Deer can be supported farther north, bringing these species into closer proximity with Caribou. Wolf populations increase in response to this "prey enrichment" and in turn encounter and kill more Caribou. Moose, Elk and Deer tend to fare better than Caribou in this situation because they tend to have more offspring and can withstand higher predation rates than Caribou. We call this phenomenon "apparent competition" because Moose, Elk and Deer seem to be out-competing Caribou, but the process is mediated through predation by Wolves.

Industrial development can clear forests and result in effects similar to fires, but in areas of oil and gas development, abundant linear features such as seismic lines, roads and pipelines can also facilitate the movement of Wolves, allowing them to travel farther (higher "predator efficiency") and penetrate deeper into Caribou habitat ("loss of spatial separation") and add further to the predation problem.

The challenge of Caribou conservation is understanding the relative importance of these different effects and how they interact, and then designing and implementing management actions that will benefit Caribou.



CHANGE IN THE
DISTRIBUTION OF
WHITE-TAILED DEER
IN NORTHEAST
BRITISH COLUMBIA



A warmer climate generates larger and more frequent fires, resulting in more young forest

Logging requires roads and removes older trees, creating young forest

Gas exploration and development creates linear features and removes old forest

1 Young regenerating forests provide abundant forage for moose, deer and elk populations that are expanding northward with warmer temperatures

3 Linear features such as seismic lines, pipelines and roads create travel corridors into caribou habitat

2 Wolf populations increase with abundant moose, deer and elk

4 Wolves encounter caribou more often and caribou populations decline

Excerpted from the
**BC BOREAL CARIBOU
RESEARCH AND EFFECTIVENESS
MONITORING BOARD
ANNUAL REPORT 2016**

DESIGN: Alaris Design ILLUSTRATION: Soren Henrich

RECOVERY INVESTMENTS

UNDERSTANDING THE BENEFITS OF HABITAT RESTORATION

The REMB has been making significant investments in habitat restoration planning and implementation, with a focus on the following areas.

PLANNING AND IMPLEMENTING CANADA'S FIRST RANGE-WIDE LINEAR FEATURE RESTORATION PROGRAM

Preparations continue for implementation of the first phase of the Parker range restoration plan in winter 2016–17. Golder Associates Ltd. has planned year 1 treatments and resources are being secured for fieldwork. This is a complex project that involves much more than just restoring Caribou habitat. Care must be taken to respect Aboriginal treaty rights and interests, recreational use and existing land tenure rights. Habitat treatments will also need to maintain the integrity of archaeological sites and minimize impacts to aquatic resources. Consultation with First Nations and stakeholders are continuing as contractors conduct pre-work activities and secure necessary permits.

ESTABLISHING MONITORING PROTOCOLS TO MEASURE THE EFFECTIVENESS OF RESTORATION

Monitoring the effectiveness of restoration treatments over time is a critical component of the REMB's work. Golder Associates Ltd. has developed a rigorous vegetation monitoring protocol to track the success of treatments over time. In addition, Matrix Solutions Ltd. has deployed remote cameras to collect pre-treatment wildlife use data throughout the Parker range. Cameras have been placed on seismic lines as well as on natural game trails, and differences in use before and after habitat treatments will be analyzed to determine whether restoration is having the intended effect of reducing predator use of treated areas.

UNDERSTANDING THE DYNAMICS AND BENEFITS OF NATURAL HABITAT RECOVERY

As important as habitat restoration may be to Caribou conservation, the role of natural habitat recovery is even more critical. Restoration treatments will be focused in areas that are unlikely to recovery naturally in the short to medium term. But elsewhere we rely on natural processes to regenerate suitable habitat. Factors affecting regeneration of vegetation on low impact seismic lines is currently an area of focus for the REMB through a project being conducted by Explor and Golder Associates Ltd. Results of this research will lead to operational recommendations that might facilitate more rapid regrowth.

The REMB is also supporting research by Foothills Research Institute to understand when naturally recovering habitat becomes functional for Caribou.

PREDICTING THE BENEFITS OF LINEAR FEATURE RESTORATION

With the focus on natural regeneration and active habitat restoration treatments, it is important to understand how the scale and scope of habitat recovery will ultimately benefit boreal Caribou populations. REMB is supporting research by the Alberta Biodiversity Monitoring Institute to understand this critical question, based on an analysis of data collected through REMB projects in northeast BC.



CARIBOU CONSERVATION AND THE ROLE OF ANIMAL HEALTH

The REMB has been supporting research at the University of Calgary Veterinary School of Medicine to better understand the role of caribou health in population decline. Although predators are the leading documented cause of death of Caribou, predators are known to target young, old and sick animals. If there are factors leading to a higher incidence of infectious diseases or chronic health problems, it could be contributing to Caribou declines. This in turn could point to alternative management actions that could benefit Caribou conservation.

The research has already identified the first known incidence of the bacterial pathogen *Erysipelothrix rhusiopathiae* in Caribou. Mounting evidence suggests that an acute outbreak of this pathogen was responsible for a higher than expected mortality rate observed in 2013–14. Although mortality rates have since declined, understanding factors that led to the outbreak and possible steps to mitigate the risk of future outbreaks has important conservation implications. More broadly, integrating a comprehensive suite of health indicators into Caribou management is addressing an important gap in our current approach.

PREDATORS, PREY AND CARIBOU

Although habitat change may be the most important, ultimate cause of Boreal Caribou declines, there is much to learn about the predator-prey system in which Caribou must persist. Predation in general, and by Wolves in particular, continues to be the most commonly documented cause of mortality, and understanding why predation rates may be changing is a primary area of research interest.

The REMB is supporting research activities through the University of Northern British Columbia to better understand the Wolf-Moose-Caribou predator-prey system. Moose survival and habitat use are being monitored in three study areas in northeast BC that differ in levels of anthropogenic activity to determine whether Moose numbers and/or distribution respond to landscape changes caused by industrial activity. If they do, then we would expect Wolf numbers to respond accordingly. REMB has been funding the Alberta Biodiversity Monitoring Institute to conduct Wolf surveys in select areas to test this hypothesis. Densities in surveyed areas have varied between 6.2 and 13.3 Wolves per 1000 km² and broadly correlate with Caribou population trends, providing further evidence that Wolf predation is an important, proximate cause of Caribou declines.

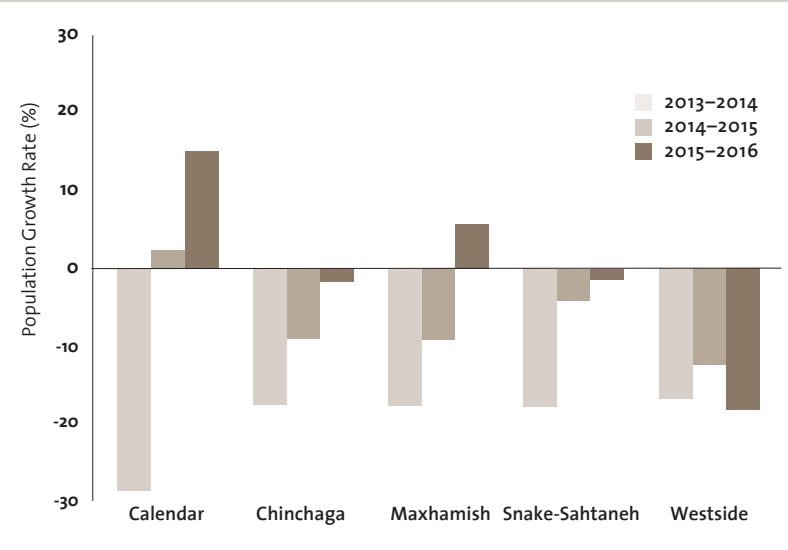
With more Wolves we expect more predation on Caribou, and researchers at the University of Alberta are using simulation models to test hypotheses regarding the relative importance of Wolf population size and the density and configuration of linear features on Caribou predation risk.



CURRENT TRENDS AND FUTURE DIRECTION

Ongoing monitoring by the REMB indicates that adult female Caribou mortality continues to improve throughout most of Caribou range from the lows recorded in 2013–14. Juvenile Caribou recruitment has been sufficient to stabilize populations in two ranges but negative trends persist elsewhere.

The Memorandum of Understanding supporting the REMB’s work expires in 2016 and projects will be winding down. Monitoring and research results are currently being integrated into a revised Boreal Caribou Implementation Plan, which is being developed by the BC government in consultation with First Nations and stakeholders. The revised Plan will set direction for future inventory and research activities.



CARIBOU POPULATION GROWTH RATES BY RANGE, 2013-2016



FINANCIAL SUMMARY

STATEMENT OF FINANCIAL POSITION (000's) AS AT MARCH 31, 2016

ASSETS

Current assets

Cash & cash equivalents	\$ 4,205
Accounts receivable	34
Prepays	20
Total current assets	4,259

Capital assets

Monitoring collars	136
Total assets	4,395

LIABILITIES AND NET ASSETS

Current liabilities

Accounts payable	454
Due to BC Oil and Gas Commission	13
Total liabilities and net assets	467

Fund balance	3,928
Total liabilities and net assets	\$ 4,395

STATEMENT OF OPERATIONS AND CHANGES IN NET ASSETS (000's)

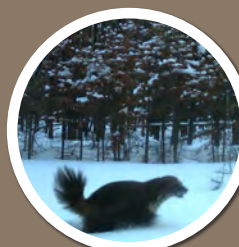
REVENUE

Fees from well applications	\$ —
Levies on production	16
Contributions	2025
Interest	61
Sub-total – Revenue	2,102

EXPENSES

Project costs	2,122
Professional services	131
Management fees	30
Amortization expense	93
Collars – maintenance	14
Extension and communication	26
Miscellaneous	—
Sub-total – Expenses	2,416

Change in fund balance	-314.46
Fund balance, beginning of year	4,242
Fund balance, end of year	\$ 3,928



PROJECT PARTNERS



Alberta Biodiversity Monitoring Institute
Blueberry River First Nations
Calgary Zoo
Caslys Consulting Ltd.
Diversified Environmental Services, Inc.
Ducks Unlimited Canada
EcoLogic Research
Explor
The Firelight Group
Foothills Research Institute
Golder Associates Ltd.
Matrix Solutions, Inc.
Nexen Energy ULC
Prophet River First Nation
University of Alberta
University of Calgary
University of Northern British Columbia
Wildlife Infometrics Inc.

