2018

ANNUAL REPORT

RICC | Regional Industry Caribou Collaboration

RICC

The Regional Industry Caribou Collaboration is a group of energy and forestry companies working collaboratively across tenure and lease boundaries focused on two northeastern Alberta caribou ranges: The Cold Lake range and the East Side Athabasca River (ESAR) range. These ranges overlap substantially with RICC members' oil sands and forest management operations in the area.

Contents

RICC enables range-level caribou recovery efforts that pre-date but support provincial woodland caribou range planning.

Government and industry alike have recognized that conservation is a shared government, public and private sector responsibility. Lease-specific mitigations undertaken by companies are important to minimize local impacts on individual animals, but more population-level benefits stem from range-level mitigations that require collaboration.

MISSION

Enable the restoration of caribou habitat and recovery of their populations through collaborative, range-based efforts

GOAL

Participate in collaborative research and active, science-based adaptive management activities within the defined RICC study area

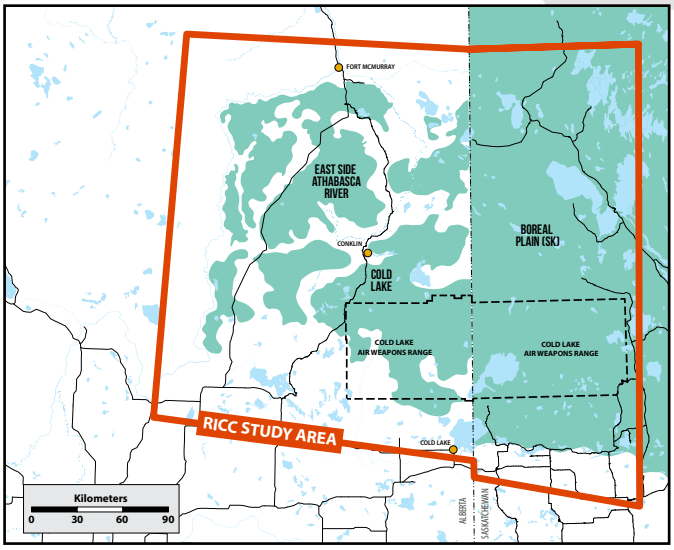
OBJECTIVES

- Coordinate industry restoration of disturbance in priority areas
- Support and lead scientific research on caribou ecology and on caribou-predator-landscape relationships to identify priority issues and/or priority areas
- Support and lead investigative trials on restoration methods, effectiveness, and wildlife responses, and make recommendations for broader implementation

RICC has retained the Alberta Biodiversity Monitoring Institute (ABMI)'s Caribou Monitoring Unit to provide secretariat and technical services that help us meet the above objectives.

RICC Study Area

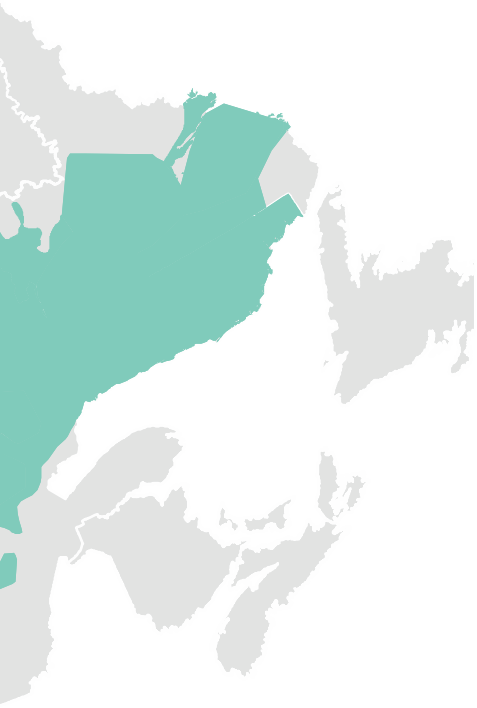
The current RICC study area covers approximately 85,000 km^2 in the Cold Lake and East Side Athabasca River (ESAR) boreal woodland caribou ranges, and parts of the Saskatchewan Boreal Plain caribou range to the east as a less-disturbed reference environment. The study area includes an additional 20 km buffer to incorporate adjacent areas that may have an impact on woodland caribou within their ranges.



State of Boreal Woodland Caribou in Alberta

Boreal woodland caribou are wide-ranging animals whose home ranges cross company leases and various land-use types. Their populations are listed as threatened under Canada's Species at Risk Act[1] (SARA). Many complex and interconnected factors are contributing to the decline of boreal caribou, including both natural and human-caused landscape changes, which are indirectly contributing to increased predation on caribou.

To increase chances of achieving self-sustaining populations, the Federal Recovery Strategy[2] estimates that at least 65% of a caribou range should be undisturbed, with disturbance defined as human footprint plus a 500 m buffer, along with areas that have been burned in the last 40 years. The ESAR and Cold Lake caribou populations are currently in decline, and as of 2017 these ranges were 84% and 87% disturbed, respectively.



"Caribou conservation is a shared government, public and private sector responsibility, led by government. A comprehensive, integrated partnership approach is needed to commit financial and other resources, in a manner which maximizes their effectiveness."

– A Woodland Caribou Policy for Alberta, Government of Alberta

Geographic distribution of woodland caribou, boreal population in Canada

Regional Industry Caribou Collaboration study area covering approx. 85,000km^2 across Alberta and Saskatchewan

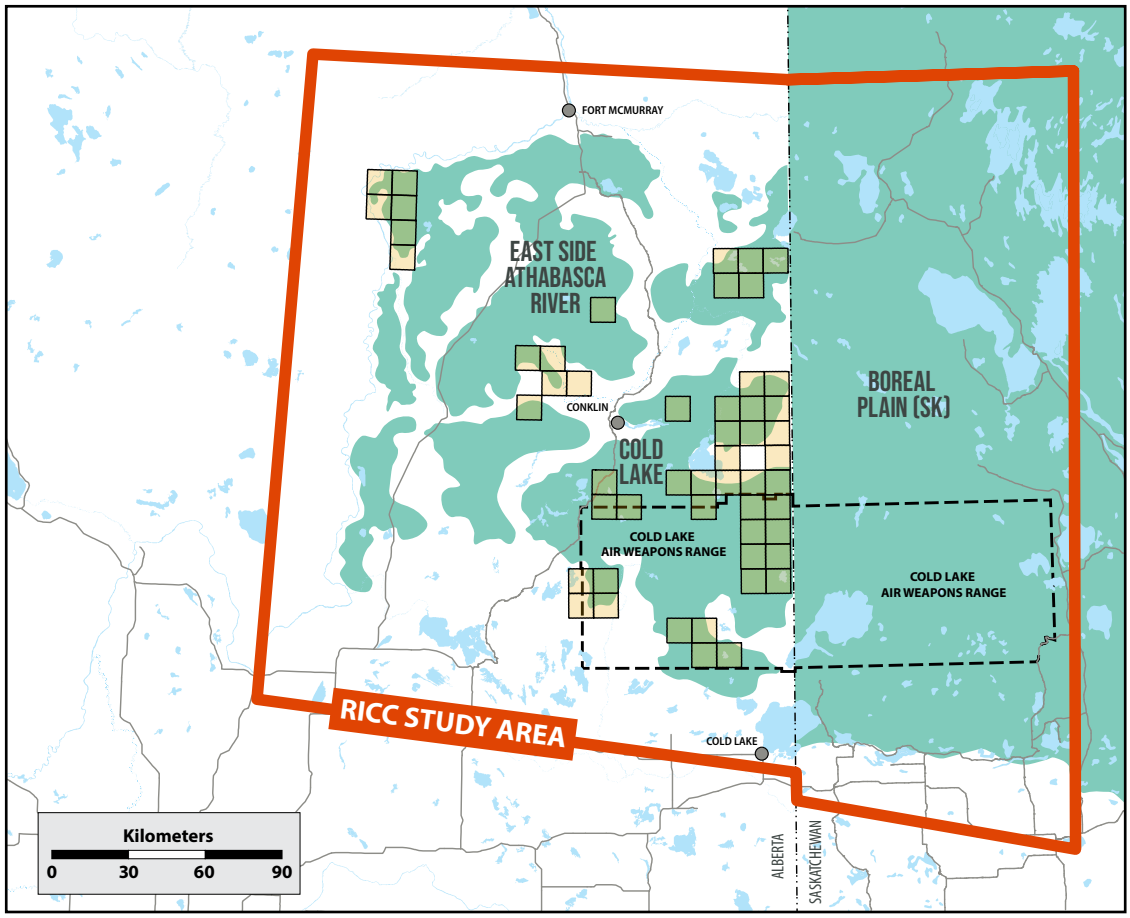
1. Environment and Climate Change Canada. 2017. Report on the Progress of Recovery Strategy Implementation for the Woodland Caribou (Rangifer tarandus caribou), Boreal population in Canada for the Period 2012-2017. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 94 pp.
2. Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada, Environment Canada, 2012.

A Focus on Restoration

Habitat restoration has traditionally focused at small scales on individual company leases and dispositions, primarily to meet company-specific regulatory requirements. While companies are continuing with those lease-focused initiatives, RICC brings companies together to do more, by coordinating habitat restoration across and beyond these leases, and by leading research and trials on restoration methods, effectiveness and wildlife responses. This work has been led by RICC members over the past six years. Together, we can have a bigger impact on caribou recovery than going it alone.

To date, RICC members have implemented restoration treatments on over 1,200 kms of legacy seismic lines across the Cold Lake and ESAR caribou ranges.

The current RICC Study Area covers approximately 85,000 km^2



TREATMENT AREAS TO DATE

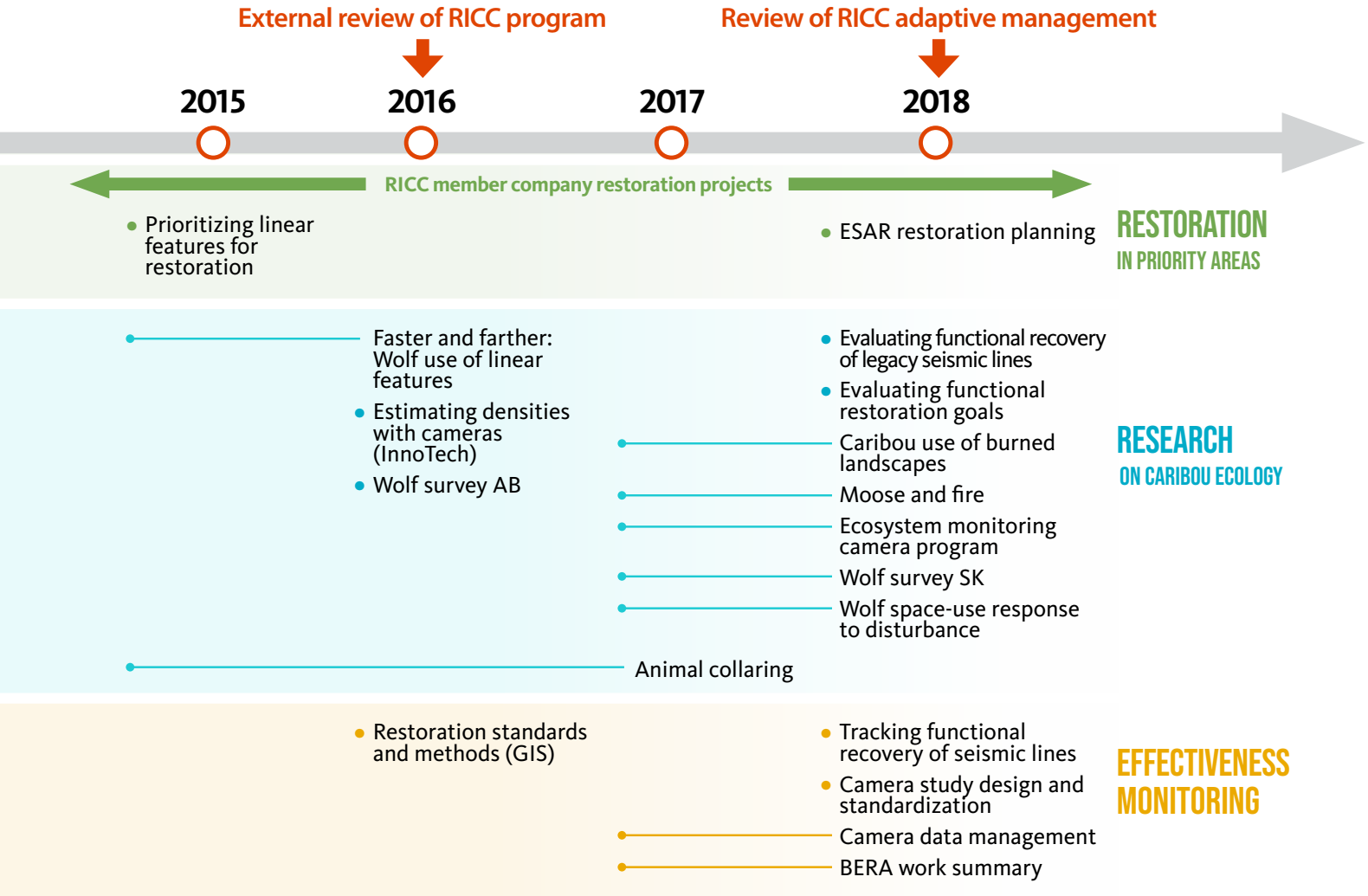
Focusing on the Science

RICC works with academia, the Government of Alberta, the Caribou Monitoring Unit at ABMI and third-party consultants to conduct and support meaningful research that improves how we restore habitat and our understanding of how caribou, other ungulates and predators respond to habitat restoration measures.

Members support and lead a variety of research initiatives on caribou ecology and caribou-predator-landscape relationships to address key uncertainties and develop science-based solutions that can be used to inform effective caribou conservation policies. Detailed technical reports on any of these research projects are available directly from RICC.

Featured 2018 research:

RICC Restoration and Recovery of Caribou Habitat and Population



POST FIRE LANDSCAPE
Bill de Groot, Natural Resources Canada

Caribou Use of Burned Landscapes

RICC has been a supporter and partial funder of Sean Konkolics' University of Alberta Masters research for the past two years, which focuses on caribou use of post-fire landscapes in northeastern Alberta.

Forest fires often destroy ground lichens - the preferred winter forage for caribou, while also generating landscapes favoured by moose and white-tailed deer and attracting their predators, mostly wolves. Consequently, caribou are thought to avoid burned landscapes due to a shortage of food and potentially higher predator densities. Following this paradigm, the federal recovery strategy for woodland caribou includes whole areas burned by wildfire in the last 40 years as disturbed habitat. However, detailed research about the relationship between post-fire forest regeneration and caribou habitat selection is lacking. Konkolic's used high-resolution satellite imagery to map wildfires from the past 40 years. Using this updated wildfire mapping, in combination with caribou telemetry locations, he assessed fine-scale habitat selection to examine whether caribou were selecting or avoiding burned areas within their home ranges.

The updated fire mapping showed that previously delineated fire boundaries consist of up to 25% residual patches, i.e. unburned patches within the larger burned complex. Konkolics found most caribou avoided both the larger burn complex and the non-burned residual patches within those complexes in all habitat types and in all seasons. Individual variation was observed for the selection of some residual patches, with 23% of caribou selecting for lowland residual patches across all seasons. This population avoidance can persist up to 40 years following a fire. Additionally, caribou were not actively selecting or choosing to use burned areas, suggesting that there is no threshold at which caribou start to show consistent use of burned areas. This research demonstrates that post-fire landscapes and the corresponding residual patches may not be optimal habitat for boreal caribou in Alberta, and furthermore may validate the wildfire-as-disturbance assumption used in the federal recovery strategy.

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Moose and Fire

What are the real implications for caribou?

A key assumption in the current federal caribou recovery strategy is that all disturbances including wildfire create favourable conditions for ungulate species other than caribou (i.e. moose and deer), and thus contribute to caribou population declines. RICC commissioned cursory research by ABMI's Caribou Monitoring Unit to test this assumption specifically for moose and wildfire in the northern boreal forest.

Craig DeMars from ABMI analyzed existing GPS radio-collar data from 112 individual moose from three study areas across the northern boreal forest (northeastern Alberta, northwestern Saskatchewan and northeastern British Columbia). The analysis specifically focused on determining moose response to fires (or burned areas) at multiple spatial scales within these areas.

RESULTS

Moose showed low use of burned areas at all scales of analysis and during all seasons, regardless of time since a fire. When considering all burns less than 40 years old – a threshold used by the federal recovery strategy for quantifying burns in caribou range – the results suggest no effect of burns on estimated moose densities. These findings suggest that forest fires are not creating attractive moose habitat within western and northern boreal forests, which challenges both (i) the traditional paradigm of moose preference for post-fire landscapes, and (ii) the prevailing caribou-related hypothesis linking fires to moose increases, and thus to caribou population declines.

These findings suggest that forest fires are not creating attractive moose habitat within western and northern boreal forests

Evaluating Functional Recovery of Legacy Seismic Lines

Previous work conducted by researcher Melanie Dickie, supported by RICC, evaluated wolf response to vegetation regrowth on linear features using radio-collared wolves and high-resolution remote sensing data to measure vegetation height. The results from this study showed that wolf travel speed slowed considerably when vegetation growth on lines reached 0.5m and was slowed to equivalent of undisturbed forest when vegetation growth reached 4.1m. Furthermore, Dickie also found that 13% of the seismic lines in her study area were already at 0.5m vegetation height. Due to their functional impact on wolf travel speeds, these two vegetation height thresholds contribute to partial and full habitat recovery, respectively, and could form the basis for future seismic line habitat restoration targets. Vegetation height is only one variable with which to characterize habitat recovery and it is recognized that it is insufficient on its own. But a key question remained – how to extrapolate Dickie's results from a small study area with detailed, high-resolution data to the broader RICC study area, where detailed high-resolution data is not consistently available.

In 2018, RICC initiated an extensive mapping exercise to use provincially available data sets to evaluate the functional recovery status of seismic lines in the entire RICC study area. The identification of seismic lines that are already at the partial (0.5m vegetation height) and full (4.1m vegetation height) recovery thresholds previously identified as functionally effective for reducing wolf travel speeds, will be a key step in prioritizing restoration plans. Work in 2019 and beyond will test and validate the relationship between wolf, bear and moose movements to vegetation height on these lines.

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Using Remote Sensing for Restoration Planning

Alberta's framework for the restoration of legacy seismic lines[1] is designed to ensure successful restoration of legacy seismic lines by identifying a common approach to planning, restoration objectives and targets, and clear approaches to monitoring and data management. Restoration involves treatments that will inhibit the movement of humans and predators along lines (stem bending, coarse woody debris placement) and encourage a return to forest cover (site preparation, tree planting). However, the sheer volume of lines on the landscape means that tools are required to assist with site-selection and effectiveness monitoring over large areas.

Since 2017, RICC has joined ConocoPhillips Canada, Alberta-Pacific Forest Industries, NSERC, and RICC members Cenovus Energy and Devon Energy in supporting the Boreal Ecosystem Recovery and Assessment (BERA) project in its pursuit of geospatial tools that can help to measure, monitor, and predict the recovery of vegetation and some animal uses along seismic lines.

RESULTS

Several BERA researchers are collaborating on the use of remote-sensing data sets and workflows to perform conifer seedling detection and stocking assessment. Softcopy (manual) photointerpretation of piloted-aircraft imagery (5 cm 4 bands) detected just 44% of field-surveyed conifer seedlings, but 72% of those with a height larger than 100 cm. Our work suggests that while survivability assessments (two to five years post-treatment) are likely not feasible at this resolution, establishment surveys (eight to 10 years post-treatment) are possible under the correct conditions. Man Fai Wu (University of Calgary) and Michael Fromm (Ludwig-Maximilian University Munich), documented similar error patterns with automated-detection techniques related to machine learning.

Gustavo Lopes-Queiroz (University of Calgary), developed a novel approach for mapping coarse woody debris (CWD), both on seismic lines and in the surrounding forest using the same piloted-aircraft imagery as above. Gus' work shows that CWD can be detected with great accuracy (>90%) when training samples are located within the application area, and with very good accuracy (>80%) when working in new areas containing no training samples. The addition of LiDAR-derived variables does not increase the accuracy of CWD detection overall (<2%) but aided significantly to the distinction between logs and snags.

In 2019, BERA will conclude its initial evaluation of airborne remote-sensing technologies for seismic-line restoration planning and assessment.

RICC supports the BERA project in its pursuit of geospatial tools that can help to measure, monitor, and predict the recovery of vegetation and some animal uses along seismic lines.

1. Government of Alberta. 2017. Restoration and Establishment Framework. Prepared for Alberta Environment and Parks, Land and Environment Planning Branch, Edmonton, Alberta. xii + 70 pp.

Ecosystem Monitoring Camera Program

Caribou recovery requires the use of multiple conservation actions to address both increased predation and the impact of habitat changes, including habitat restoration, population management of alternative prey and predators, and direct caribou population interventions. In 2017, RICC initiated a collaborative ecosystem monitoring camera program with ABMI, the Government of Alberta, and the University of Alberta. Cameras are used to monitor changes in relative density and activity levels of ungulates, predators and various medium-sized mammals over time and space.

THE PRIMARY OBJECTIVES OF THE ECOSYSTEM MONITORING CAMERA PROGRAM ARE TO:

1. Monitor multi-species responses to caribou management strategies over time using wildlife cameras.

   This data will be compared across caribou ranges undergoing various combinations of caribou-centric management activities, including:

   - predator reductions in ESAR;
   - predator reductions combined with extensive restoration treatments in Cold Lake;
   - no active caribou-related management in West Side Athabasca River (WSAR); and
   - reference areas with relatively little disturbance in the Saskatchewan boreal plain.

2. Clarify the relative influence of human disturbance and climate on predator and prey densities.

   Cameras are placed across a latitudinal gradient to capture a range of winter severity, which is hypothesized to drive white-tailed deer expansion into caribou range. The program will compare deer densities obtained from cameras at similar latitudes (or winter severity), but varying levels of disturbance.

   Data from year one of the project showed that both deer and black bears exhibited a strong latitudinal gradient in the Alberta caribou ranges, with densities an order of magnitude larger in the southern portions of WSAR and ESAR compared to the northern portions. However, this latitudinal trend was not immediately evident in preliminary data from Saskatchewan. Multiple years of monitoring will be required to draw more meaningful conclusions, and we look forward to continuing this important program in 2019.

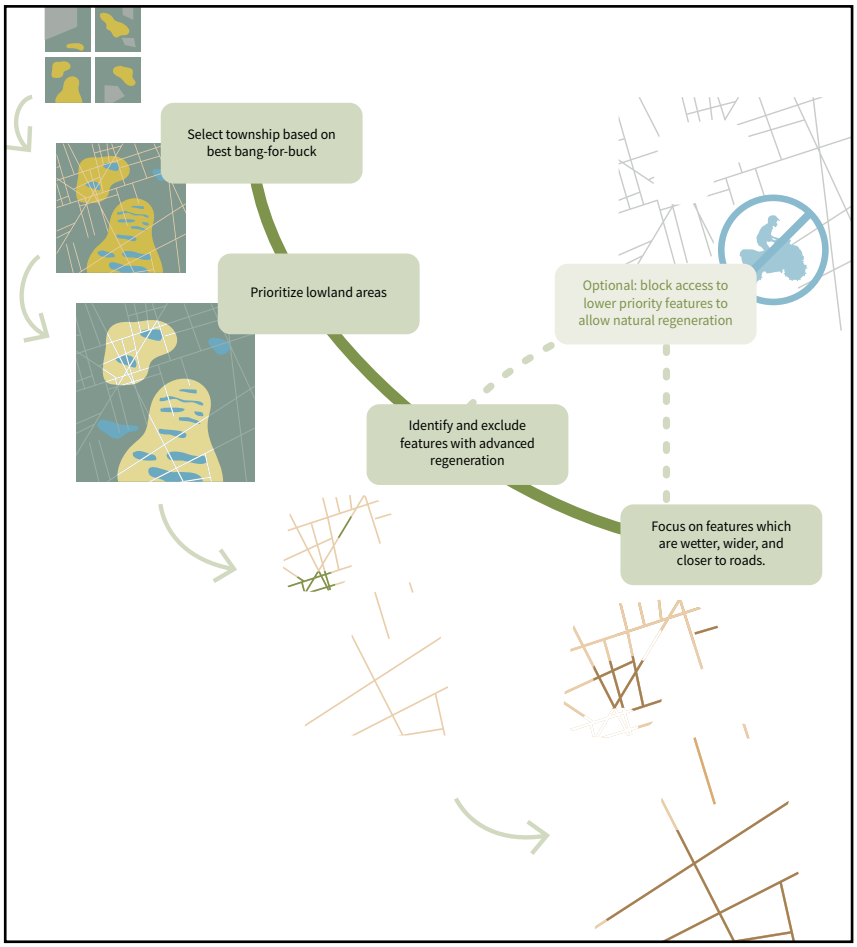
Photos captured by remote cameras

Restoration Innovation Roadmap

A SYNTHESIS OF LESSONS LEARNED

RICC compiled a current state-of-knowledge related to caribou habitat restoration, as a key tool for facilitating adaptive management, and for expediting learnings and efficiencies in future projects. RICC engaged Fuse Consulting Ltd. to synthesize key learnings related to research, implementation, and monitoring of existing caribou habitat restoration programs. Phase 1 of this project, conducted in 2018, yielded eight preliminary recommendations for opportunities to reduce cost and improve effectiveness of restoration. A second phase of the restoration innovation roadmap will be continued in 2019, with a focus on identifying future opportunities to significantly reduce the cost of restoration while maintaining or improving effectiveness of these treatments.

A potential streamlined approach for prioritizing restoration efforts. (Excerpt from Restoration Innovation Roadmap Report, 2019)



PUBLICATION HIGHLIGHTS

- Fire and forest recovery on seismic lines in sandy upland jack pine (Pinus banksiana) forests. Angelo T. Filicetti, Scott E. Nielsen, 2018, Forest Ecology and Management, 421: 32-39.
- Faster and Farther: wolf movement on linear features and implications for hunting behaviour. Dickie, M., Serrouya, R., McNay, R.S. and S. Boutin. Journal of Applied Ecology. 2017 https://besjournals.onlinelibrary.wiley.com/doi/pdf/10.1111/1365-2664.12732
- Evaluating functional recovery of habitat for threatened woodland caribou. Dickie, Serrouya, DeMars, C., Cranston, J. and S. Boutin. Ecosphere. 2017 https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1002/ecs2.1936
- Effects of Linear Disturbances and Fire Severity on Velvet Leaf Blueberry Abundance, Vigor, and Berry Production in Recently Burned Jack Pine Forests. Dawe, C., Filicetti, A. and S.E. Nielsen, 2017. Forests,8(10):398.

Upcoming publications:

- Moose, caribou and fire: Have we got it right yet? DeMars, C., Serrouya, R., Mumma, M., Gillingham, M., McNay, R.S. S. and Boutin. In Press.

Partner with us

Regional Industry Caribou Collaboration members work with academia, the Government of Alberta and the Alberta Biodiversity Monitoring Institute (ABMI) Caribou Monitoring Unit on an ongoing basis. Learn more about our work and how to become a member at:

www.cosia.ca/initiatives/land/regional-industry-caribou-collaboration

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