# **THE EXCHANGE:**

Sharing Knowledge, Inspiring Solutions







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# **Recent insights into white-tailed deer expansions**

Expanding white-tailed deer populations could spell bad news for woodland caribou. As a primary food source for wolves, encroaching white-tailed deer populations can support more wolves, leading to an increase of incidental predation on woodland caribou and other species.

Several mechanisms have been suggested as drivers of the white-tailed deer expansion:



Understanding white-tailed deer responses to landscape features could help forestry companies and other partners identify ways to mitigate white-tailed deer expansions using silviculture and harvesting techniques.

### A closer look at drivers of expansion

Several recent papers have investigated the drivers of white-tailed deer expansions in Alberta, providing insight into their northward expansion.

Using data from ABMI camera sites across the province, Laurent et al. (2020) evaluated the relative effects of snow conditions and anthropogenic habitat alternation on the presence and number of white-tailed deer. Some key study outcomes include:

explained by snow

depth only.

- White-tailed deer distribution in winter and spring was best explained by models that included both snow depth and habitat alteration.
- Winter white-tailed deer density was best explained by snow depth only, while spring density was explained by both habitat alteration and the previous winter's snow depth.
- Limiting habitat alteration and restoring habitat could help slow or reverse expansion, but climate is also a key factor.



landscape alteration and the previous winter's snow depth.

In a similar study, Fisher et al. (2020) evaluated the influence of landscape change and winter severity on white-tailed deer distribution in northeastern Alberta. This study used data from 62 camera traps located in north-eastern Alberta over three years and found:

• White-tailed deer distribution shrank in severe winters but rebounded in spring regardless of winter severity.



White-tailed deer distribution shrank in severe winters.

- Distribution was best explained by anthropological landscape features associated early seral vegetation.
- When lower winter severity was combined with anthropogenic habitat alteration, it was found to positively influence white-tailed deer distribution.

Using data from 62 camera traps in northeastern Alberta, this three year study by Fisher and Burton (2020) evaluated the effect of anthropogenic habitat alteration vs natural landscape heterogeneity on white-tailed deer reproductive success. The study found:

- White-tailed deer reproductive success was best explained by oil and gas landscape features associated with young vegetation.
- The effect of anthropogenic features was two orders of magnitude greater than the observed natural variability in vegetation.
- A higher presence of young vegetation supports high springtime births and survival of young deer, maintaining populations despite severe winters.
- More research is needed to understand differences in how oil and gas vs post-harvest forest patterns affects the success of white-tailed deer populations.





White-tailed deer distribution rebounded in spring regardless of winter severity, and was best explained by anthropological landscape features.

### Bringing it all together

These studies suggest that while climate is an important factor in northward expansions of whitetailed deer, landscape disturbance appears to play a key role in maintaining deer populations at the northern limits of their range. Evidence suggests that the additional browse provided by these landscape features facilitates high springtime reproductive success, allowing deer populations to bounce back quickly from severe winters.

Restoration efforts or silvicultural approaches to reduce deer expansion may have the greatest benefit in northern areas of the province, where these dynamics are most at play, though further research is needed.

#### Further reading:

Fisher, J. T., & Burton, A. C. (2021). Spatial structure of reproductive success infers mechanisms of ungulate invasion in Nearctic boreal landscapes. *Ecology and evolution*, 11(2), 900-911.

Fisher, J. T., Burton, A. C., Nolan, L., & Roy, L. (2020). Influences of landscape change and winter severity on invasive ungulate persistence in the Nearctic boreal forest. *Scientific reports*, 10(1), 1-11.

Laurent, M., Dickie, M., Becker, M., Serrouya, R., & Boutin, S. (2021). Evaluating the Mechanisms of Landscape Change on White-Tailed Deer Populations. *The Journal of Wildlife Management*, 85(2), 340-353.

# Finding a common definition for Integrated Land Management: highlights from the first completed ARCKP project

Over the course of their lifetime, woodland caribou move through an extensive landscape. This contributes to the many challenges of land management. A single woodland caribou range will interact with multiple overlapping leaseholders, disturbances of varying types and ages, and even areas in different jurisdictions. Coordinating industrial land-use and habitat restoration in order to make an impact at the range scale requires cooperation and communication between stakeholders.

Integrated Land Management (ILM) is a collaborative approach to land-use planning that seeks to holistically manage competing land-uses and values on the landscape. For instance, an ILM approach might involve stakeholders working together to consolidate road networks, restore habitat strategically, or more effectively engage Indigenous communities in land-use planning. Despite the potential benefits for woodland caribou recovery and management, ILM has been difficult to implement in Alberta.



To help advance ILM in Alberta, the ARCKP funded a project to investigate opportunities, gaps, and/or barriers in Alberta's ILM policies, practices and legislation. The project represents the first completed ARCKP study and involved:

- an examination of relevant case studies
- an extensive literature review
- interviews with 32 subject matter experts from Indigenous communities, academia, forest and energy sectors, government, Alberta Energy Regulator, and environmental organizations.



The project resulted in 26 specific recommendations for consideration to enhance ILM in Alberta. One key finding that emerged was the need for a shared definition of ILM in Alberta.

Working definitions of ILM range from an operational tool, to a process, to a broader strategic mindset. The absence of a clear and shared definition of ILM contributes to a lack of common vision on how it will be implemented on the ground, making it difficult to advance ILM initiatives for woodland caribou recovery.



The project leaders recommend adoption of the following definition of ILM:

"Integrated Land Management (ILM) is a strategic, planned approach to manage and reduce human footprint on the landscape. It is a collaborative approach to promote responsible use of public lands by influencing human behavior and encouraging ILM as a way of thinking for all land users."

With adoption of a clear definition, ILM planners can focus their planning efforts and work towards identifying roles and responsibilities among stakeholders.

Calculated, strategic action is needed to make ILM a success and support woodland caribou recovery in Alberta. In upcoming issues of *The Exchange*, we will continue to share some of the key recommendations from the project.

You can learn more about this project at **arckp.friresearch.ca**.

#### Alberta Regional Caribou Knowledge Partnership

# **Restoration innovations in woodland caribou ranges**

Landscape disturbance is a key obstacle to woodland caribou recovery. Legacy disturbances, like seismic lines, contribute to increased predation risk by aiding predator movement and providing access to woodland caribou habitat. Restoration of legacy seismic lines is an essential part of woodland caribou recovery programs and is critical to achieving disturbance targets in woodland caribou ranges, as set by the federal recovery strategy. The restoration of legacy seismic lines requires the application of forestry knowledge, but it comes with a suite of challenges. Some restoration challenges are readily familiar to foresters:

• Reducing soil compaction • Creating suitable microsites for trees • Managing competition for tree seedlings.

Thankfully, this is an area where techniques and strategies have evolved rapidly, aided by multi-sector knowledgesharing initiatives. One such initiative is the Silviculture Toolkit, developed by Natural Resources Canada and Canada's Oil Sands Innovation Alliance (COSIA). The toolkit profiles silvicultural techniques to aid in the restoration of woodland caribou habitat, including mounding, stem bending, tree felling, transplanting, and coarse woody debris.



Even with the application of advanced forestry techniques, however, the cost of legacy seismic feature restoration has remained high, with reported costs ranging from \$6,000-\$34,000/km depending on the program. This has sparked innovation among companies to enhance program effectiveness and reduce costs.



The Restoration Innovation Roadmap, initiated by the Regional Industry Caribou Collaboration (RICC) synthesized some of these key learnings and recent innovations related to restoration programs. The goal was to raise awareness about key innovations, and to expedite the cycle of adaptive management related to restoration.

Following are some current and ongoing examples of innovations related to restoration and developing more effective implementation plans.

#### Planning Innovations

- Prioritization tools to identify where restoration can achieve the best "bang-for-buck". Such tools can aid with identifying areas for collaborative restoration efforts between forestry companies, oil and gas companies, and the provincial government.
- Better detection and mapping of advance regeneration using unmanned aerial vehicles (UAVs) and other imaging techniques. These approaches can help increase program efficiencies by capitalizing on existing recovery and developing more effective implementation plans.

#### Further reading:

Natural Resources Canada (NRCan) Silviculture Toolkit: https://www.360tours.cosia.ca/toolkit/

Pyper, M., & Broadley, K. (2019). Restoration Innovation Roadmap Phase 1: A Synthesis of Lessons Learned to Date. Prepared for Regional Industry Caribou Collaboration (RICC). May 3, 2019.

Pyper, M., Broadley, K., Tigner, J., & Byrne, K. (2020). Restoration Innovation Roadmap Phase 2 A summary of opportunities to advance innovation for linear restoration within woodland caribou habitat. Prepared for Canada's Oil Sands Innovation Alliance (COSIA) and Alberta Innovates. Jan 31, 2020

 ${\tt RICC-https://www.cosia.ca/initiatives/land/projects/regional-industry-caribou-collaboration}$ 



Treatment recommended

No treatment recommended

## Implementation Innovations

- Experiments on treatment intensity and application, such as mound size (small mounds may be insufficient in many lowland sites) and winter planting (which performs with similar success to summer planting). These experiments can help guide operational efficiencies and maximize restoration effectiveness.
- Equipment innovations, such as amphibious excavators and custom tow-behind implements (devices dragged across the ground by a machine) to treat lines in different seasons and more efficiently.
- Novel site preparation techniques, like peat hummock transplantation in lowland sites to re-establish immediate tree cover on restored peatland sites.

## **Monitoring Innovations**

 Use of consumer-grade cameras on UAVs and fixed-wing aircraft to monitor vegetation (shown particularly effective for vegetation height). The importance of such innovations is anticipated to grow rapidly if/when drones can be legally operated beyond line-of-sight and can be used to enhance both planning and monitoring efforts.



Small mounds Large mounds Summer Winter planting planting

Amphibious excavator



Hummock transfer

Legacy feature restoration continues to evolve, and has strong connections to integrated land management. Sharing of knowledge and silviculture advancements related to key advances made by the Regional Industry Caribou Collaboration, Canada's Oil Sands Innovation Alliance, and forestry companies can help ensure that treatments are being delivered as efficiently and effectively as possible to achieve caribou conservation objectives.

# WHAT IS THE ARCKP?

Who we are, and what we do

Woodland caribou are a cultural and ecological icon of Alberta's forests. However, they are also a threatened species, and represent a significant conservation challenge. In response to this challenge, and to the additional challenge of managing woodland caribou across different ecosystems, the Government of Alberta and the province's forest sector formed the Alberta Regional Caribou Knowledge Partnership (ARCKP). Together, we are committed to finding on-theground solutions that balance forestry activities with woodland caribou conservation.

- » The ARCKP is an association of fRI Research and funded by the Forest Resource Improvement Association of Alberta (FRIAA) through the support of 12 forestry companies in Alberta.
- » Together, these partners have contributed over \$1 million per year for five years to address region-specific knowledge gaps in woodland caribou ecology.
- » A steering committee with government and industry representatives oversees allocation of the funding and guides the operation of the partnership.



To advance conservation and produce relevant, on-the-ground solutions, it's important to ask the right questions. That's why we draw on expert knowledge to identify solutions for the working landbase, including identifying knowledge gaps and priority areas in research, applications, policy, and knowledge exchange.

### The ARCKP has four focal areas that currently guide our work:



Restoration



Integrated Land Mangagement



Silviculture and Harvest Systems



**Harvest Planning** 

We collaboratively identify knowledge gaps by consulting with government, industry, and a wide range of stakeholders.



Through multi-sector meetings and workshops, our technical subcommittee reviews and prioritizes research topics and projects for the ARCKP to fund.



We then invite experts and researchers to submit Expressions of Interest for projects. Selected projects are delivered with close collaboration with the partners.



We create a forum for industry and government to discuss research outcomes, alternative practices, and implementation options.



The ARCKP is committed to knowledge sharing and getting important knowledge into the hands of practitioners. This publication is the first of many to come and aims to:





Connect you to accessible and relevant scientific information.

Keep you informed on ARCKP work and projects.



Facilitate stronger research outcomes and increased opportunities for knowledge sharing and collaborations.

We are excited to watch these important research, communication, and implementation initiatives unfold.

You can stay current on our latest updates by following this newsletter.

Have questions about the ARCKP? Contact our network coordinator Kristy Burke at kristy@fuseconsulting.ca or visit arckp.friresearch.ca.



The ARCKP is funded by the Forest Resource Improvement Association of Alberta



ARCKP Partners -----

























For more information or to contact the ARCKP, visit arckp.friresearch.ca



