



THE EXCHANGE:

Sharing Knowledge, Inspiring Solutions



2024
EDITION 9



Alberta Regional Caribou Knowledge Partnership



Connecting Alberta's forest sector and policy makers to accessible and relevant scientific information is key to advancing woodland caribou conservation efforts across the province. To facilitate this, the Alberta Regional Caribou Knowledge Partnership (ARCKP) provides regular knowledge exchange, keeping our partners and stakeholders up to date on the research and information they need to make important forest management and policy decisions.

TABLE OF CONTENTS

02 GREY WOLVES USE CUTBLOCKS MORE AND LINEAR FEATURES LESS FOLLOWING PREDATOR CONTROL

04 LICHEN TRANSPLANTATION HOLDS PROMISE FOR INCREASING CARIBOU WINTER FORAGE

06 SILVICULTURE AS A TOOL FOR REDUCING UNGULATE USE OF HARVEST BLOCKS

08 WHAT IS THE ARCKP?
Who we are, and what we do

Grey wolves use cutblocks more and linear features less following predator control

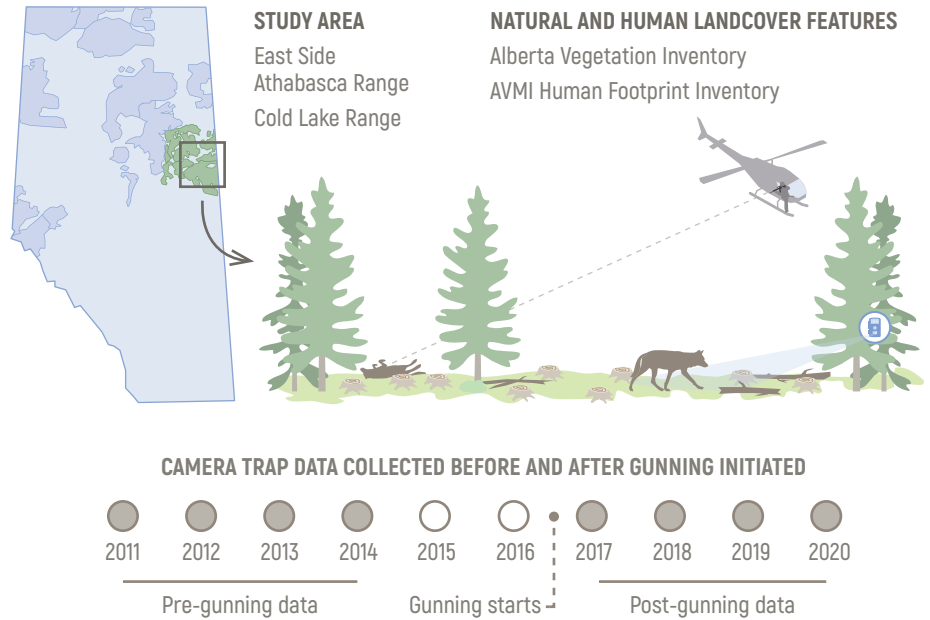
Wolf culls are a form of predator control that has been, and continues to be, employed as a tool for caribou conservation. However, it has been criticized for not being especially well-researched, particularly given the high potential for unintended impacts.

One key question that has not been well-studied is **how wolf culls alter wolf behaviour**. For wolves, anthropogenic features (e.g., cutblocks) provide easier access to prey such as deer and moose, which are drawn to the early-seral forage species that regenerate following disturbance. Anthropogenic features are also more open, leaving wolves exposed to aerial gunning. A recent study asked, **do wolves change their use of anthropogenic features because of an increased risk from aerial gunning?**

Study design

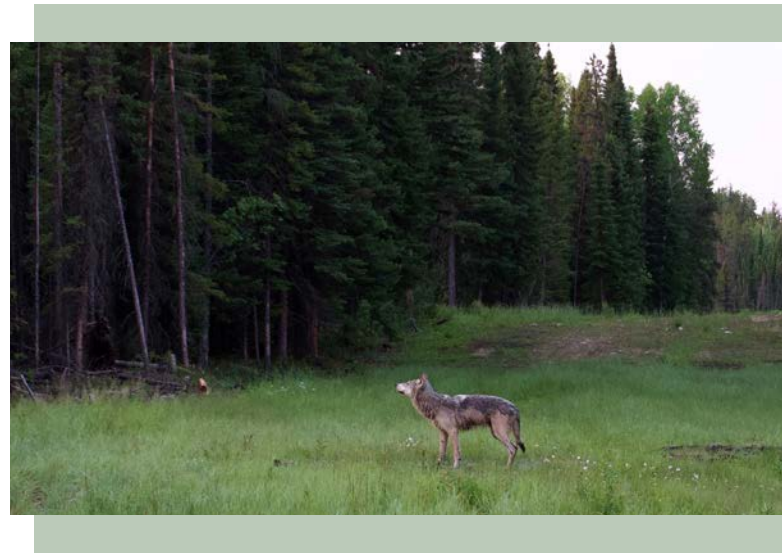
This study took place in east-central Alberta.

Camera traps collected wolf population data before a wolf population reduction program was initiated using aerial gunning via helicopter. Post-control data were collected from 2017–2020, during which time 92 wolves were killed as part of the program.



Predator control substantially reduced wolf detections

During the study period, there was a 76% decline in the number of wolf detections. The remaining wolves spread out, maintaining 75% of their pre-cull distribution.



Wolves avoided lines and selected polygons following predator control

A surprising result of this research was that wolves started selecting harvest blocks and well sites, which are highly exposed, after aerial gunning began. However, linear features lend themselves best to aerial gunning by being both open and long (i.e., easy to follow tracks), and open features may therefore be less risky to wolves while still attracting primary prey.

WOLVES AVOIDED SEISMIC LINES AFTER PREDATOR CONTROL



Pre-cull: Selected linear features, especially roads.

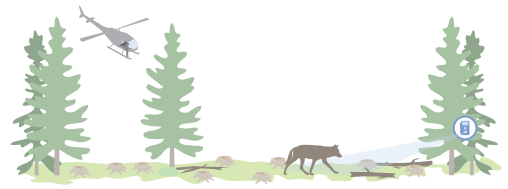


Post-cull: Avoided all linear features.

WOLVES SELECTED CUTBLOCKS AND WELL SITES AFTER PREDATOR CONTROL



Pre-cull: No strong relationship to polygonal disturbances.



Post-cull: Strongly selected cutblocks and well sites.

Forest management may play an important role where predator management occurs

This research shows that an unintended impact of predator management is increased use of cutblocks and well sites by wolves. This study did not explore the implications of this pattern on caribou demographics; however, if these features contain ample forage for primary prey, they may allow wolf populations to recover more quickly, ultimately reducing the effectiveness of predator management. Likewise, if these features occur near important caribou habitat areas, they are likely to increase the risk to caribou of predation by wolves.

Where predator management is occurring, planned or anticipated, there is an opportunity for research into the impacts of increased wolf presence in cutblocks on caribou. For example, research of block-scale strategies to reduce forage species that attract primary prey may inform how forest management can support positive outcomes for caribou alongside predator management. At larger scales, this study emphasizes the importance of planning refugia for caribou far from early-seral cutblocks within a harvest sequence, or planning of regeneration strategies that may discourage selection by wolves, deer and moose. While these predator management strategies are important for caribou generally, this research shows that **they may play an outsized role in caribou ranges where predator management is being used to maintain caribou populations.**

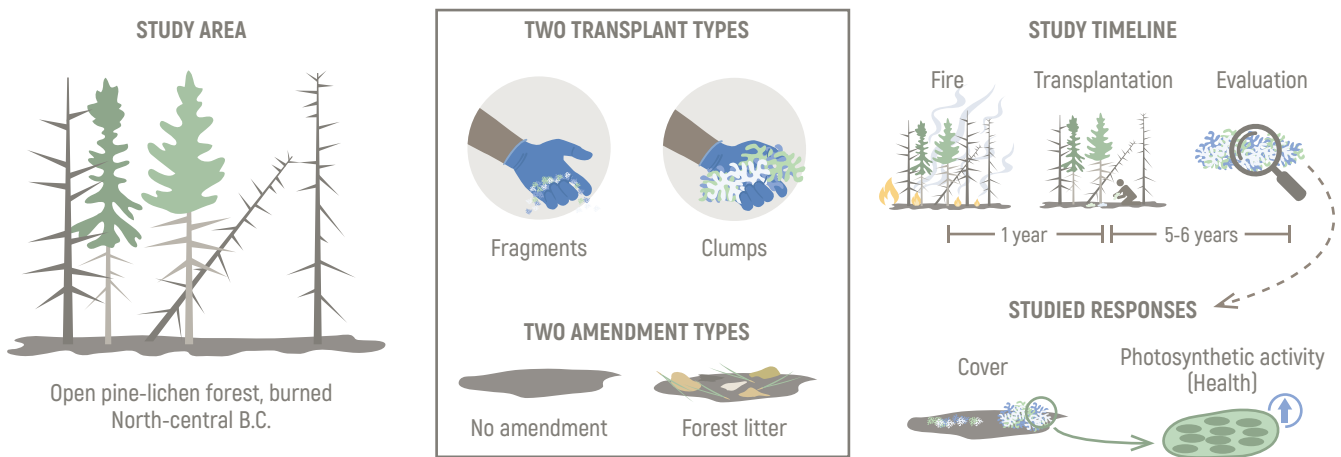


Baillie-David, K., Volpe, J.P., Burton, C., and Fisher, J.T. Preprint. Grey wolves (*Canis lupus*) shift selection of anthropogenic landscape features following predator control in the Nearctic boreal forest. Available at [SSRN](https://ssrn.com/abstract=4654628) or <http://dx.doi.org/10.2139/ssrn.4654628>.

Lichen transplantation holds promise for increasing caribou winter forage

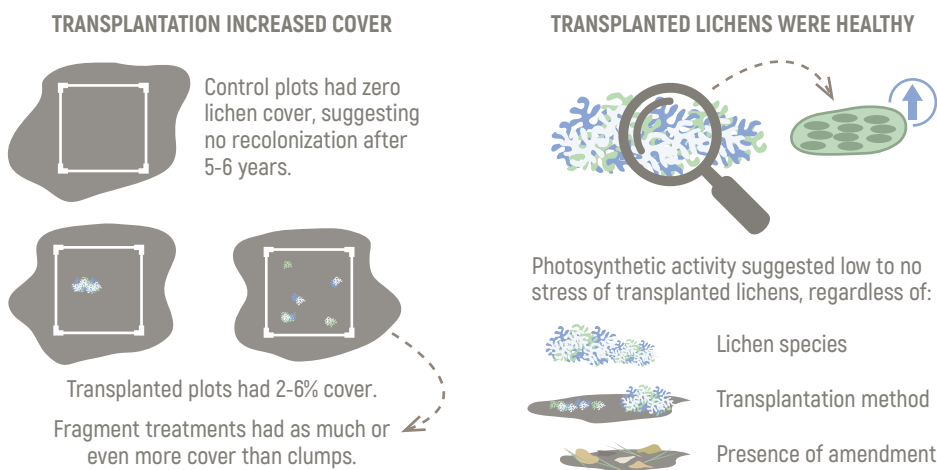
Caribou have many specific habitat needs that make them especially vulnerable to both natural and human-caused disturbances, one being the need for terrestrial lichen as a winter forage. One possible avenue of habitat restoration is to actively increase the amount of terrestrial lichens by transplanting them from another site. **The role of transplantation in caribou habitat restoration is of interest because lichens can be a limiting resource in the winter**, and they take many decades to regrow following a stand-replacing disturbance like fire.

The following study evaluated the **cover and survival of terrestrial lichens, five to six years after they were transplanted**. While the study assessed the success of transplantation in a burned stand, it provided important insight into the general viability of this habitat restoration strategy.



For a detailed description of the approach used for lichen collection and transportation, see [Rapai et al. 2017](#).

Transplanted lichens had high survival and cover after five years



The health of the transplanted lichens indicates that barriers to dispersal, rather than poor growing conditions, are the main reason that lichens are slow to recolonize burned stands.



What do these findings mean for forestry?

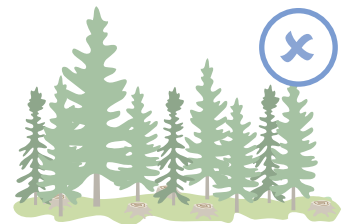
This trial was performed in a burned stand, but raises possibilities for applications in the context of forest management:

- Transplantation can promote faster establishment of lichens in burned environments, and future research could inform how this treatment could be applied to achieve faster restoration of other stand-replacing disturbances such as harvest.
- Spreading lichen fragments shows promise as a more efficient technique with similar or even better results than mats.

However, it is important to recall that the stands where lichens have been transplanted are themselves regenerating, with important implications to consider:

- The benefits of lichen transplantation may have limited utility in stands with dense regeneration of trees and/or understory vegetation.
- Lichen transplantation will provide fewer benefits in stands that caribou tend to avoid or that put them at increased risk.

As wildland fires occur with greater extent and intensity across western Canada, the importance of lichen transplantation may increase as a tool for restoring foraging caribou habitat. **The findings of this study suggest that lichen transplantation has the potential for accelerating the return of terrestrial lichen cover in disturbed stands, particularly in sites that were previously suitable for lichen growth (e.g., open pine-lichen stands).**



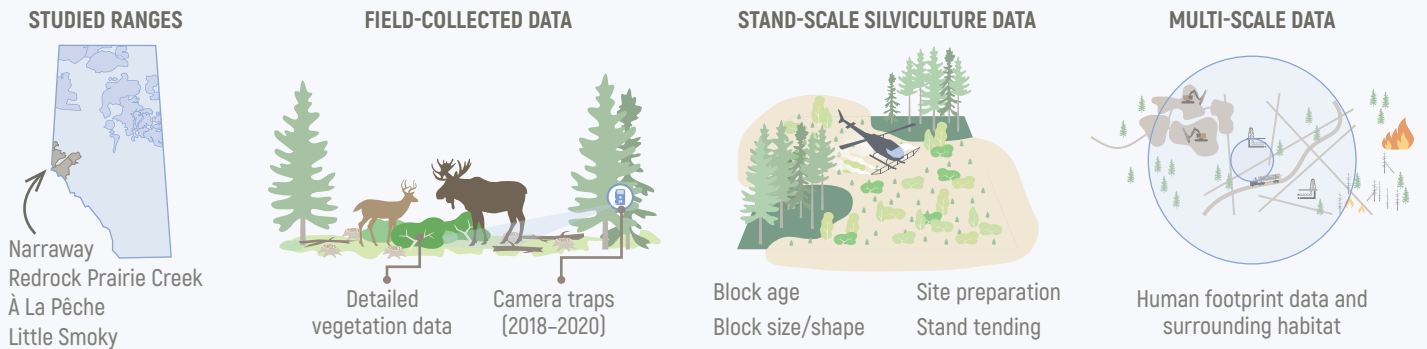
Rapai, S.B., D. McColl, B. Collis, T. Henry and D. Coxson. 2023. Terrestrial lichen caribou forage transplant success: year 5 and 6 results. *Restoration Ecology* 31(4): e13867. [\[URL\]](#)

Silviculture as a tool for reducing ungulate use of harvest blocks

Forest harvest alters habitats in several ways that affect caribou, including the creation of habitat that may attract other ungulates like deer, moose and elk. The early seral vegetation that often grows in younger harvest blocks is an appealing draw for hungry ungulates, who in turn attract hungry predators like wolves and bears to these habitats.

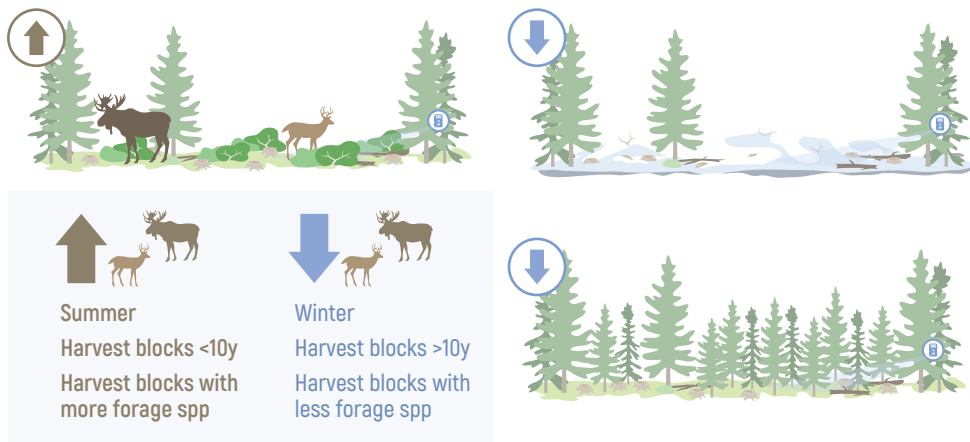
Stand-scale silviculture treatments also alter habitats by reducing competing vegetation and promoting rapid tree regeneration through site preparation, tree planting and stand tending. However, the relationship between these treatments and ungulate use has not been studied until now. The findings of this research provide important implications for strategies forest managers may employ for **limiting deer, moose and elk within their harvested areas**.

Multiple datasets at multiple scales



Young harvest blocks attract ungulates, especially in the summer

Camera trap results found higher occurrences of deer, moose and elk during the summer than the winter, in younger harvest blocks (10 years or younger), and in harvest blocks that contained more forage species. Taken together, these findings illustrate the harvest block-level conditions that are expected to most increase predation risk to caribou.



The following forage species were positively associated with elk, deer and moose:

- *Calamagrostis canadensis*
- Aspen and poplar saplings
- Horsetail
- Willows

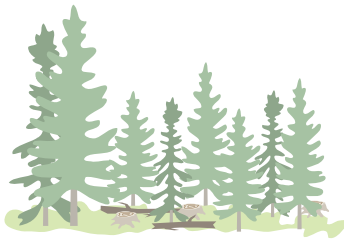
Tree planting and stand tending reduced ungulate use of harvest blocks

While young harvest blocks attracted ungulates, silviculture treatments reduced ungulate use of harvest blocks.

Ungulates also responded to landscape-scale factors

Ungulates also responded to habitat factors at larger scales, suggesting additional factors that forest managers may need to consider.

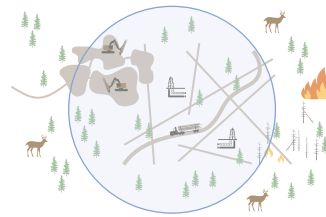
HIGH PLANTING DENSITY OF LODGEPOLE PINE



White-tailed deer & Mule deer

Rapid canopy closure shades out forage vegetation in the understory.

HIGH HARVEST BLOCK AND LINEAR FEATURE DENSITIES



White-tailed deer

Require a mix of forest ages at larger scales despite attraction to early seral habitats.

STAND TENDING



Mule deer

Direct removal of competing vegetation reduces forage availability.

Implication: Silviculture treatments with ungulate management as a primary goal may be less worthwhile on heavily disturbed landscapes than on those with lower human footprint, particularly for white-tailed deer.

Silviculture may help support reforestation and caribou conservation goals at once

By demonstrating the relationship between deer, moose and elk with silviculture treatments in the context of a harvested landscape, this research provides an exciting look at the ways in which silviculture may be used to achieve multiple objectives. **Tree planting** and **stand tending** might both be used strategically to reduce ungulate use of young regenerating stands that would otherwise draw them in.

The landscape context of these findings provides important insights into where these treatments would be expected to provide the most value to caribou conservation. Many ungulates may already avoid heavily harvested landscapes that lack patches of older forest and highly disturbed areas are also unsuitable for caribou. However, **young harvest blocks that occur in areas with a higher proportion of older forests may be good candidates for targeted silviculture** aimed not only at enhancing tree growth, but also reducing the availability of forage species for competitive species such as deer, moose and elk.

McKay, T. and Finnegan, L. 2023. Ungulate occurrence in forest harvest blocks is influenced by forage availability, surrounding habitat and silviculture practices. *Ecological Solutions and Evidence* 4: e12226. [\[URL\]](#)

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-the-ground 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.



OUR VISION

A collaboration promoting self-sustaining caribou populations and a viable forest sector.



OUR MISSION

We support the development and sharing of innovative tools, techniques, strategies and understandable scientific knowledge to enhance sustainable forest management and caribou recovery efforts.

Have questions about the ARCKP? Contact our network coordinator Rielle Massey-Leclerc at rielle@fuseconsulting.ca or visit arckp.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.ca



AN ASSOCIATION OF **fri** Research