



# THE EXCHANGE:

Sharing Knowledge, Inspiring Solutions



2021  
EDITION 1



Alberta Regional Caribou Knowledge Partnership





Credit: Mercer Peace River Pulp Ltd.

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# WHAT IS THE ARCKP?

## Who we are, and what we do

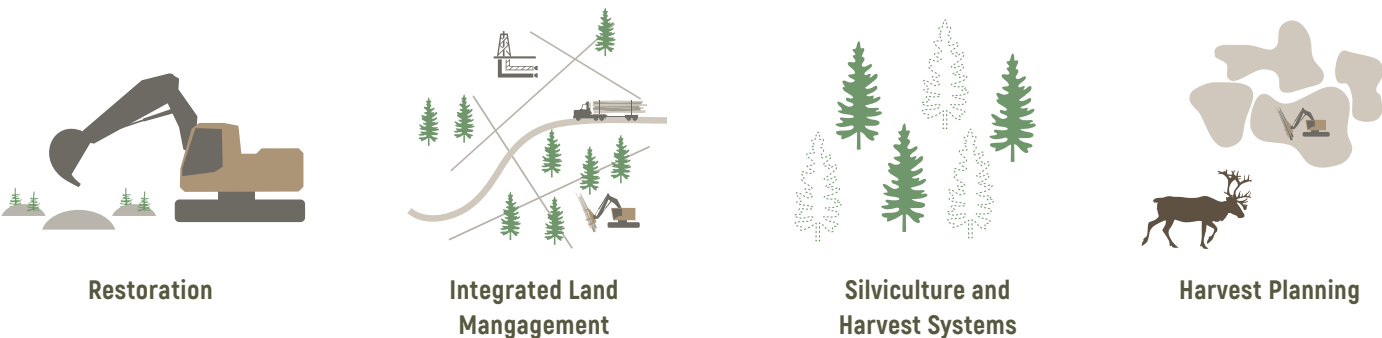
Woodland caribou are a cultural and ecological icon of Alberta’s forests. However, they are also a threatened species, and represent a significant conservation challenge. In response to this challenge, and to the additional challenge of managing woodland caribou across different ecosystems, the Government 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.
- » A steering committee with government and industry representatives oversees allocation of the funding and guides the operation of the partnership.

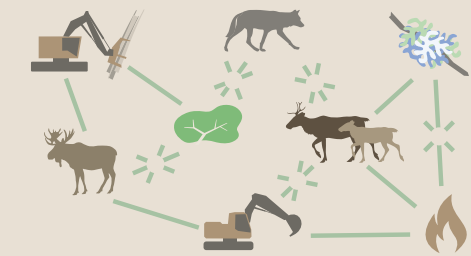


To advance conservation and produce relevant, on-the-ground solutions, it’s important to ask the right questions. That’s why we draw on expert knowledge to collaboratively identify knowledge gaps and priority areas in research, applications, policy, and knowledge exchange.

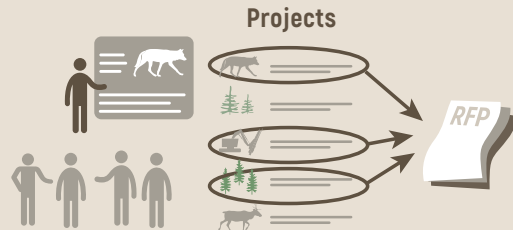
## The ARCKP currently has four focal areas that guide our work:



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



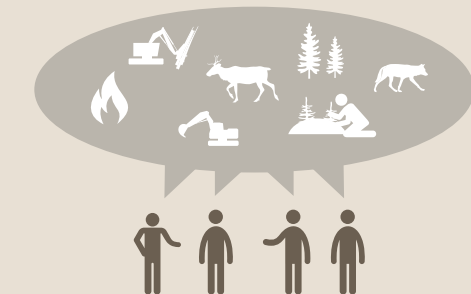
Through multi-sector meetings and workshops, our technical subcommittee reviews and prioritizes research topics and projects for the ARCKP to fund.



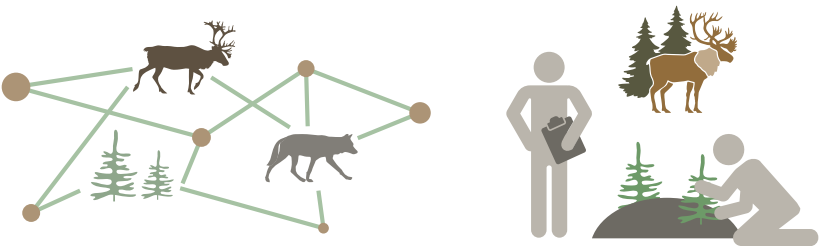
We then invite experts to submit Expressions of Interest for projects. Selected projects are delivered with close collaboration with the partners.



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

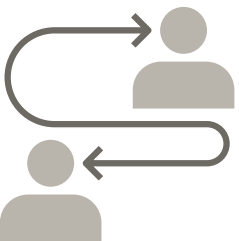


The ARCKP is committed to knowledge sharing and getting important knowledge into the hands of practitioners. This publication is the first of many to come and aims to:



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](mailto:kristy@fuseconsulting.ca) or visit [arckp.friresearch.ca](http://arckp.friresearch.ca).

# RESTORATION:

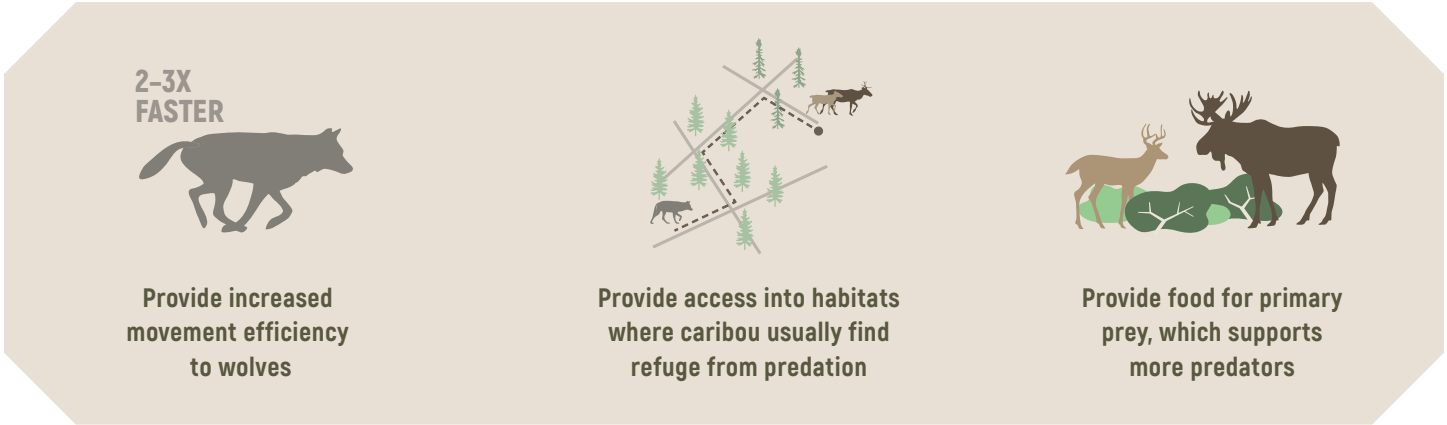
## What are its goals, and how is forestry knowledge being used?

Forest professionals are readily familiar with the power of silviculture to direct reforestation. Whether to give seedlings a head start against competition, determine the species composition of the future stand, or provide favourable soil and nutrient conditions, silviculture techniques provide a suite of tools that help achieve a more predictable result.

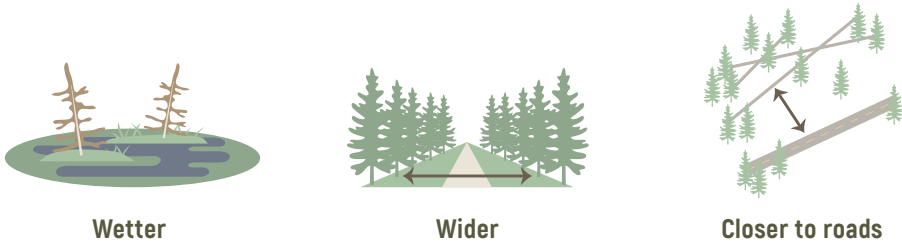
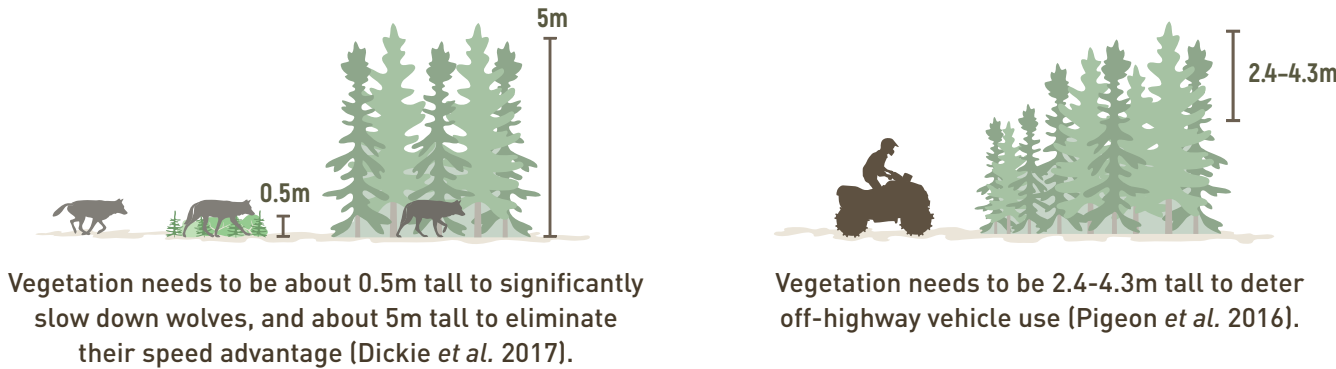
Habitat restoration of legacy features (e.g., seismic lines, roads, pipelines, and wellpads) involves unique challenges,

but represents an exciting application of forestry knowledge in caribou conservation. To achieve the federal recovery target of 65% undisturbed habitat, restoration of legacy features and other disturbances is a critical step.

Legacy features impact caribou in multiple ways. The key mechanisms illustrated below inform the goals of restoration in caribou habitat:



Studies have explored factors that affect predator use of linear features over time, and when such features are expected to recover on their own. Key findings have included:



Linear features that are wetter, wider, and closer to roads are least likely to regenerate on their own (Van Rensen et al. 2015).

Restoration efforts, therefore, aim to achieve multiple goals:



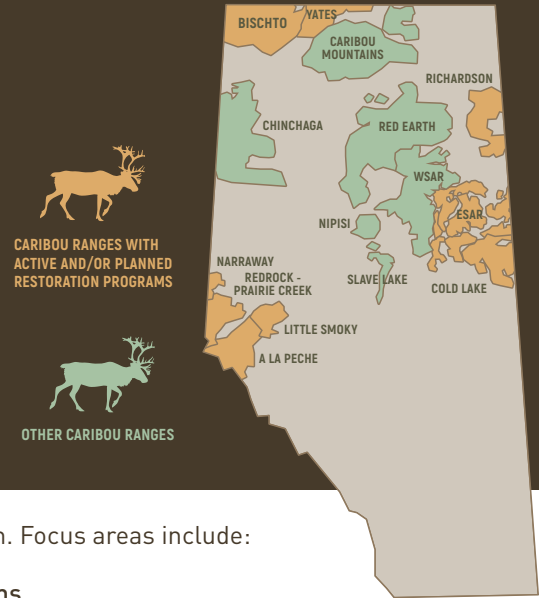
Natural Resources Canada and Canada's Oil Sands Innovation Alliance (COSIA) has developed a toolkit of silvicultural techniques to aid in the restoration of caribou habitat. These include:



The province of Alberta has also created a framework to guide the evaluation of restoration success within restoration programs. The principles are modelled after free-to-grow-assessments and include requirements to achieve:

- » Sufficient stocking densities on both sides of linear features.
- » Specific height targets based on ecosites.
- » Completion of survival assessments within 2-3 years of treatments.
- » Completion of establishment surveys within 8-10 years of treatments.

Organizations continue to build on this momentum and large-scale projects are being planned across various regions of the province.



COSIA member companies also continue to explore ways to advance restoration. Focus areas include:

- » Improving prioritization, planning, and site selection of restoration programs.
- » Exploring innovation opportunities for treating upland and lowland areas more efficiently and effectively.
- » Investing in projects to determine the best ways to evaluate restoration effectiveness.

As research continues, there is great value in cross-industry sharing of knowledge about advancements in silviculture and learnings from operating in caribou habitat.

Further Reading:

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

Government of Alberta. (2017). *Provincial restoration and establishment framework for legacy seismic lines in Alberta*. Alberta Environment and Parks, Land and Environment Planning Branch. Government of Alberta, Edmonton, Alberta.

Dickie, M., Serrouya, R., DeMars, C., Cranston, J., Boutin, S. (2017). Evaluating functional recovery of habitat for threatened woodland caribou. *Ecosphere*. 8 (9): e01936

Dickie, M., Serrouya, R., McNay, R.S., Boutin, S. (2016). Faster and farther: Wolf movement on linear features and implications for hunting behaviour. *Journal of Applied Ecology*. 54 (1): 253-263

Pigeon, K.E., Anderson, M., MacNearney, D., Cranston, J., Stenhouse, G., Finnegan, L. (2016). Toward the Restoration of Caribou Habitat: Understanding Factors Associated with Human Motorized Use of Legacy Seismic Lines. *Environmental Management*. 58 (5): 821-832

van Rensen, C.K., Nielsen, S.E., White, B., Vinge, T., Lieffers, V.J. (2015). Natural regeneration of forest vegetation on legacy seismic lines in boreal habitats in Alberta's oil sands region. *Biological Conservation*. 184: 127-135



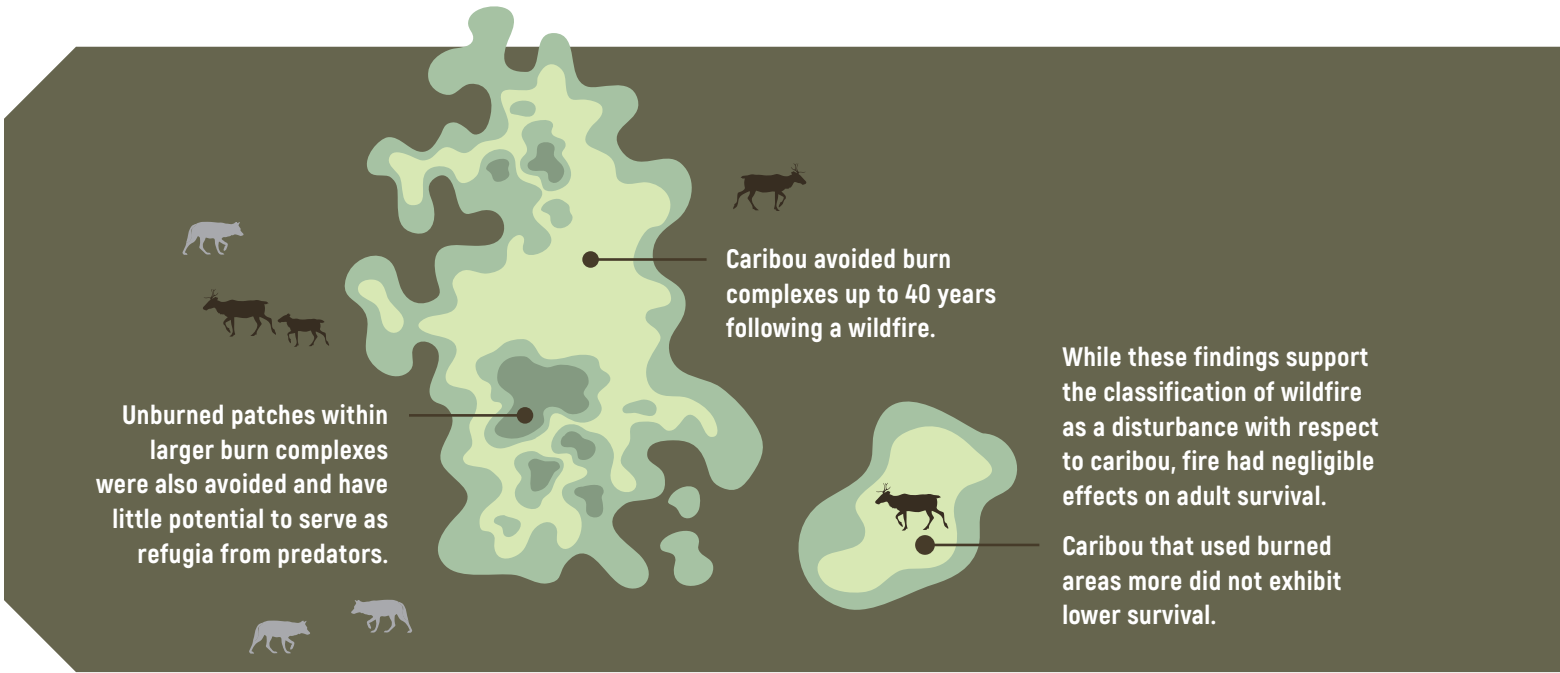
# UNTANGLING THE ROLE OF FIRE AS DISTURBANCE

Wildfires are a natural part of the boreal forest and can cause significant changes to woodland caribou habitat. Fires burn away terrestrial lichen – a preferred food source for caribou – and promote the growth of early seral forage favoured by moose and white-tailed deer. For these reasons, burned areas up to 40 years old are classified as disturbed under the federal recovery strategy for woodland caribou. In some cases, burns can represent a significant portion of the area in a caribou range, and the importance of wildfires is likely to increase as they become more frequent and severe due to climate change.



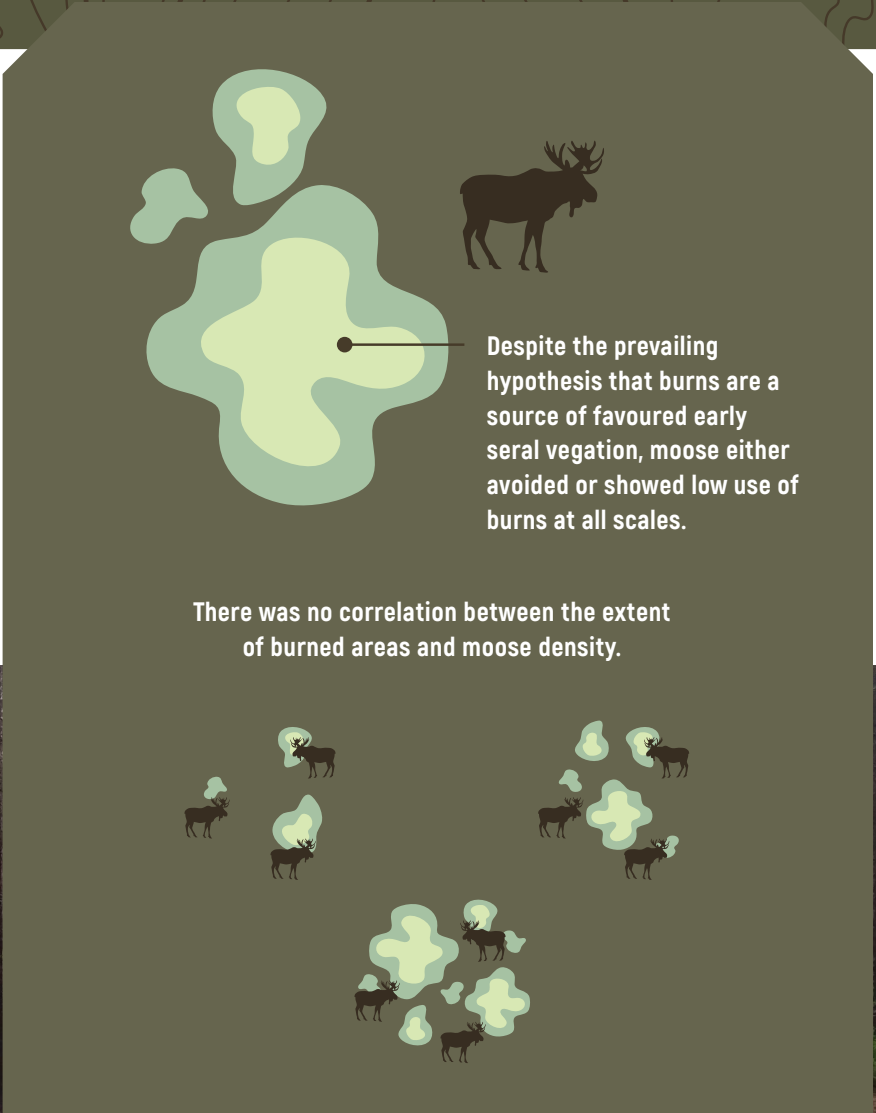
While caribou are known to avoid burned areas, previous research on caribou responses has only mapped burns at a coarse scale. At a finer scale, however, burn patterns are often complex, varying in severity and configuration and leaving unburned residual patches within a larger burn. A recent university research project by Sean Konkolics has provided more detailed insight into the response of caribou to burned landscapes.

» Burn complexes were mapped using high-resolution imagery to assess fine-scale habitat selection for six caribou populations in northeastern Alberta.



Burns have also traditionally been thought to contribute to primary prey (i.e., moose and deer) by creating additional early successional vegetation on landscapes. However, a recent study showed that burns may not contribute to other ungulate populations as previously expected (DeMars *et al.* 2019).

» Moose selection was assessed for burns at several spatial scales in northeastern Alberta, northwestern Saskatchewan and northeastern British Columbia. Moose density was also compared to the extent of burned areas up to 40 years old.



These studies emphasize the importance of focused studies to help understand how wildlife are responding to burned landscapes.

Like all good research, these studies have led to many more questions related to why moose and caribou are responding in the way that they are. This creates an opportunity to explore additional research to better understand the mechanisms behind the responses observed. In addition, these studies create a foundation for understanding how caribou and moose respond to harvesting and to use this to develop and test adaptive management strategies.

Further Reading:  
Konkolics, S. (2020). A burning question: The spatial response of woodland caribou to wildfire in northeastern Alberta.  
DeMars, C. A., Serrouya, R., Mumma, M. A., Gillingham, M. P., McNay, R. S., & Boutin, S. (2019). Moose, caribou, and fire: have we got it right yet?. *Canadian Journal of Zoology*, 97(10), 866-879.



# A CLOSER LOOK AT HOW DISTURBANCE AFFECTS CARIBOU

Research has indicated that woodland caribou need large, contiguous areas of mature coniferous forest. This is reflected in the federal recovery strategy, which sets a target of 65% undisturbed habitat in each caribou range. Disturbed areas, as defined in the recovery strategy, include both the actual footprint of human activity and a 500m buffer around each feature. However, caribou are often observed in disturbed landscapes. How does disturbance relate to the persistence of caribou herds?

The ways in which disturbance affects caribou are complex and often invisible. This includes both direct effects (habitat loss and noise) and indirect effects (increased primary prey and changes to predator space-use). These mechanisms change how risky the area is for caribou. The more time caribou spend in high-risk areas, the more likely they are to die from predation.

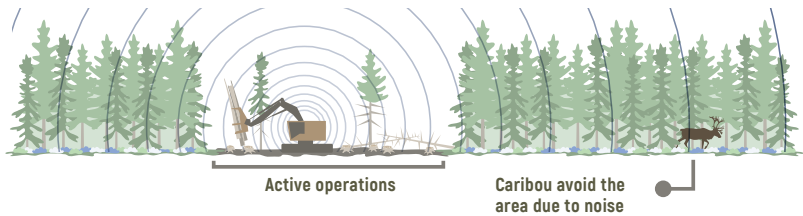
A range of buffer sizes were tested in the Scientific Assessment that supports the federal recovery strategy. Buffers ranging in size from 100m to 4,000m were analyzed. Models that included a buffer size of 500m or greater were 1.5 times better at explaining the effects of disturbance on boreal caribou recruitment than models that either had no buffer or a 100m buffer on disturbance.

## DIRECT EFFECTS

### HABITAT LOSS

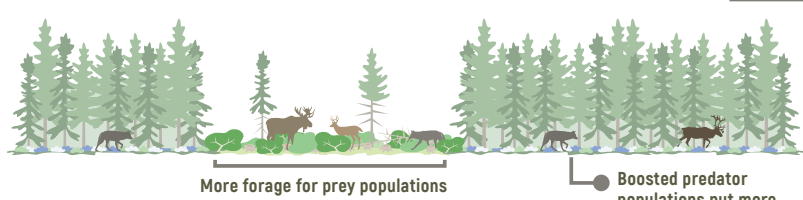


### NOISE

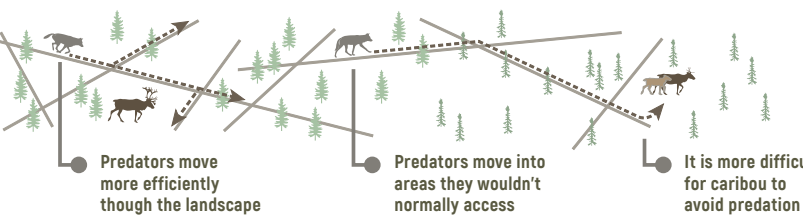


## INDIRECT EFFECTS

### INCREASED PRIMARY PREY



### PREDATOR SPACE-USE

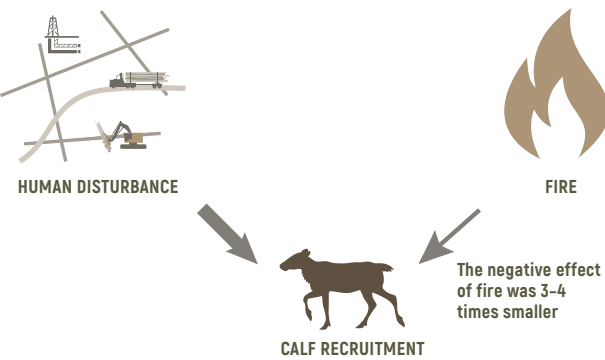


INCREASE  
RISK FOR  
CARIBOU

## Different disturbances, different effects?

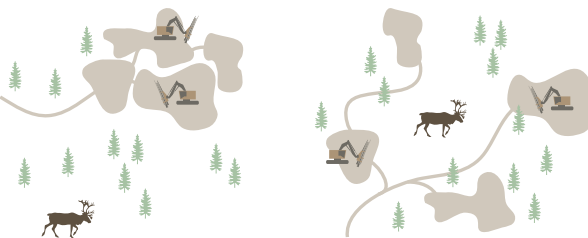
While it is important to manage disturbance levels holistically, not all disturbances affect caribou in the same way. The federal recovery strategy treats human and natural disturbances differently – applying a 500m buffer to human disturbances and no buffer to natural disturbances. A recent analysis (Johnson *et al.* 2020) helped dig into these differences by examining the relative impacts of disturbance types.

- » Calf recruitment and adult female survival data from ~58 study areas across Canada were used to model the effects of human disturbance and fire. The top models were then used to model population responses to disturbance in two contrasting landscapes: Little Smoky and the northern boreal shield in Saskatchewan.
- » Both fire and human disturbance negatively affected recruitment, however the negative effect of fire was 3-4 times smaller than the negative effect of human disturbance.



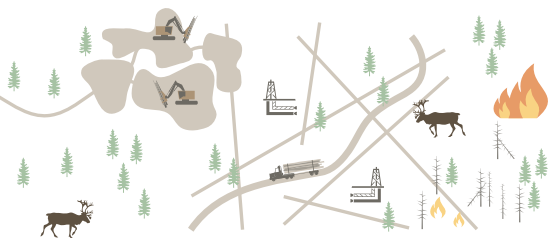
Understanding the factors that lead some caribou populations to perform differently at different disturbance levels can help prioritize management actions and lead to targeted strategies in different regions.

## DISTURBANCE CONFIGURATION



Do different disturbance configurations result in different caribou responses?

## DISTURBANCE TYPE



Does the disturbance type affect caribou responses differently?

They also noted differences in how population persistence is related to disturbance levels. They found that the Saskatchewan caribou population could be self-sustaining with 40% undisturbed habitat when fire is the predominant disturbance but could become vulnerable if human disturbance were to increase (8%-9% on top of the current footprint). In contrast, the Little Smoky population, whose range is predominately impacted by human disturbances, would require ≥68% undisturbed habitat to maintain a self-sustaining population.

These questions represent an opportunity for industry and government to work together and to focus on finding ways to increase the persistence of woodland caribou within Alberta's ranges. The ARCKP is focusing on four core areas: restoration, integrated land management, harvest planning, and silviculture.

Further Reading:  
Canadian Boreal Forest Agreement (CBFA) primer on disturbance thresholds: <https://www.fpac.ca/wp-content/uploads/ERCAPprimer-1.pdf>  
Johnson, C. A., Sutherland, G. D., Neave, E., Leblond, M., Kirby, P., Superbie, C., & McLoughlin, P. D. (2020). Science to inform policy: Linking population dynamics to habitat for a threatened species in Canada. *Journal of Applied Ecology*.





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](http://arckp.friresearch.ca)



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