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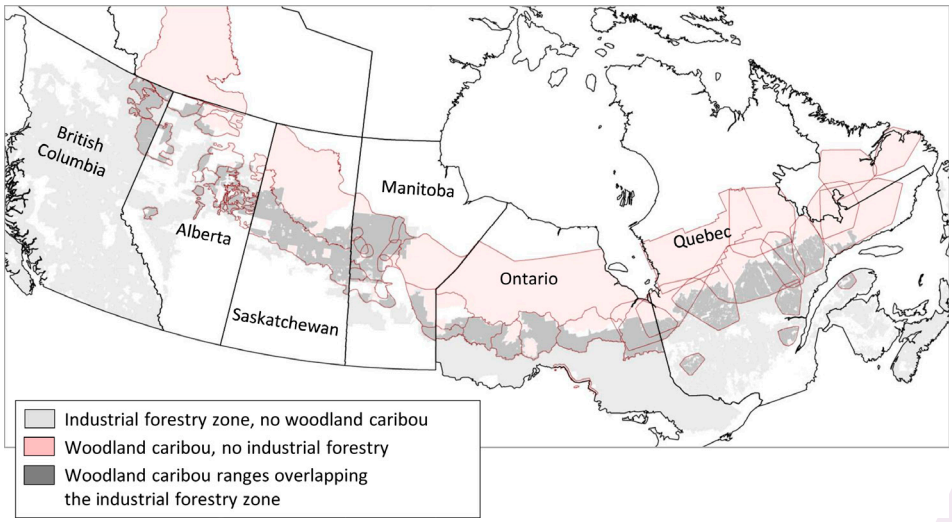
# Studying the habitat of the boreal caribou to develop appropriate conservation strategies

Global biodiversity loss is undermining the functioning of ecosystems, even altering the distribution range of species. For many species, in addition to climate change, the impacts of human activities, particularly on their habitat, pose a major threat. For some species, such as the boreal caribou, it may be important to distinguish the effects of human activities from those of climate change if we are to develop appropriate conservation strategies and understand the impact on wood supply.

## The shifting distribution range of the boreal caribou

Climate change has caused the southern limit of the boreal caribou's range in Quebec to shift northward since 1850. The geographical evolution of climatic conditions favourable to caribou has been illustrated using historical maps of the species' range combined with climate models from 1850 to the present day.

If climate change alone had been responsible, the southern limit of the boreal caribou's range would have shifted approximately 105 km northward since 1850. However, this southern limit has shifted by 620 km. This relatively limited impact of climate supports the idea that anthropogenic factors largely explain the reduction in the distribution range of boreal caribou in Quebec.




Caribou ranges and Industrial forestry zone in Canada (*)

## The role of caribou as an umbrella species

Umbrella species are organisms with large home ranges that are sensitive to habitat changes caused by human activity and are representative of their ecosystem. For these reasons, biodiversity conservation approaches involve protecting these species and their habitats. With this in mind, a research team from the Canadian Forest Service helped determine whether scenarios aimed at conserving boreal caribou habitat would also preserve the integrity of regional biodiversity in the face of climate change.

The combination of forest dynamics models and predator-prey interactions has made it possible to model the impact of caribou habitat management strategies on caribou survival in the boreal forest. Predictive models of species occupancy were then used to characterize the impacts on bird and beetle diversity. Forest landscapes were then simulated based on three climate change scenarios and four forest management scenarios.

The observed interaction between changes in forest attributes, caribou mortality, and bird and beetle species assemblages shows that conserving caribou, as an umbrella species, can have significant beneficial effects for other species, particularly in the context

of climate change. Although climate change has an impact on projected caribou habitat management strategies, human activities appear to have a more pronounced effect. The most effective management strategies for mitigating the impact of these factors, such as reducing harvesting rates or establishing protected areas, have also proven effective in protecting the biodiversity of birds and beetles.

## And what about the impact on wood supply?

In Canada, industrial forestry activities overlap with the ranges of several boreal caribou populations. A national study assessed how various scenarios for limiting disturbance to caribou habitat would affect the ability to maintain current harvest levels in six Canadian provinces, both with and without consideration of climate change. The scenarios studied involve a disturbance rate for each of the species' ranges of 35%, 25%, and 20%.

The disturbance scenario limiting to 35% shows that in Quebec and Alberta, the impact of caribou protection on wood supply would be equal to or less than that of climate change, particularly due to the increase in burned areas caused by climate change. For example, in Quebec, the decrease in softwood lumber supply attributable to caribou protection would be 14.9%, while the decrease attributable to climate change would be 37.9%. For Saskatchewan, Manitoba, and Ontario, this scenario has no impact on the ability to maintain current harvest levels. For these provinces, minor impacts on wood supply are observed when the projected level of disturbance to caribou habitat is limited to 25% for Ontario (0.9% decrease by 2070) and Manitoba (1.1% decrease by 2070) and 20% for Saskatchewan (0.2% decrease by 2070). The small scale of the reductions predicted in these three provinces suggests that higher levels of protection could be achieved without major impacts on provincial wood supply.

A caribou spotted in Quebec (photo Getty Images © Jérémie LeBlond-Fontaine)

By studying the habitat of the boreal caribou in this way, scientists are highlighting the possibility of developing appropriate conservation strategies, while providing information on their potential impact on wood supply.

(*) Yemshanov, D., Simpson, M., Gauthier, S., Liu, N., Pedlar, J., Bernier, P., Boulanger, Y., Cyr, G. and Mathey, A.H., 2025. Climate change, caribou protection, and Canada's timber supply. Canadian Journal of Forest Research, 55, pp.1-24. https://doi.org/10.1139/cjfr-2024-0181

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