

# Harvesting, fire and regeneration: tracking caribou habitat change.

Habitat protection and restoration are essential parts of woodland caribou recovery efforts. However, measuring progress can be challenging. Caribou live in a landscape where resource extraction and natural disturbances occur alongside forest regeneration and active habitat restoration.

A 2021 study\* tracked how habitats have changed over time to determine whether the amount of available suitable habitat is growing or shrinking in caribou ranges in British Columbia.

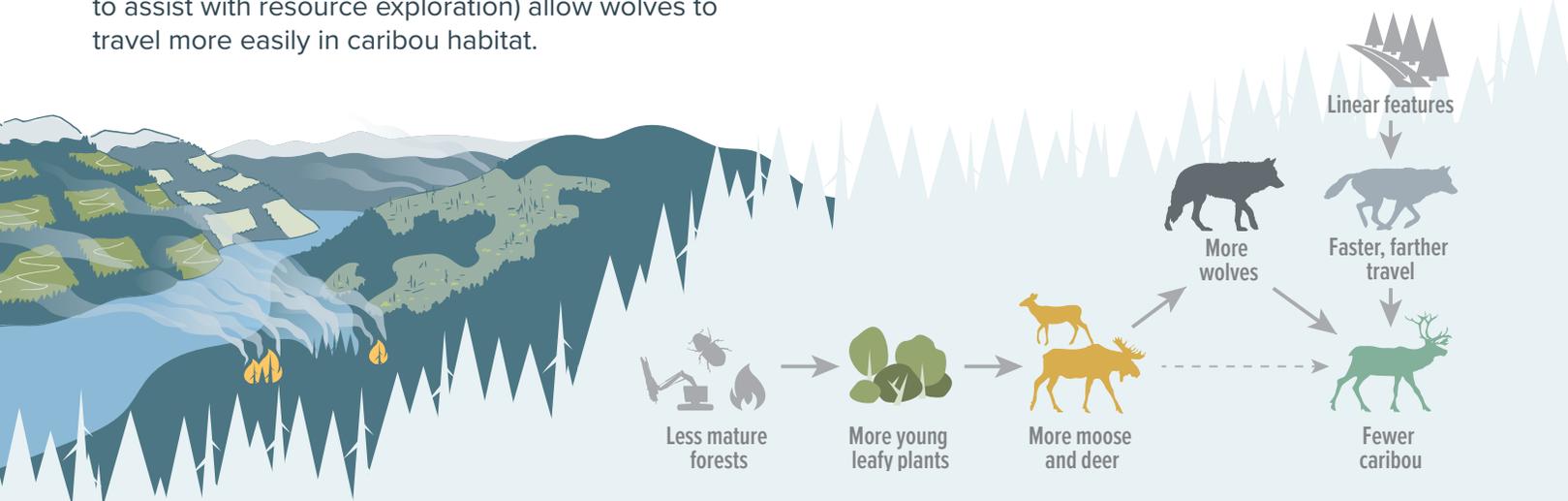
## Quantifying caribou habitat is important

Woodland caribou are socially, culturally, and ecologically important to people in British Columbia. Unfortunately, many caribou herds have experienced steep population declines attributable to habitat loss. Conserving caribou is a high conservation priority.

Woodland caribou require large, undisturbed areas of mature and old forests to maintain self-sustaining populations. Broad-scale landscape changes (including those caused by industrial natural resource extraction and wildfires) have prompted a shift from mature forests towards younger forests that are dominated by deciduous trees. These young forests favour other ungulate species like moose, elk and white-tailed deer (primary prey), which in turn attract more predators that also hunt caribou. Furthermore, linear features like roads and seismic lines (i.e., corridors cleared in forests to assist with resource exploration) allow wolves to travel more easily in caribou habitat.

Throughout B.C., caribou populations have declined from about 40,000 to 17,000 animals over the last century, leading to significant investments in caribou recovery actions. Reducing the number of predators and alternate prey (e.g., by increasing the number of moose hunting licences issued), maternal pens and supplemental feeding have all been used effectively to stabilize and prevent the local extinction of several herds. These methods are sometimes needed as temporary, emergency measures to maintain caribou populations while their habitat recovers, which can take several decades.

To recover caribou populations and avoid the need for indefinite emergency measures, additional habitat losses should be offset by even greater habitat gains. It is therefore important to quantify caribou habitat gains and losses in ranges throughout B.C., identify the main drivers of habitat loss (such as timber harvesting, wildfires or other disturbances) and consider how to mitigate those losses.



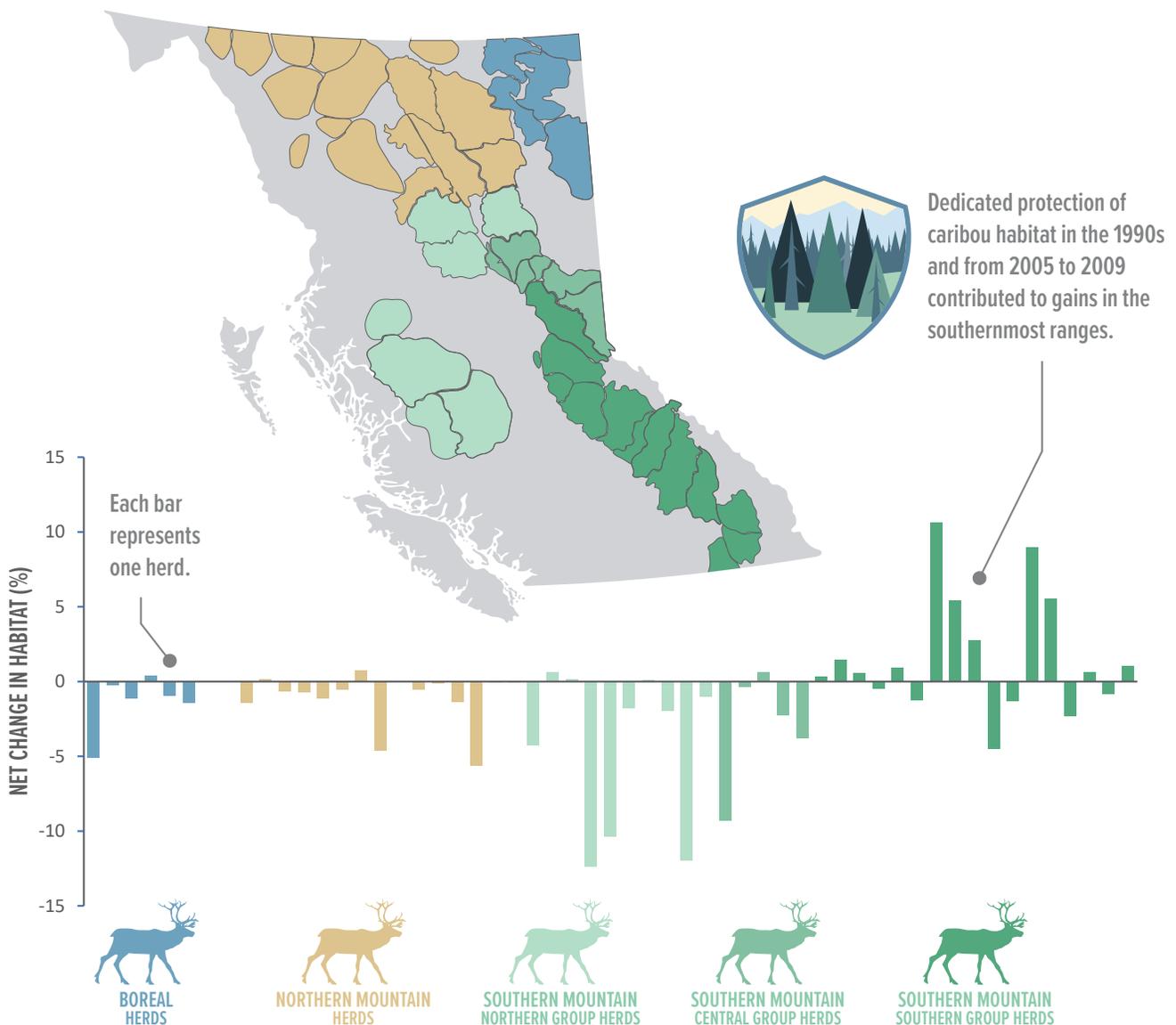
\* Nagy-Reis, M., Dickie, M., Calvert, A.M., Hebblewhite, M., Hervieux, D., Seip, D.R., Gilbert, S.L., Venter, O., DeMars, C., Boutin, S. and Serrouya, R., 2021. Habitat loss accelerates for the endangered woodland caribou in western Canada. *Conservation Science and Practice*, 3(7), p.e437.

## Some progress in southernmost caribou ranges

To better understand what factors have caused caribou to gain or to lose suitable habitat, a team of scientists used satellite imagery to assess how caribou habitats have changed across their ranges.

The greatest habitat improvements were observed in the Southern Group of Southern Mountain caribou, where the amount of caribou habitat grew in two-thirds of their ranges. A major factor in these gains was the provincial [Mountain Caribou Recovery Implementation Plan \(2007\)](#), which resulted in increased protection of old-growth forest. However, more action is needed, since several Southern Mountain caribou populations have either not yet stabilized or have been extirpated. There is continued net habitat loss in most ranges.

Forest harvesting has typically been the main driver of change in the Southern Mountain caribou ranges. Habitat loss within ranges of the Southern Group appeared to have stabilized after the release of the provincial recovery plan, although losses increased again after 2016 despite the release of a [federal recovery strategy](#). Habitat loss accelerated for all groups of Southern Mountain caribou from 2000 to 2018. As well, the extent of linear features such as roads have generally expanded over time.



Net change of caribou habitat (measured as forest cover) in British Columbia from 2000 to 2012. Net habitat change (%) = forest cover gain within caribou range (%) minus forest cover loss (%). Positive forest cover change values represent net gain and negative values represent net loss.

## How the changes in habitat were measured

Because caribou require old and mature forests, the amount of forest cover (as determined from aerial and satellite imagery) can be used as a proxy to estimate the amount of suitable caribou habitat in an area. This study analyzed satellite imagery of caribou ranges throughout B.C. to determine whether changes in forest cover are on target to meet caribou habitat recovery goals and objectives.

This study used a combination of Canada Landsat Disturbance and Global Forest Watch data. Forest cover “gain” was defined as a return of the tree canopy to a height of at least five metres. This is typically when broadleaf shrubs, which attract moose, elk and deer (and in turn predators), no longer dominate a landscape. However, this threshold is not an indicator of other caribou requirements that forests may provide, such as sufficient volumes of lichen (a preferred food source for caribou).



This study also used the Canada Landsat Disturbance dataset to determine whether forest cover “loss” was due to forest harvesting or wildfires. A loss of forest cover that couldn’t be attributed to a wildfire or timber harvesting was classified as “other.” These losses were due to other causes, such as outbreaks of insects that harm trees.

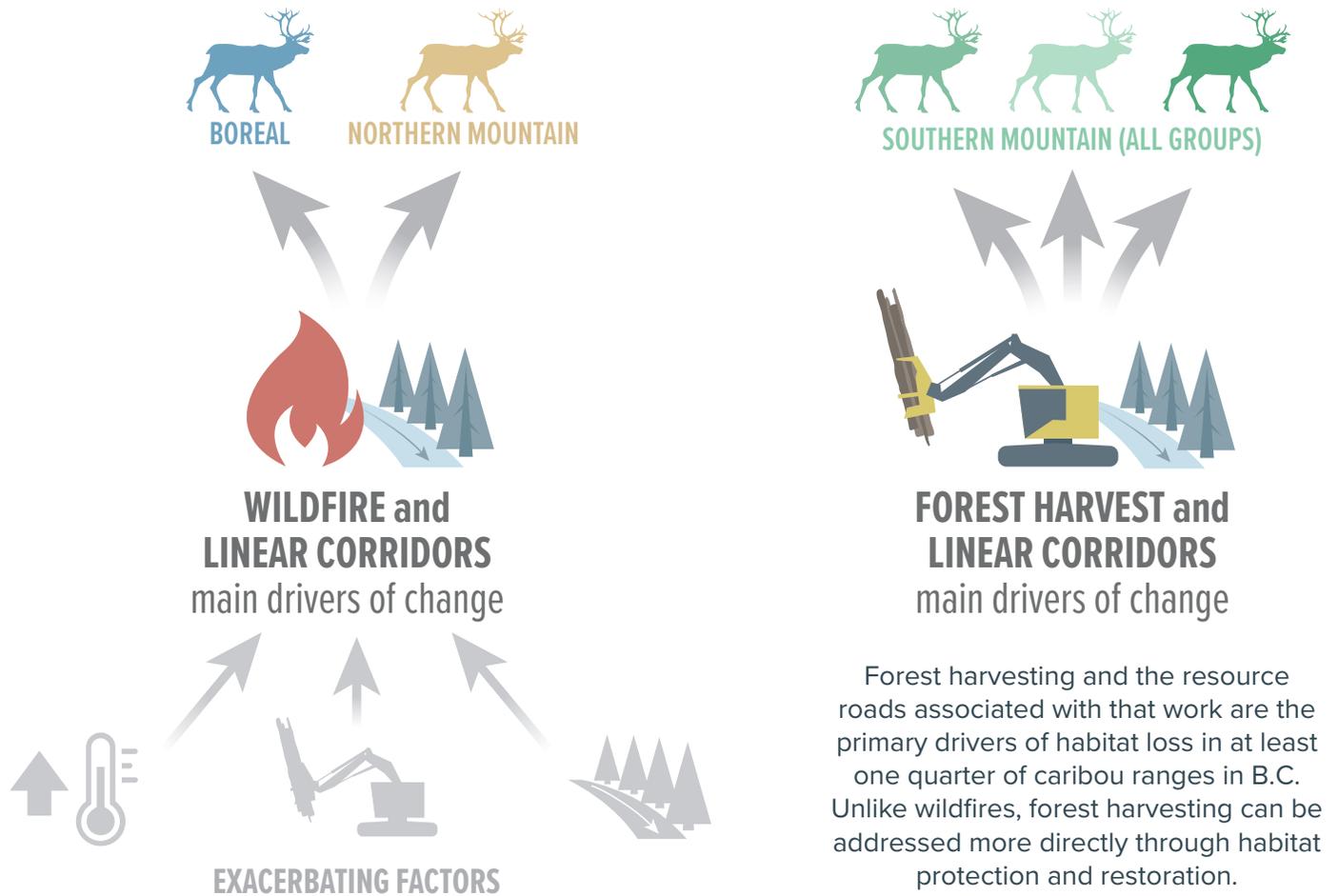
## Caribou habitat losses continue in other regions

Despite ongoing efforts to help caribou populations under provincial and federal recovery plans, the amount of habitat continues to decline in most woodland caribou ranges in B.C. However, the causes of habitat loss differ between regions.

Unlike in Southern Mountain caribou ranges (which were mainly impacted by forest harvesting), wildfire activity was the main cause of habitat loss in most Northern Mountain and Boreal caribou ranges. In the past, self-sustaining caribou in these areas were able to avoid wildfire impacts by moving to unburned areas of their range. However, several factors have exacerbated the effects of wildfires on caribou:

1. Forest harvesting and land clearing removes habitat that could provide suitable refuge from burned areas.
2. Linear corridors like seismic lines and logging roads fragment remaining large patches of mature forest, giving predators easier access to hunt. This is especially pronounced in Boreal caribou ranges, which have averaged an additional 1,200 km per year from 1995 to 2020.
3. Climate change and accidental, human-caused fires have increased the frequency and severity of wildfires.

Habitat loss caused by wildfires is challenging to manage due to their unpredictability. However, there is evidence that the negative effects of wildfires on the survival of caribou calves have a much lower impact than habitat alteration caused by humans. The impact of wildfires on caribou habitat can be mitigated by reducing forest harvesting where wildfire rates are high and by minimizing the number of linear features (such as roads or seismic lines).



## Habitat losses continue for most caribou herds. What comes next?

This study found that habitat loss has largely continued since the release of federal recovery strategies or provincial recovery plans in B.C. The main factors driving habitat loss are wildfire (Northern Mountain and Boreal caribou ranges) and forest harvesting (Southern Mountain caribou ranges). However, many herds in the Southern Group of Southern Mountain caribou gained habitat following initiatives such as the Mountain Caribou Recovery Implementation Plan (2007).

Careful monitoring of changing habitat conditions in response to habitat protection, restoration and alteration will be needed to assess progress.