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## THE EFFECTS OF RESOURCE EXTRACTION ON WOODLAND CARIBOU IN ALBERTA

Much of western Canada is made up of dense forests, snowy mountains, pristine waters, and a variety of wildlife. This picturesque landscape is where the woodland caribou roam freely in the deep snow where predators and food competitors can't go; it is the perfect habitat for caribou. Their newest, most powerful opponent though can't be stopped by the snow.

Who knew that the huge expanses of boreal forest that the caribou depend on sits on top of millennia-old oil sands, which humans could make great use of. As the caribou face the loss of their precious habitat, will we split the land fairly, or will the force of our human systems drive the caribou out for good? This study will provide information about the threatened woodland caribou in Alberta, the aspects that influence their status, and what is being done to ensure their survival in this ever-changing world.

### Background Information

#### *Ecology of the Woodland Caribou*

Woodland caribou (*Rangifer tarandus caribou*) are medium-sized members of the deer family, reaching a shoulder height of 1.2 metres. At maturity, caribou generally weigh from 110 to 210 kg. Woodland caribou have an average lifespan of 4.5 years and can live up to 15 years at maximum. They bear thick fur coats to help them survive cold climates. Woodland caribou can be identified by brown or grey fur that is white at the neck. Both males and females grow antlers, but cows' (females) antlers are shorter.

In the summer, woodland caribou eat leafy shrubs, grasses, and willows. During the winter, they depend heavily on lichens. Arboreal lichen, which is what most caribou prefer as a food source in harsh weather, grows on the ground and on trees. Although these lichens are high in carbohydrates, they contain an average of only 2% protein. It cannot support large animals like deer for long periods of time, which is why caribou do not eat it year-round. Woodland caribou use their large hooves to dig in the snow to find them. Lichens are only found in mature forests, and it takes >80 years to grow enough lichens to support caribou.

One of the woodland caribous' advantages above other deer species are their large hooves and long legs that allow them to walk in places with deep snow where potential competitors of food cannot go. If there was not enough deep snow, the caribou would be forced to graze in areas where other deer populations feed, resulting in a scarcity of food. Old, dense forests also provide cover from predators, which are most commonly wolves. In general, woodland caribou tend to shy away from large populations of moose and deer; these animals attract more carnivores.

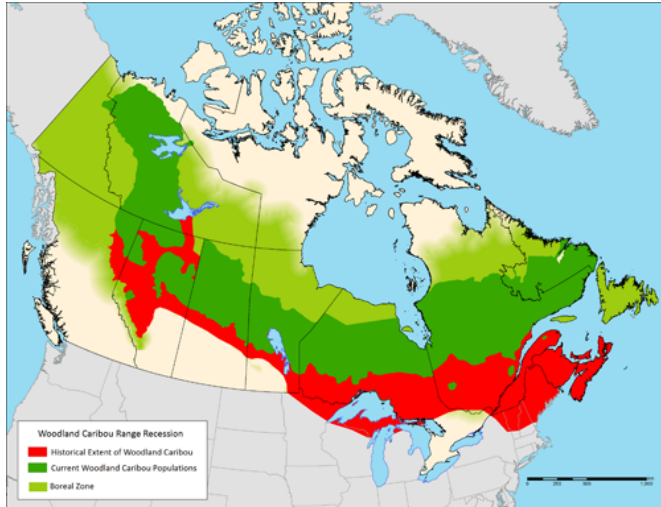
### *Herds, Abundance, and Distribution*

A herd of woodland caribou normally consists of around 200 caribou that live in a specific area. Caribou from different herds very rarely cross into another herd's "territory". Recently, though, Parks Canada has reported herds containing merely 15 animals at times. The herd of 7 that inhabited the Mount Revelstoke and Glacier national parks was down from around 100 in 1994. The small herd in Banff National Park was completely eliminated in 2009.

10,000 to 15,000 square km is needed for every caribou herd. This is because caribou calves are very vulnerable to predators, especially in their first year. Predators are attracted to large groups of prey, so herds separate into smaller groups so that each female can have roughly 16 square km. Woodland caribou can only cope with approximately 7 wolves for every 1000 square km .

Woodland caribou have low reproduction rates. Normally cows have their first calf when they are three years old, and they only have one calf a year at maximum. Other deer species like moose and elk may have two calves per year. The low reproduction rates contribute to the low probability of dwindling herds to make a comeback.

Historically, woodland caribou could be found throughout the Boreal biome, in nearly all the provinces of Canada with the exception of Nunavut. Now, there are no woodland caribou in Prince Edward Island, Nova Scotia, and New Brunswick. Populations in other provinces, namely herds that are located towards the south, are also declining.



*Light green: Boreal zone; Green: Current woodland caribou populations; Red: Historical extent of woodland caribou* In the last few centuries, the expansion of cities and natural resources extraction has driven woodland caribou out of around 50% of their historical range.

*Credit: Canadian Boreal Initiative*

In 1973, there were an estimated 5,000 individual caribou in Alberta. In 2005 the Alberta Caribou Committee announced the province's caribou population: 2,500 to 4,000 individuals. In 2011, 7 of Alberta's 12 remaining herds were at risk of extinction.

### *History with Humans*

Some say that woodland caribou have been around since 10,000 years ago, and their populations have been affected by humans ever since we started settling in the New World.

Some First Nations and Inuit communities depend on woodland caribou for survival. If caribou is abundant, eating caribou meat can be less expensive compared to imported, store-bought meats. Aboriginals treat caribou with respect by hunting only what is needed and using all parts of the caribou so that nothing is wasted. The fur, antlers, organs, bones, and even the head have various uses. The animals play a significant role in Aboriginal cultures by passing down traditions like the hunt.

Woodland caribou were widely hunted by non-Aboriginals ever since the first Europeans came and settled in Canada. Throughout the 1900s, the Albertan government switched multiple times between banning and reopening the caribou season. All non-Aboriginals in Alberta were banned from hunting caribou in 1981.

## *Significance*

Woodland caribou have a deep connection with the land, and some historians believe that the very first indigenous peoples who arrived in Canada had followed the caribou herds over the ice from present-day Russia to Alaska.

Woodland caribou are widely considered to be “the canaries of the coal mine”, meaning that they are a natural indicator of the status of their ecosystem; in other words the decline of the caribou is reflective of the health of the boreal forest.

## The Issue

The woodland caribou is listed as threatened in Canada’s Species at Risk Act. Predation (mostly from wolves) has often been blamed for the recently declining numbers of woodland caribou, but it is only the tip of the iceberg. If that was the only cause, how did the caribou survive historically with the wolves for thousands of years?

The dynamics between predator and prey are changing. Before humans, or more precisely, the Europeans came along, there was an equilibrium between caribou and wolves, and it was only ever shifted by a natural cause (an ice age, flooding, earthquake etc.). However, in the last few centuries, the expansion of cities and natural resources extraction has driven woodland caribou out of around 50% of their historical range. All of the issues concerning woodland caribou include predators, competitors, illegal hunting, climate change, pollution, and loss of habitat; all of which are interconnected. It is not a simple problem. This section reports some of the most urgent issues.

## *Logging*

Caribou need large expanses of land, deep snow, and dense, old forests to thrive, and it cannot be stressed enough: they need to live in places where others can’t. It is their adapted strategy for survival. They have thrived for thousands of years this way. Ideal boreal forests for woodland caribou would be thick with trees to provide coverage from wolves, and mature (at least 50 years old) so that the slow-growing plants and lichens that caribou need to eat are growing and abundant.

However, habitats that used to shield caribou are being altered. Clear-cut grounds are expanding, whether it is from timber harvesting or oil and gas extraction. According to

Canadian Geographic, Canada has set aside only 12% of its land to be protected under the law (lower than the global average of 12.9%). These lands include national parks and conservation regions.

One particular 2,500 square km of old-growth forest in Little Smoky was so badly hit, a federal government report stated that 95% of the caribou habitat was disturbed (meaning that the habitat was affected). The forest was fragmented by roads for large vehicles, recreational roads, pipelines, welling sites, and large areas where timber was harvested. Dave Hereview, provincial biologist and caribou management coordinator for Alberta, informed a reporter, "Pretty good for moose," referring to the divided forests that Little Smoky held, "but caribou couldn't exist in this sort of a situation."

For the caribou, there are a few consequences of fracturing forests. Old-growth forests take long periods of time to recover and grow back, at least 50 years. During this time, caribou are forced to migrate to other, perhaps less suitable environments to inhabit.

Hunting caribou becomes easier for predators without the trees in the way. Roads may seem to have less impact on caribou because of their size; they are only thin strips of habitat being removed. However, even paths for cross-country skiers can severely impact woodland caribou. Moose, elk, and most importantly, wolves, travel quicker on a bare, packed-down path than they do in the thicket with deep snow.

### *The Oil Sands*

The oil sands are a type of petroleum deposits that are found mostly in northern Alberta. The petroleum is found under the ground, in natural mixtures of sand and clay. The oil sands cover more than 140,000 squared km and holds 1.75 trillion barrels (approx. 278 trillion litres) of petroleum. Since the 1970s, Canadians have been working on technologies for oil extraction from the oil sands.

The oil sands have become an important part of the Canadian economy. Since it can be extracted and used as normal petroleum, new systems do not have to be built to incorporate a new energy source. All that is needed are pipelines and refineries. The oil sands allow Canada to create more jobs and eliminates the need to import oil, and therefore lets Canada become more independent.

On the other hand, extracting more oil means cutting down more forests, digging up more habitats, and disturbing more ecosystems.

Just one of the oil companies looking to expand its business is Shell Oil. It was looking for approval from the federal and provincial governments to step up its extraction of oil sands from 200,000 barrels a day to 300,000 barrels in its Jack Pine mines in the Fort McMurray area. Shell Oil's environmental assessment reported that 47% of caribou habitat would be destroyed by its projects in that area. Despite this, Shell got the approval.

### Solutions Being Explored

#### *Resource Exploration and Construction Approval Process*

Each resource extraction project must go through the provincial and federal governments before they are allowed to start. A Caribou Protection Plan (CPP) is also required for each project. They describe what outcomes are desired to be achieved, and they include reducing direct human-related caribou mortality, avoiding habitat loss, and reducing potential increases in population of prey species that may affect the woodland caribou in the area of the project.

#### *Breeding Caribou*

Parks Canada is teaming up with the B.C. government and the Calgary zoo to start a captive breeding program for caribou. Genetically selected caribou would be brought into the zoo, where they would be protected and fed, so that their calves can survive the critical first year. Then, some caribou would be released into the wild to join other threatened herds in Jasper and in British Columbia.

However, transporting caribou is not easy. A recent attempt to move caribou from northern to southern B.C. ended with disastrous results. 15 of the 19 caribou that were moved could not become accustomed with their new homes, and died months within the move. Each of the animals' deaths costed \$10,000.

#### *The CBFA*

The Canadian Boreal Forest Agreement is a conservation initiative that was signed by forest industry companies and Canadian environmental organizations. Signed in May

2010, this agreement applies to 73 million hectares of forests licensed to the Forestry Products Association of Canada (FPAC) companies across Canada, including Kruger, Cascades, and NewPage. The environmental groups consist of the Canadian Boreal Initiative, the David Suzuki Foundation, the Nature Conservancy and others.

The agreement requires environmental organizations to stop boycotting the forestry companies; in return the companies halted logging in 28.4 million hectares of boreal forest. Some of these areas are in Alberta.

Environmental groups and forestry companies are teaming up to start new conservation projects, such as developing plans for accelerating the recovery of woodland caribou and creating guidelines for forestry companies to improve the sustainability of their logging practices. For example, these companies could start selectively cutting down trees instead of clear-cutting large expanses of forests. This way caribou do not have to alter their routes or migrate somewhere else to avoid places where timber was harvested.

These plans would go through any affected groups: Aboriginal groups, communities in the area, municipal, provincial, and federal governments.

FPAC companies could also benefit from these efforts. Improving practices and working with environmental organizations could promote the companies as environmentally friendly, boosting their sales.

### *Predator Management*

Currently, the Alberta government's resolution for the caribou is to cull the wolves in threatened caribou habitat, but this method has already been proven a failure.

In the early 1900s, it was the elk population in Alberta that was threatened. The government's solution was to wipe out the predator. Wolves were killed in Alberta's national parks for over 50 years to protect the elk and other species. With no predators, the elk population boomed. They had no predators to maintain healthy herds by eliminating the weak and the sick. Later, when wolves were reintroduced into the parks, their populations, in turn, sped out of control because of the abundance of prey. "We think that is long term why there's been this caribou decline," says Parks Canada biologist Mark Bradley, "is because we had too many of the one kind of prey, which led to too many predators, which led to too few caribou."

Instead of restoring boreal forests and stopping the expansion of oil extraction sites, the Alberta government decided to solve the surface of the issue: the wolves. In Little Smoky, where 95% of caribou habitat has been disturbed by human encroachment, wolves have been killed for eight years. Whether it was shooting from aircraft or putting out poisoned baits, approximately 100 wolves are killed a year in the Little Smoky area. Many conservation activists are outraged that wolves are being killed and yet there are few barriers put in front of expanding oil companies.

### *Habitat Protection and Mitigation Measures*

In October 2012, Minister for the Environment, Peter Kent, announced that at least 65% of caribou habitat across Canada must be undisturbed. This meant that oil companies will either have to stop expanding and/or restore habitats.

With increasing populations and demands, to stop developing land for oil extraction would not be easy on the economy. What about restoring habitats after developing and gathering the resources? As explained above, it would take at least 50 years for a forest fit for caribou to grow, and at least 80 years for the critical caribou food source, lichen, to be adequate. These numbers do not include the years it would take for other plants to grow back; for rivers to flow again; and for insects, birds, mammals, and fish to re-enter the ecosystem. The prime caribou habitat that was Alberta a few centuries ago had developed over thousands of years. Through most of the process, humans were not involved. Even with recovery efforts to help, the ecosystem may take hundreds of years to return to its original form, and even then it may not be suitable for woodland caribou to reinhabit. Though, at the rate the caribou are declining, there may not be any woodland caribou left in Canada by the time the forests recover.

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