Caribou in Alberta's oil sands stressed by human activity, not wolves

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A University of Washington dog handler accompanies a scat-detection dog in the oil sands region of northern Alberta. The dog has been trained to locate scat from a wide variety of species, which is used to determine wildlife abundance, distribution and physical health across large remote regions. Credit: Center for Conservation Biology/University of Washington

Caribou have been dwindling in Alberta for several decades and some scientists believe they could be gone entirely in 70 years. In the area of the petroleum-rich Athabasca Oil Sands in the northern part of the Canadian province, some say they could disappear in as little as 30 years.

Efforts have begun to remove wolves from parts of Alberta to reduce caribou predation, but new research suggests that human activity related to oil production and the timber industry could be more important than wolves in the caribou population decline.

In fact, while the drop in caribou and moose numbers in recent decades is unmistakable, the populations have held relatively steady in the last four years, said Samuel Wasser, a University of Washington conservation biologist who is the lead author of a paper describing the research published in the June issue of *Frontiers in Ecology and the Environment,* a journal of the Ecological Society of America.

The paper advocates specific options to control the impact of human activities in the area before resorting to more drastic actions such as predator removal. Co-authors are Jonah Keim of Matrix Solutions Inc. in Edmonton, Alberta; Mark Taper of Montana State University and Subhash Lele of the University of Alberta.

Northern Alberta's oil sands deposits are so large that the region is second only to Saudi Arabia as a potential petroleum source. The Athabasca deposit is the largest of three that cover about 54,000 square miles.

In 2005, North American Oil Sands Corp. asked for Wasser's help to determine what was happening to caribou, moose and wolf populations in the Athabasca Oil Sands region south of the city of Fort McMurray, where the company held oil leases. Wasser began using non-invasive methods he had developed to acquire DNA and hormone data from scat samples located by dogs.

In 2007 the company was acquired by Norway-based Statoil, which continued to fund the research. The research became more focused on whether the caribou population decline resulted from habitat changes

because of roads and other infrastructure associated with the oil and forestry industries, from physiological stress caused by human activity, or from excessive wolf predation brought on by increased numbers of deer and, consequently, wolves. Wasser joined with Keim and Lele, habitat selection experts, and Taper, a population modeler, to try to answer those questions.

The oil sands are in an area covered largely by forests and peat bogs, and most human activity takes place from mid-December to mid-March, when the otherwise marshy ground is frozen and ice roads can be used.

Scat samples from caribou, moose and wolves, well preserved because of sub-freezing temperatures, were collected in the winters of 2006, 2007 and 2009. In 2009, four teams of highly trained scat-detection dogs led to the recovery of 2,000 samples of caribou, moose and wolf scat in 10 weeks.

In examining the samples, the researchers determined habitat preferences for each species, their abundance, the type and quality of food consumed and hormone levels that could indicate whether the animals were under psychological or nutritional stress, or both. They found that deer made up 80 percent of wolves' diet, with caribou and moose each accounting for about 10 percent.

Moose favored habitat associated with food and didn't seem particularly concerned about people. The result was that their scat had low levels of stress hormones and high levels of nutrition hormones.

But caribou proved to be much more skittish. They chose open, flat areas where, presumably, they could see and hear predators and escape. That also made it easier for them to see and hear humans on the landscape. Their scat reflected high stress and low nutrition in areas nearer roads when humans were most active.

It turned out that wolves mostly favored areas inhabited by their favorite food source, deer, which also is habitat with few caribou.

Removing wolves actually could have unintentional consequences, Wasser said, because with a much-reduced wolf population the number of deer would probably increase rapidly. The deer could alter the habitat and perhaps reduce the caribou food supply. Deer also carry multiple diseases that could jump to the caribou population. Until there is evidence to the contrary, changing human activity patterns is safer, he said.

The research also produced the first precise numbers of the caribou, moose and wolf populations in this wooded habitat. As of 2009, the scientists estimated 330 caribou, 387 moose and 113 wolves within the small section of oil sands included in the study. The caribou population was more than double the highest previous estimate. None of the populations changed significantly during the four years of the study.

Wasser said the work provides options that can help reduce impacts from human development. For example, instead of roads or pipelines being routed in a straight line on open, flat terrain, they could wind through more complex wooded terrain and avoid areas that caribou prefer for food and security.

The tools developed to evaluate scat samples for evidence of habitat selection, population changes, nutrition and stress will also provide the means to tell quickly whether mitigation efforts are working or if changes are needed.

"They would be able to make course corrections quickly and effectively," Wasser said.

More information: See *Frontiers in Ecology and the Environment* at

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