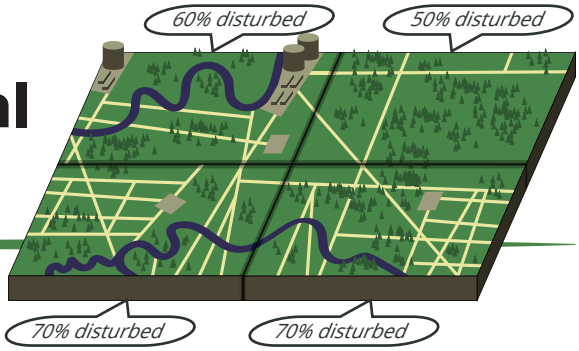
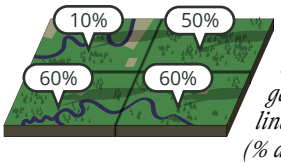
Prioritizing zones for habitat restoration in boreal woodland caribou range



In a working landscape, how do we prioritize restoration to get the best "bang" for our "buck?"

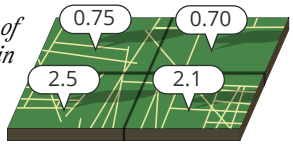
Woodland caribou populations in Alberta are declining by up to 16% per year[1] and their recovery represents a significant conservation challenge, both provincially and nationally. Declines are driven by increased predation, primarily from wolves and bears, resulting from habitat alteration through human land-use and a changing climate. Recovery will require a combination of actions, including habitat restoration and protection, and predator management through culling or the creation of safe havens. The Federal Recovery Strategy mandates that 65% of caribou ranges be undisturbed for populations to remain viable.[2] Most Alberta herds are well below this threshold.

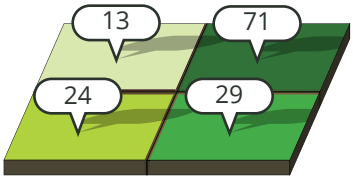


***BANG:** How much undisturbed habitat is gained if all seismic lines are restored? (% disturbed - % disturbed if restored)*

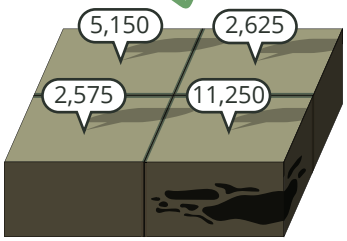
How do we prioritize habitat restoration?

***BUCK:** The density of seismic lines that are in each township. (km/km²)*





*We divide to get the "**bang-for-buck**" Higher "bang-for-buck" = higher priority.*

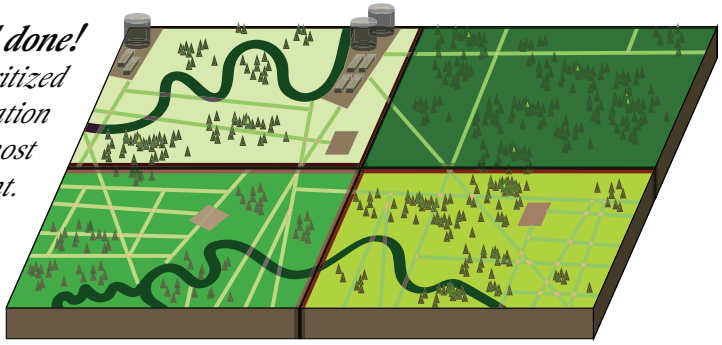


Lastly, priority rankings are adjusted relative to their resource value ($MM CDN). This pulls restoration efforts away from areas likely to be developed in the near future.

Over 100,000 km of seismic lines have been cut across Alberta's Oil Sands Area.[3] Though habitat restoration is already taking place, it is costly,[4] time consuming, and difficult to implement across lease boundaries. Where and when restoration should occur has been identified as an important planning exercise for caribou recovery.

We addressed this question by simulating outcomes of various restoration strategies. First, we classified suitability for restoration using criteria such as the degree of human disturbance,[5] seismic line density, and projected economic potential. Then we ranked townships into 5 categories of restoration priority. As per the Federal Recovery Strategy, we applied a 500-m buffer around all human disturbances and considered the area within them disturbed. Thus, restoring seismic lines that are further apart gains more "undisturbed" habitat than areas with lines that are close together.

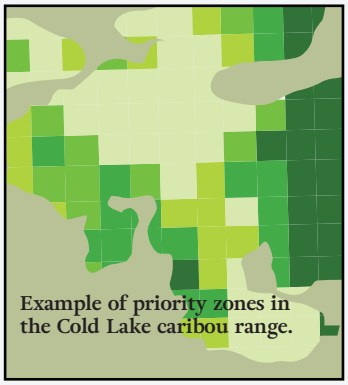
***All done!** Areas are prioritized such that restoration efforts are most efficient.*



priority level:

high — low

From our simulation, we found that for four of the five caribou ranges in Alberta's Oil Sands Area to reach federal disturbance targets, every seismic line had to be restored, regardless of priority zone. When additional 'semi-permanent' human footprint features, such as well pads and forestry cut blocks, were also simulated as restored, all five caribou ranges reached federal targets when only the 3 highest priority zones were restored.[6]



Example of priority zones in the Cold Lake caribou range.

The highest priority zones are typically in areas with low seismic line density and low potential for future development; restoring these areas leads to the greatest gain in undisturbed habitat for the lowest cost.

So what?

Restoring seismic lines in a single caribou range could cost hundreds of millions.[3] By prioritizing areas that maximize the gain in undisturbed habitat per dollar spent, or return in investment, our analyses suggest those dollars can be stretched up to three times further.[3,7] Results are already being acted on, but prioritization must continue if federal disturbance targets for caribou are to be met expediently. For more information on available priority zones for the Cold Lake, East Side and West Side Athabasca River, Richardson, and Red Earth caribou ranges, contact the Alberta Biodiversity Monitoring Institute.

Woodland caribou recovery is a shared responsibility of all energy sector operators. Recovery will require a collaborative, range-wide approach, involving multiple management actions. The Chair will work to continue to define recovery and develop alternative criteria for restoration.

Project supporters

Canada's Oil Sands Innovation Alliance partnered with the ABMI's Caribou Monitoring Unit to prioritize areas for habitat restoration. The Alberta Biodiversity Conservation Chair program (Dr. Stan Boutin) has been integral to the development of this work.

Dr. Stan Boutin
https://tinyurl.com/StanBoutin

ABMI Caribou Monitoring Unit
http://www.abmi.ca

Canada's Oil Sands Innovation Alliance
https://www.cosia.ca

Additional ABC Chair Funders:

University of Alberta Faculty of Science
https://www.ualberta.ca/science

Alberta Innovates
http://www.albertainnovates.ca

[1]Hervieux, D. et al. Widespread declines in woodland caribou (*Rangifer tarandus caribou*) continue in Alberta. Can. J. Zool. 91, 872–882 (2012).
[2]Environment Canada. Recovery strategy for the woodland caribou, boreal population (*Rangifer tarandus caribou*) in Canada (2012).
[3]ABMI. Prioritizing zones for caribou habitat restoration in the COSIA area: Version 2.0. Prepared for Canada's Oil Sands Innovation Alliance (2017).
[4]The cost of developing priority areas for restoration is only a small fraction of the cost of restoring seismic lines across caribou range (estimated at $10,000/km).
[5]Human disturbance values were calibrated to those in the Federal Recovery Strategy, allowing a more direct comparison to the lower resolution Landsat data used to create federal disturbance targets.
[6]Results account for human disturbances only; another analysis included burned areas and human disturbance together.
[7]Restoring all seismic lines in the highest priority zone of the Cold Lake caribou range will result in a gain that is 3-fold higher than restoring a similar amount of seismic lines in the fourth highest priority zone (i.e., 11.4% vs. 3.9%).
*Infographic on P1 and illustrations created by Kate Broadley.