

# Restoring caribou habitat: When should seismic lines be taken off the books?



Woodland caribou populations in Alberta are declining by up to 16% per year<sup>1</sup> 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.<sup>2</sup> Most Alberta herds are well below this threshold.

## Seismic lines improve wolf hunting efficiency and are a target for restoration



MSc student Melanie Dickie tracked wolf movements using GPS collars that obtained a location every 5 minutes. She found that wolves select linear features, such as seismic lines, for travel (Fig. 1a), and move 2–3 times faster on them (Fig. 1b).<sup>3</sup> Distance travelled by wolves increased by up to 54% every hour they spent on linear features. This may increase their search rate, and ultimately result in higher kill rates of caribou. ‘Low-impact’ seismic lines were not selected by wolves for travel and did not increase movement rates.

**Wolves are 2-3X faster on seismic lines**

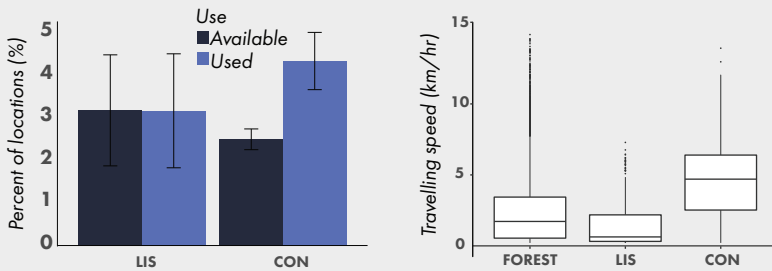


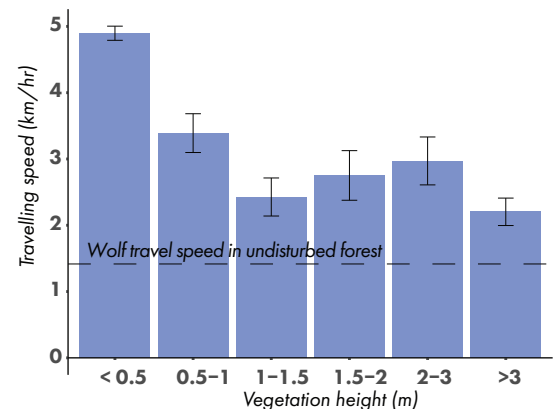
Fig. 1 (a) Wolves used conventional seismic lines (CON) more than they were available, meaning they select them for travel. Low-impact seismic lines (LIS) were not selected; (b) Median wolf travel speed (km/h) was faster on conventional seismic lines than low-impact seismic lines in summer. Undisturbed forest is included for comparison.

The Federal Recovery Strategy defines disturbed caribou habitat as any human-caused change that is visible using Landsat satellite imagery. Seismic lines fall into this category, and because tree seedlings grow slowly, the lines remain visible from space for decades. With over 100,000 km of seismic lines in caribou habitat in Alberta’s Oil Sands Area,<sup>4</sup> they are an obvious focus for restoration. With an estimated restoration cost of \$10,000 per km, the question is, when should restored lines be taken off the books?

## When is a line recovered?

The “visible from space” definition of disturbance means that restoration today will not produce measurable improvements in caribou habitat for years. However, if wolves use seismic lines to increase their travel speed and hunting efficiency, it may be more appropriate to consider when lines regenerate enough vegetation to slow, and eventually stop, wolves from using them preferentially.

Fig.2 Wolf travel speed on seismic lines in the summer, in upland forests. Once vegetation height reaches 50 cm, wolf travel speed is considerably reduced.



## So what?

**By developing a definition of recovery for seismic lines based on a functional understanding of how vegetation influences wolf movement, the process of effective recovery could be much shorter than under current definitions.**

Lines with vegetation already exceeding 50 cm would be considered “restored,” providing an immediate bump in undisturbed habitat. For example, in Dickie’s study area, 13% of lines had already reached the 50-cm height threshold, reducing the cost and timelines required for caribou ranges to meet federal disturbance targets by decades. While more research is needed to determine exactly when wolves begin to treat seismic lines the same as natural forest, Dickie’s work suggests an intriguing new paradigm for seismic line restoration, at least with respect to woodland caribou.

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*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.*

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## Project supporters

This work was made possible through the Alberta Biodiversity Conservation Chair (Dr. Stan Boutin) and collaborations with the Caribou Monitoring Unit of the Alberta Biodiversity Monitoring Institute and the Regional Industry Caribou Collaboration.

### Dr. Stan Boutin

<https://tinyurl.com/StanBoutin>

### ABMI Caribou Monitoring Unit

<http://www.abmi.ca>

### Regional Industry Caribou Collaboration

<http://www.cosia.ca/initiatives/land>

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<https://www.alpac.ca>



<sup>1</sup>Hervieux, D. et al. Widespread declines in woodland caribou (*Rangifer tarandus caribou*) continue in Alberta. *Can. J. Zool.* 91, 872–882 (2012).

<sup>2</sup>Environment Canada. Recovery strategy for the woodland caribou, boreal population (*Rangifer tarandus caribou*) in Canada (2012).

<sup>3</sup>Dickie, M., Serrouya, R., Mcnay, R. S. & S. Boutin. Faster and farther: Wolf movement on linear features and implications for hunting behaviour. *J. Appl. Ecol.* 54, 253–263 (2017).

<sup>4</sup>ABMI. Prioritizing zones for caribou habitat restoration in the COSIA area. Prepared for Canada’s Oil Sands Innovation Alliance (2016).

<sup>5</sup>Dickie, M., Serrouya, R., DeMars, C., Cranston, J., and S. Boutin. Evaluating functional recovery of habitat for threatened Woodland Caribou. *Ecosphere* 8(9) e01936 (2017).

\*Wolf and caribou graphics created by Kate Broadley.