

QuickNotes

Science Summaries from fRI Research

Whose Line is it Anyway? Moose (*Alces alces*) Response to Linear Features

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Linear features like seismic lines, pipelines, and roads are prevalent across the boreal forest and impact the movements and distribution of several boreal species. Woodland caribou, listed as threatened under the Species At Risk Act, are negatively affected by linear features as they alter the distribution of other ungulate species like moose, and the distribution of shared predators like wolves. Both caribou and moose are ecologically and culturally important boreal species, so effective restoration of linear features to benefit caribou needs to consider ecological relationships and impacts on other boreal species, like moose.

We used GPS collar data to assess moose response to linear features, characteristics of linear features, and the surrounding habitat matrix in west-central Alberta.



Key Findings

- **Seismic Lines:** During winter, moose selected seismic lines in areas with low seismic line densities, regardless of the vegetation height on seismic lines or the surrounding habitat. This relationship was mostly driven by males. Moose also selected seismic lines in areas with high wildfire and/or harvest block densities.
- **Pipelines:** During winter, moose selected pipelines in areas with low road and seismic line densities. During summer, moose selected pipelines in areas with low wildfire and/or harvest block densities. During both seasons, moose selection of pipelines was not driven by the surrounding habitat or soil wetness.
- **Roads:** Moose did not respond to roads, although the sample size was small and there was high variability between individuals and among road types.

Methods

We used GPS telemetry data from seven adult moose collared between 2008 and 2010. GPS data were provided by the Government of Alberta and the University of Montana. Collars were programmed to send fixes every four hours and we partitioned locations into summer and winter. The study area included four caribou ranges in west-central Alberta: Little Smoky, A La Peche, Narraway, and Redrock-Prairie Creek.

At the landscape-scale, we used generalized linear models to investigate the functional response of moose proximity to seismic line, pipelines, and roads in relation to the surrounding densities of other disturbances (linear features, cutblocks, wildfires). Functional response models assess how response to habitat attributes changes as a function of the surrounding landscape. At the fine-scale, we used conditional logistic regression models to investigate how vegetation regeneration (seismic lines only), soil wetness, and surrounding habitat characteristics influenced moose response to seismic lines, pipelines, and roads.

Conclusions

Our results suggest that moose response to linear features is likely driven by a range of factors including access to forage, reducing predation risk, increasing movement efficacy, and density of disturbances in the surrounding area. As moose selected seismic lines regardless of their regeneration height, both functional (targeting wildlife movement) and structural (targeting vegetation composition) linear feature restoration will be required to separate caribou from moose and shared predators. Effective habitat restoration for caribou habitat must consider the impacts of restoration on other boreal species.

More Information

Read the full paper here: <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecs2.4636>

Related studies:

Tattersall, E., Burgar, J., Fisher, J. T., Burton, A. C. "Mammal seismic line use varies with restoration: Applying habitat restoration to species at risk conservation in a working landscape." *Biological Conservation*. Volume 241, 2020. 108295. DOI: [10.1016/j.biocon.2019.108295](https://doi.org/10.1016/j.biocon.2019.108295)

Finnegan, L., Pigeon, K. E., MacNearney, D. "Predicting patterns of vegetation recovery on seismic lines: Informing restoration based on understory species composition and growth." *Forest Ecology and Management*. Volume 446, 2019. 175-192. DOI: [10.1016/j.foreco.2019.05.026](https://doi.org/10.1016/j.foreco.2019.05.026)

Tattersall, E., Pigeon, K., MacNearney, D., Finnegan, L. "Walking the line: Investigating biophysical characteristics related to wildlife use of linear features." *Ecological Solutions and Evidence*. Volume 4, 2023. e12219. DOI: [10.1002/2688-8319.12219](https://doi.org/10.1002/2688-8319.12219)

