

Behaviour and calving success of boreal caribou in relation to oil and gas development.

15-ERPC-06

Best Practices Recommendations

Project problem

Anthropogenic disturbance is thought to negatively affect boreal caribou through displacement and degradation of habitat and creation of favourable conditions for other ungulates predators. Reproductive success may also be impacted by anthropogenic disturbance, and while some research has been conducted for barren ground caribou and for other ungulates, there is little knowledge regarding the effects that sensory and physical disturbance from oil and gas development may have on boreal caribou in Alberta, where a large proportion of caribou range is currently disturbed. Oil and gas well sites go through dramatic changes in human activity as they are developed, from the drilling phase through to production and eventually to inactivity. Knowledge of how human activity at oil and gas well sites affects caribou movement and habitat selection, and whether the intensity of activity and the proximity of caribou to well sites can affect caribou populations through reproductive success could contribute greatly to efforts to mitigate impacts of development on caribou, and help land managers plan for caribou recovery.

Project objectives

We developed a project to investigate the impacts of well sites in all phases of development on caribou habitat selection and reproductive success. We focused on two boreal caribou herds (Chinchaga and Little Smoky) in west-central and north-western Alberta where the anthropogenic disturbance footprint is extensive. We used GPS collar data from caribou, disturbance data from partners in the forestry and oil and gas sectors and the Government of Alberta, and information on well site activity to address the following objectives:

1. Determine how well sites in different stages of development influence the behaviour of caribou, and assess how changes in caribou behaviour vary seasonally and across different regions (west-central Alberta vs. north-western Alberta).
2. Evaluate calving success and habitat selection of caribou during the calving season in relation to the proximity and density of oil and gas developments and other disturbances in boreal caribou herds in west-central and north-western Alberta.
3. Evaluate whether 500m buffers on well sites and pipelines accurately reflect caribou functional habitat when considering information on well site activity and re-vegetation stage of pipelines.
4. Synthesize findings to support decision making with respect to restoration and mitigation of disturbance features within caribou range and contribute to caribou recovery in west-central and north-western Alberta.

Project outcomes

- Using movement rates for individual GPS collared caribou we estimated the calving status of 71 caribou in the Chinchaga and Little Smoky range, and estimated that the parturition rate was 87% between 2007 and 2009 for Chinchaga caribou, and 81% between 2000 and 2015 for Little Smoky caribou.
- We estimated a calf survival rate of 55% for Chinchaga caribou and 47% for Little Smoky to 4 weeks of age.
- At broad and fine scales of habitat selection, adult female caribou avoided well sites regardless of activity status in both Chinchaga and Little Smoky and in all seasons.
- Well sites with higher intensities of activity were generally avoided more than well sites with lower intensities of activity.
- Adult female caribou generally avoided areas with high density of anthropogenic disturbance in both Chinchaga and Little Smoky.

- The probability of having a calf was lower for Little Smoky caribou that encountered higher densities of anthropogenic disturbance the previous fall.
- We found no clear relationship between calf survival and the exposure of adult females to anthropogenic disturbance during gestation.
- We found no evidence to refute the 500m buffer on well sites and oil and gas infrastructure.

Actionable outcomes

- To mitigate potential negative effects of oil and gas development on caribou habitat selection and reproductive success, landscape planning could consider the placement and timing of development of these features while also considering the spatio-temporal distribution of caribou within their ranges
- It is possible that activity at well sites could affect caribou calving success several months before calving; operational standards for high activity stages of development when feasible could consider implementing mitigation measures at well sites when caribou are located nearby. Additional research may be able to provide insight into thresholds in the intensity of work that illicit greater negative response from caribou.
- We identified calving sites and seasonal ranges for caribou in the Chinchaga and Little Smoky boreal ranges. Probability maps will be provided as supplemental material when final data analyses are complete. Land managers could use this knowledge of caribou locations in important times of the year to protect areas used by caribou from further development, and to direct restoration efforts to where they will have the greatest benefit for caribou.
- Caribou respond negatively to well sites even in the inactive phase; efforts could be made to speed restoration of inactive well sites back to pre-disturbance habitat types by using silviculture methods for site prep, and planting trees.
- We were unable to identify a distance at which caribou no longer responded to well sites in any phase of development. Therefore, we can not refute the 500m buffer placed on oil and gas well sites to define disturbed habitat and cannot define a distance from well sites at which caribou habitat is considered undisturbed. Additional research including data on health, calf survival, adult caribou mortality, and predation risk may help to answer this question in more detail.

Overall, our analyses of caribou response to well site status contributes new knowledge towards understanding the effect of disturbances on animal behavior, and towards understanding the full effects of oil and gas development on caribou through direct response to disturbance features, and indirect costs to reproductive success through exposure to sensory disturbance. Collaboration and data contribution by partners within the energy and forest sectors, and the Government of Alberta has facilitated the first detailed analysis of boreal caribou response to well site activity in west-central and north-west Alberta, and contributes considerable new knowledge that may be used by industry partners, and land planners within the provincial government to mitigate impacts of oil and gas development on caribou in terms of direct habitat degradation and indirect population health and reproductive success. Ultimately, these results may be used to expedite recovery planning to reach the disturbance targets outlined in the federal recovery strategies.