Project Profile

Project Name:	Caribou and Wolf Behaviours in Relation to Oil and Gas Development: Are all Disturbances Created Equal?
Project Number:	BCIP-2016-15
Proponent:	Foothills Research Institute
Funding Envelope:	Boreal Caribou
Timeframe:	Phase 1: November 1, 2015 to November 30, 2016 Phase 2: November 30, 2016 to December 31, 2017

Project objectives

The objective of the project are:

a. Determine how different types of activity at well sites influences the behaviour of caribou and wolves and assess how this relationship changes seasonally and in relation to the surrounding habitat matrix (e.g. proximity to cut blocks, seismic lines (vegetation height measured using LiDAR), habitat and topographic variables).
b. Assess caribou and wolf response to pipelines in relation to pipeline age and the surrounding habitat matrix.
c. Use models of caribou and wolf use of pipelines developed in Alberta (FRIP OF-13-006) to model caribou and wolf use of pipelines in the BC portion of the Chinchaga caribou range, and validate models with field data collection.
d. Evaluate whether currently accepted 500m buffers on well sites and pipelines accurately reflect caribou functional habitat.
e. Synthesise the results from objectives a - d to provide guidelines for restoration and mitigation of disturbance features within caribou ranges to contribute towards caribou recovery in north-western Alberta and north-eastern BC.

Project description

In light of **federal and provincial legislation mandating caribou recovery in Canada**[1], the purpose of this project is to support to land managers by assessing how oil and gas activities affect behaviour and habitat use of caribou and one of their primary predators, wolves, and to determine whether animal response to oil and gas activities is consistent across all stages of re-generation and activity. This proposed project builds upon and complements existing research underway by the fRI Caribou Program assessing the response of caribou and their predators to disturbed areas at different stages of activity

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and re-vegetation. Boreal caribou occur at low densities in mature forest with terrestrial and/or arboreal lichen cover where other ungulates are less prevalent[2–4]. Historically, caribou populations were able to meet nutritional needs and maintain low population densities by utilizing large patches of mature forest, which enabled spatial separation from other ungulates and their corresponding predators and ensured predation rates were low[5,6]. Recent landscape fragmentation due to anthropogenic disturbance has converted large tracts of the boreal forest to early seral stage habitat; increasing niche overlap between caribou and other ungulates, and is believed to have increased predator presence in caribou ranges[5,7]. Thus the extent of disturbed habitat within caribou ranges is thought to be the ultimate cause of caribou declines[8–10]. In addition, as research has found that the effect of habitat disturbance is more extensive than the disturbance itself [11,12], the federal recovery strategy currently includes a 500m buffer on all disturbed habitat[1].

Recent research has revealed that grizzly bear response to well sites differs according to well site activity stage[13], and preliminary analysis on southern mountain caribou has revealed similar patterns[14]. To our knowledge no evaluation of wolf and boreal caribou response to oil and gas activities has included information on re-vegetation stage and activity status. If this is the case, evaluating the response of wolf and caribou to oil and gas activities will have important implications on the buffer sizes of disturbances at all stages of re-vegetation/activity, and on the estimates of disturbed habitat thresholds across caribou ranges. It is critical to understand *when* disturbed habitat returns to effective habitat for caribou and is no longer selected/appealing to predators. Understanding when habitat is perceived as disturbed and not disturbed by caribou and their predators is essential to accurately assess the extent of disturbed habitat within caribou ranges, and is vital to inform science based restoration for caribou.

Project background

Boreal caribou (*Rangifer tarandus*) populations are in decline across Canada, and this is believed to be due in part to the direct and indirect effects of oil and gas development within caribou ranges which are believed to have increased both the distribution, and movement of caribou predators. Under the federal recovery strategy, a minimum of 65% undisturbed habitat within each caribou herd range is required to stabilize populations. Currently, most boreal caribou ranges exceed that threshold, and disturbed habitat is defined by the footprint of disturbance features (e.g. well sites, pipelines, roads, and seismic lines) buffered by 500m, irrespective of the activity status (active/abandoned) or regeneration stage of the disturbance. Because these disturbances and buffer zones are widespread across the landscape, maximizing the efficiency and cost-effectiveness of restoration actions, is imperative. Therefore understanding how well site activity and regeneration stage influence the behaviour of caribou and wolves (*Canis lupus*), one of their main predators, is key. Restoration efforts will be most effective if directed towards actions that yield quantifiable improvements in caribou habitat quality and an increase in caribou functional habitat. This project addresses two of the priorities of the REMB: **Mitigating impacts of industrial activity on boreal caribou;** and **Improving habitat conditions for boreal caribou.** The research will be focused on the **Chinchaga caribou herd.**

Project approach

The project will be carried out using the following approach:

Animal response to well sites at different stages of activity: We will use existing GPS location data from caribou and wolves to build resource selection functions (RSFs) that model the response of caribou and wolves to well site activity status (drilling, producing, capped, or restored) and other parameters (e.g. surrounding habitat type, disturbance density).

Animal response to pipelines at different stages of activity: To assess animal response to pipelines we will use GPS location data to build models of animal occurrence and associated zone of influence in relation to pipelines, pipeline age, and the surrounding habitat matrix.

Validating predictive maps built in Alberta: To determine whether predictive models of animal use of pipelines built in Alberta can be applied in BC we will use the AUC and cross validation to measure the ability of generalised linear mixed models developed in Alberta as part of previous research to accurately predict caribou and wolf use of linear features in BC.

Project deliverables

The deliverables from this project include the following:
- Year 1 Report.
- Final Report.