

Alternative Silvicultural Systems and Harvesting Techniques for Caribou Habitat



Summary

Alternative silvicultural systems have potential to allow for a *working landscape* with some level of timber harvest whilst also minimizing negative impacts on caribou. However, widespread adoption of alternative silviculture systems over conventional clearcut forestry remains constrained by knowledge gaps, financial considerations and policy restrictions. While there are limited caribou-specific trials of alternative systems in Alberta, experience from other jurisdictions and re-purposing of other studies provides guidance in how such systems could be applied. In this study, we draw upon subject-matter expert interviews and literature review to identify options and trade-offs for forestry in Alberta caribou ranges. We recommend building upon this review with a detailed real-world planning study that brings together silviculturalists, caribou biologists and operational foresters and considers the systems and treatments that are possible given the existing forest structure and stand-level objectives.

Prepared For:

The Alberta Regional Caribou Knowledge Partnership (ARCKP)

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- Caribou populations are in decline throughout Alberta and urgent action is required to reverse caribou declines and for Alberta to meet Federal targets for reducing habitat disturbance under the Species at Risk Act.
- Forestry in Alberta is a multi-billion-dollar industry and a crucial employer in many rural communities, directly employing 17,500 people and supporting another 23,900 jobs¹.
- Caribou ranges and forestry overlap - 38% of Alberta's green (forested) zone is within caribou range and over half of boreal caribou range and almost all of Southern Mountain winter caribou range is under Forest Management Agreement or other major forestry tenure.

Methods

Assess alternative silvicultural systems and harvesting techniques, relative to clearcutting with retention, asking:

- (a) is forage availability for other ungulates minimized, thereby reducing the impact of apparent competition?
- (b) are caribou biophysical habitat and associated forage resources maintained post-harvest?
- (c) what is the extent and duration of road access required for implementation?



Literature Review
& Case Studies



Subject-Matter
Expert Interviews

Results

While there are clearly no “silver-bullet” solutions, we identify a number of alternative approaches that have potential to improve outcomes for caribou in Alberta. However, we caution that results from these systems will be highly dependent on forest type, site productivity, and extent of required access. Some systems may have negative impacts if applied in the wrong situation. As such, it is vital that any alternative system is carefully evaluated in the context of local conditions.

Apparent Competition:

Increase in early seral stage vegetation (e.g. through clearcutting) favoring other ungulate species such as moose, deer, and elk. These prey species support higher density wolf populations, as well as other predators, which incidentally prey on caribou, causing unsustainable mortality.

¹ <https://www.alberta.ca/forest-business-overview.aspx>

Results cont.



- In coniferous stands, partial harvest systems with varying levels of removal and spatial layout can maintain old forest characteristics and associated terrestrial and/or arboreal lichens that caribou rely on. Extensively trialed in other jurisdictions.
- For apparent competition, the outcomes are mixed. In some cases the maintenance of canopy cover can prevent a significant response from the understory. However, in other cases, partial harvest systems can lead to a major “flush” of highly palatable early seral stage growth, creating excellent habitat for other ungulates, and worsening outcomes for caribou.
- Single-tree selection systems show potential, for example, through the use of commercial thinning treatments. These result in a more open stand structure, which can favour lichen growth, while providing timber volume.



- Deciduous and mixedwood forests in or near to caribou habitat are important because harvest in these areas can increase early seral stage habitat availability, increasing apparent competition.
- Understory protection is sometimes used in deciduous stands in Alberta, to remove deciduous canopy while protecting a coniferous understory. Under the right conditions, it may be effective at suppressing aspen suckering and the growth of other browse species, creating an opportunity to harvest timber whilst minimizing habitat quality for other ungulates.
- Partial harvest systems may also be an option in some cases for reducing understory browse species response by maintaining canopy cover.

Variability:

Outcomes of any system are highly dependent on details of implementation, forest structure, and site productivity. Balancing the need to maintain caribou habitat attributes, minimize apparent competition, and minimize access is key.

Recommendations - Other

1. Facilitate knowledge exchange between silviculture experts, foresters, and biologists e.g. workshops, visual guides.
2. Utilize existing and planned trials, including those not conceived with a caribou focus e.g. EMEND (long-term data on variable retention), mixedwood management trials (understory protection), partial harvest trials (BC/QC).
3. Research ways to identify the specific site conditions, level of harvest and associated light conditions under which alternative systems would minimize understory response. Use (a) forage availability, (b) ecosite types and site index, (c) canopy cover structure e.g. using LiDAR, and (d) light models.

Key Trade-Offs



Access requirements are an Achilles heel for many alternative systems. Increased access can bring more predators, other ungulates, and people into caribou habitat. In some cases, the negative effects of additional access requirements may outweigh the benefits of adopting alternative systems, although there is much uncertainty in quantifying this.



Alternative systems, particularly low removal partial harvest and single-tree selection systems, involve additional costs and/or lower timber volume removals per unit area, increasing harvest costs. In addition, if we assume mill requirements remain constant, adoption of partial harvest systems risks spreading disturbances across caribou habitat.

Recommendations - Pilot Study

Assemble a multidisciplinary team of biologists and forestry professionals with the expertise to carry out a real-world planning exercise, designed to better assess the cumulative trade-offs for a large component of a caribou range. A detailed planning approach is required as alternative (non-clearcut) silviculture systems can only be successfully applied to a limited range of stand conditions.

- Apply at a large scale (e.g. 10,000 - 30,000 ha) - utilize existing aggregated harvest timing units, replacing planned clearcuts with alternative systems.
- Identify stand-level vegetation objectives (biology), systems/treatments to achieve them (silviculture), quantify costs/practicality (operational forestry).