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# PROJECT REPORT

## **Towards Undisturbed Habitat: Forest Management in Alberta's Caribou Ranges**

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# **Toward Undisturbed Habitat: Forest Management in Alberta's Caribou Ranges**

## **Summary**

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cutblocks to be restored after 30-40 years, no one has developed age-related guidance for linear features (Table 1).

*Table 1. Current thresholds applied by jurisdictions to classify previously disturbed habitat as again undisturbed, either in the field or in forecasts.*

<b>Jurisdiction</b>	<b>Undisturbed threshold for cutblocks (years)</b>	<b>Undisturbed threshold for linear features</b>	<b>Comments</b>
British Columbia	40	To be determined	No guidance for mountain caribou, although linear feature restoration is in progress.
Northwest Territories	30-40	Identified as knowledge gap	Permit 40% disturbance in the south and 30% in the north to achieve 35% overall.
Saskatchewan	40	Not currently available	Forecasted future disturbance assumed a 40-year recovery for all features with a reclamation delay of 10 years for some roads.
Manitoba	-	-	In initial phases of range planning.
Ontario	40	No specific guidance	40-year threshold applied for range planning; operational guidance for forestry specifies age at which stands types are considered caribou habitat (41-101 years).
Québec	50	All but winter roads considered permanent	Road restoration trials underway.
Newfoundland and Labrador	-	-	Very low levels of habitat disturbance so not a priority.

## Considering Multiple Functional Pathways

There are different, interacting pathways to caribou decline that are associated with different components of habitat, and therefore how habitat should be managed to restore and/or maintain function should be sensitive to the roles different habitat components serve in the caribou system (Figure 1).

## Caribou Discriminate Among General Forest Types and Stand Ages

Monitoring in several Alberta boreal and mountain caribou ranges has demonstrated that upland productive forests, and in particular, those with a deciduous component, are strongly avoided by caribou, while lower productivity forests dominated by black spruce and larch are strongly

selected (Table 2). Lower productivity lodgepole pine stands with abundant ground lichens are preferred winter range for mountain caribou while lodgepole or jack pine stands receive variable use by boreal herds, with the strongest associations occurring where those stands are in close proximity to suitable lower productivity habitats. In addition to productivity, forest age is an important driver of caribou habitat selection, with caribou generally avoiding younger age classes.

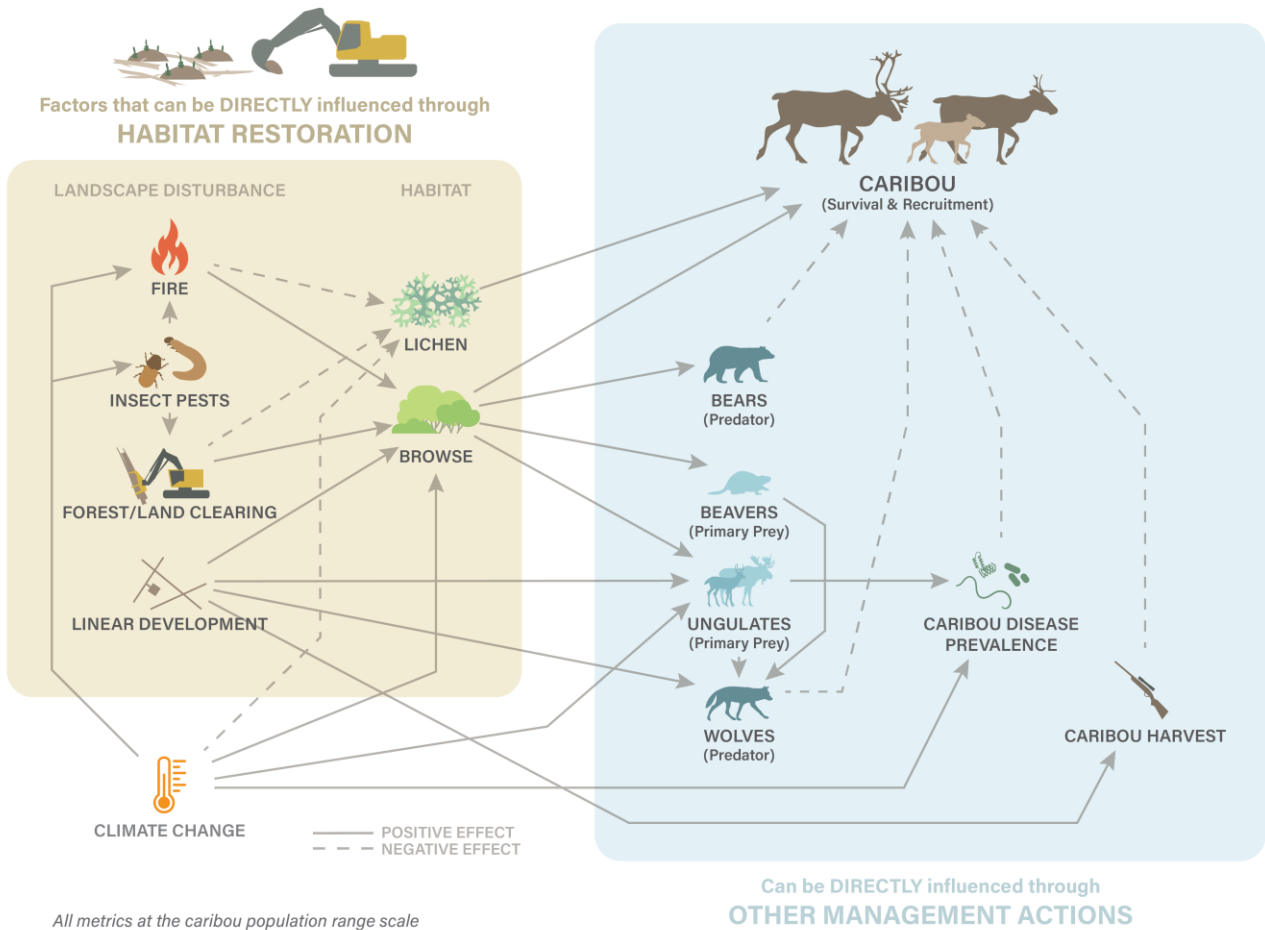


Figure 1. National boreal caribou ecological model (Habitat Restoration Working Group, 2021).

In contrast, primary ungulate prey such as moose and white-tailed deer demonstrate the opposite pattern, generally selecting younger, more productive forests. This differential selection can provide at least a partial refuge for caribou from predators that tend to be more abundant and spatially coincident with denser populations of primary ungulate prey. Land management

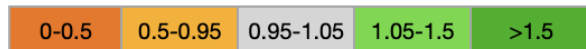
practices that erode caribou refugia and generate larger populations of predators can lead to unsustainable predation on caribou.

## Habitat Management Goals Should Differ by Forest Type

If different forest types serve different functional roles for caribou and are therefore used differently, then caribou forest management goals should differ as well (Figure 2).

*Table 2. Habitat selection of different forest types by caribou subpopulations in Alberta for which telemetry data are available. Ranges of selection ratios are presented as different colours, with greens representing forest types used more than expected, based on the proportion of telemetry locations recorded in a forest type divided by the proportion of the range covered by that forest type. Percentages in each cell reflect the distribution of different forest types by range. Use by forest type was aggregated from Government of Alberta telemetry data summaries.*

Population	Range	Pine	Black spruce-larch	Spruce-balsam	Mixedwood	Deciduous
<b>Boreal</b>	BIST	3.6%	51.1%	10.2%	6.1%	16.8%
	YATES	0.1%	52.8%	8.4%	4.7%	17.1%
	CM	2.8%	42.6%	12.7%	4.9%	16.8%
	ESAR	7.8%	54.2%	2.6%	2.9%	10.9%
	WSAR	4.9%	61.2%	2.4%	3.2%	1.8%
	LSM	51.5%	27.8%	8.2%	2.9%	2.0%
<b>Mountain</b>	CHIN	20.0%	27.4%	8.9%	7.8%	24.0%
	NARR	36.2%	14.0%	14.2%	11.3%	12.3%
	RRPC	57.9%	5.2%	23.5%	5.5%	2.7%
	ALP	56.9%	11.6%	21.5%	0.64%	0.21%



## Defining Undisturbed Habitat Conditions to Meet Caribou Forest Management Goals

What constitutes undisturbed habitat in a forest type should depend on the caribou forest management goal that's being pursued (Table 3). Not all goals are applicable to all forest types.

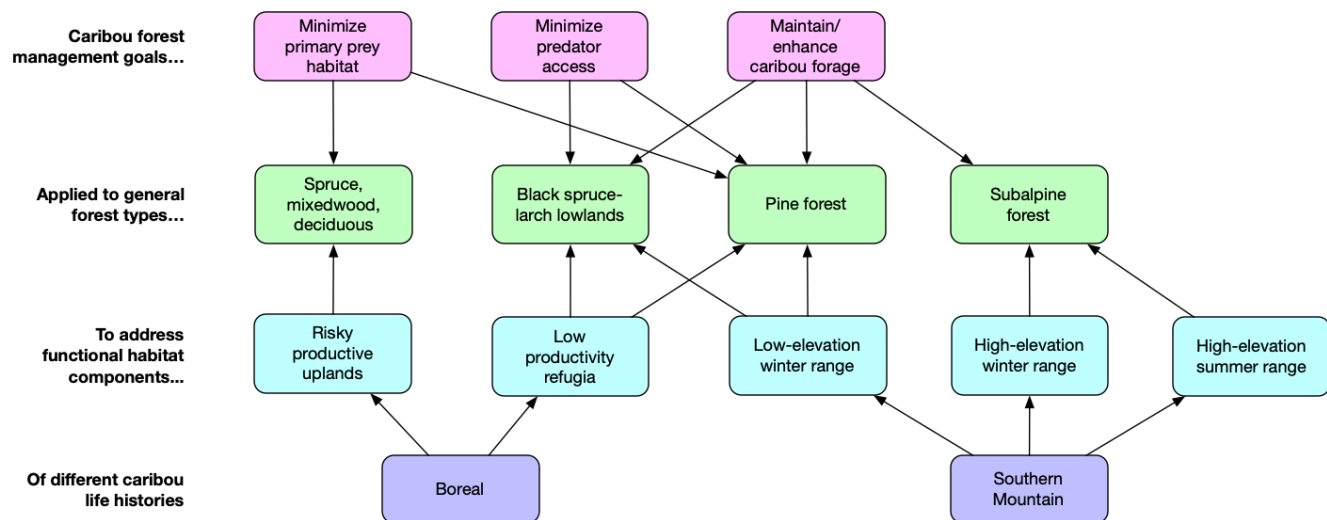


Figure 2. Relationship between functional habitat requirements of boreal and mountain caribou and proposed caribou forest management goals, by general forest types.

Table 3. Proposed qualitative definitions of undisturbed habitat conditions to meet desired outcomes inferred from caribou habitat management goals.

Caribou forest management goals	Desired outcome	Undisturbed habitat condition
Minimize primary prey habitat	Predator-prey populations consistent with self-sustaining caribou subpopulations.	Sparse cover of herb, shrub, and deciduous tree forage preferred by primary ungulate prey.
Minimize predator access	Permeability of the landscape for predators does not result in unsustainable predation rates on caribou.	Travel rates of predators and use of linear features are similar to those in the surrounding forest.
Maintain/recover caribou forage	Forage is sufficient to meet the nutritional needs of self-sustaining caribou subpopulations.	Abundant terrestrial and/or arboreal lichens for winter forage, <i>ad libitum</i> preferred forage in other seasons.

## Proposed Metrics

Draft metrics to define undisturbed habitat in specific forest types to achieve undisturbed habitat conditions can be interpreted from the existing caribou and forestry literature (Table 4).

Table 4. Draft default metrics proposed to meet undisturbed habitat conditions, by forest type.

Undisturbed habitat conditions	Forest type	Draft default metric
Sparse cover of herb, shrub, and deciduous tree forage preferred by primary ungulate prey.	Spruce, mixedwood, deciduous	>40 years of forest growth, although this can occur earlier in productive ecosystems and might not apply in very cold and/or dry conditions.
	Black spruce-larch	Not applicable, but treatments should encourage a rapid return to conifer cover.
	Pine	40-100 years of forest growth for mesic stands and all ages for xeric stands
	Subalpine forest	>40 years of forest growth in closed forest stands at lower elevations, does not apply in higher elevation habitats.
Travel rates of predators and use of linear features are similar to those in the surrounding forest.	Spruce, mixedwood, deciduous; black spruce-larch; pine	>1 m tall vegetation
	Subalpine forest	Not applicable
Abundant terrestrial and/or arboreal lichen for winter forage, <i>ad libitum</i> preferred forage in other seasons.	Spruce, mixedwood, deciduous	Not applicable
	Black spruce-larch	>40 years of forest growth
	Pine	40-100 years for mesic stand and all ages for xeric stands
	Subalpine forest	>60 years

## Beneficial Management Practices

To meet caribou forest management goals, objectives can be established for each forest type, which then inform practicable strategies that can be implemented to generate undisturbed habitat conditions as rapidly as possible following disturbance, or that can support caribou habitat management goals indirectly (Table 5).

Table 5. Proposed objectives for each forest type, aimed at achieving caribou forest management goals.

Forest type	Caribou forest management goals	Proposed forest management objectives
Spruce-mixedwood uplands	Minimize primary prey habitat	Minimize edge
		Minimize forage response



Forest type	Caribou forest management goals	Proposed forest management objectives
Black spruce-larch	Minimize predator access	Encourage stem exclusion as rapidly as possible and maintain as long as possible Encourage high hunter use and success Minimize roads and trails
	Maintain/recover caribou forage	Minimize ground disturbance Encourage rapid return to conifer cover Retain suitable stands known to be selected by caribou
Pine	Minimize predator access Minimize primary prey habitat (mesic conditions and/or where a strong shrub response is expected)	Minimize roads and trails Minimize forage response
	Maintain/recover caribou forage (in more xeric conditions where terrestrial lichens dominate understories)	Encourage stem exclusion as rapidly as possible and maintain as long as possible Minimize ground disturbance
Subalpine forest	Maintain/recover caribou forage	Target xeric/low productivity sites for retention Maintain mature conditions in mesic pine forest Minimize slash Retain or recruit stands with high arboreal lichen loading

## Recommended Workflow

Harvesting and silviculture planning can be informed by answering specific questions in the context of caribou recovery (Figure 3).

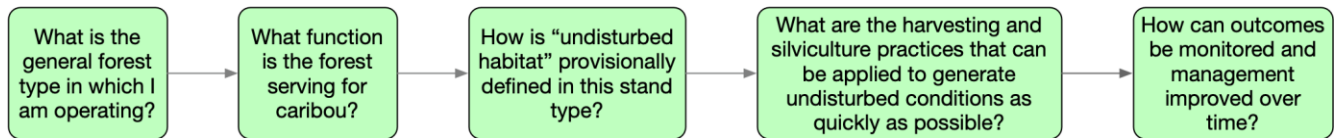


Figure 3. Planning workflow questions to inform harvesting and silviculture strategies to be implemented in different forest types to support caribou recovery.

## Knowledge Gaps

Companies can contribute positively to caribou recovery by understanding the functional roles of the forest types in which they operate, understanding what characteristics constitute undisturbed habitat conditions, and implementing strategies and practices to achieve those conditions as rapidly as possible. Effective practices are expected to vary with site conditions and additional research is required to:

1. Develop a more precise definition of early seral forage conditions that are inconsistent with caribou recovery.
2. Develop detailed planning guidance for pine-leading forests to optimize conditions for caribou.
3. Assess the effect of forest interspersion on managing caribou refugia from predation.
4. Determine the extent to which subalpine refugia for mountain caribou are compromised by linear features.
5. Better integrate caribou habitat management goals with those for other species or biodiversity in general.

## Next Steps

This report presents several broad concepts as well as proposed goals and strategies that can form the basis for further dialogue with the Governments of Alberta and Canada on strengthening the evidence considered in range planning. Key themes for discussions could include that:

1. Different habitat types serve different functional roles in the caribou system and therefore no single “undisturbed” metric is likely to drive caribou recovery efforts effectively or efficiently.
2. In fire-adapted ecosystems, an older forest is not necessarily a better forest for caribou.
3. Current evidence is not consistent with some current federal and provincial direction and alternatives to improve the effectiveness and efficiency of caribou recovery could be explored.