

Exploring the Implementation of Aggregated Harvest in Woodland Caribou Ranges

Summary

Aggregating forest harvesting is an important strategy to reduce the impacts of forestry on caribou. In this project, timber supply modelling scenarios were run in Patchworks™ to investigate the impacts of implementing aggregated harvest in three of Alberta's caribou planning sub-regions over a 100-year planning horizon. We tested a range of scenarios to examine how this approach can be tailored to work most effectively for caribou while providing for a working landscape, and assess the trade-offs between aggregated harvest and ecological and socio-economic values. Clear trade-offs between patch size, harvest volume, and caribou habitat metrics were observed. Increased patch size resulted in a volume reduction due to both a loss of harvest area and utilizing younger, suboptimal timber, but increased the proportion of undisturbed habitat within ranges. The greatest impact of aggregation is the reduction of area disturbed by the harvest buffer. Harvest reductions from baseline (i.e., business as usual) levels will be required in all assessed regions in order to meet the federal target of > 65% undisturbed habitat.

Authors:

Logan Purdy
Casi Bouchie
Bob Christian

Date:

May 25, 2022

Scenarios:

- Business as usual (BAU)
- Small patches
- Small-moderate patches
- Moderate-large patches
- Very large patches
- Large-very large patches + constraining access
- Large-very large patches + even-flow harvest
- Large-very large patches + constraining harvest timing
- Large-very large patches + achieve > 65% undisturbed habitat (Berland & Chinchaga only)

Methods

For this model, undisturbed habitat did not include seismic lines or wildfires. Some types of temporary disturbances (e.g., access roads, well pads) were progressively reclaimed and no new non-forestry disturbances were allowed. The following analyses were included:

Comparison of regional differences using three caribou planning sub-regions: One each in the Northeast (Wandering River), Northwest (Chinchaga) and West-Central (Berland) regions of the province.

Harvest aggregation size and scale: For each range, we examined a range of harvest block aggregation sizes, from individual harvest blocks (e.g., 2.5 ha) up to very large patches (e.g., > 10,000 ha).

Harvest timing: We examined a range of timing options, including:

- Consistent even flow entry into the range; or,
- Constraining entry timing by allowing harvest within the range for 3 or 4 decades and excluding entry for the remaining decades.

Road building/maintenance: Road building and maintenance levels were adjusted to determine the effects on harvest and caribou habitat.

Results



Harvest Volume

- BAU harvest levels will not achieve caribou habitat objectives in any sub-region.
- Aggregation causes harvest levels to decrease from baseline levels with increasing patch size corresponding to decreasing volume.
- Reduced harvest within caribou ranges can only be minimally compensated for by increasing harvest outside of ranges and this varies by sub-region.



Undisturbed & Biophysical Habitat

- The level of undisturbed habitat increases as harvest patch size increases.
- Aggregating harvest results in significantly less forestry buffer area contributing to disturbance levels in caribou range(s).
- The earliest that the > 65% undisturbed habitat target was met in any sub-region was year 80.
- An additional scenario directing the model to meet the > 65% target was required in Berland & Chinchaga while several of the original scenarios achieved the target in Wandering River.
- Aggregation increases the proportion of biophysical habitat.



Non-Timber Values

Non-timber values include road metrics, songbirds, marten, and watershed and trapline disturbance levels.

- Scenarios constraining access and directing the model to reach > 65% undisturbed habitat typically resulted in the best outcomes for all species except ovenbird, where BAU and small aggregation scenarios resulted in the highest species abundance. No species falls below 70% of current levels in any scenario within any sub-region (including BAU).
- Watershed disturbances were minimal in all scenarios.
- Nearly all scenarios in all sub-regions resulted in higher trapline disturbance over time. Scenarios constraining access & harvest timing best improved outcomes.



Neptune Metrics

NEPTUNE is a tool that examines how the size, shape, and distribution of disturbance events impacts the amount and connectivity of disturbed area and compares it to the natural range of variation (NRV). Events are composed of the disturbance, the matrix, islands, and other.

- Total disturbance area and matrix remnant area decrease as target patch sizes increase.
- Larger patches result in events with a similar distribution to NRV in Berland and Chinchaga.
- Larger harvest patches create more contiguous and uniform disturbance events and reduce the number of disturbance patches per event and the event shape index.

Discussion

There is a clear trade-off between harvest aggregation and a reduction in harvest volume, due to both a loss of harvest area and decreased volume from harvesting timber outside of the optimal age range. Aggregating harvest into larger patches reduces caribou habitat disturbance considerably by reducing the harvest buffer area required and has a secondary effect of increasing biophysical habitat. The ability to aggregate varies between sub-regions due to the amount and spatial layout of active landbase found within and outside of caribou range(s). Access and harvest timing can potentially be used to further reduce disturbance levels depending on local conditions. BAU approaches will not achieve caribou habitat objectives and harvest reductions within caribou ranges are inevitable. However, aggregation can potentially reduce the negative impacts to the forest industry while aligning with federal caribou habitat targets.

Harvest Reductions Required to Achieve Federal Disturbance Target:

Berland

- Conifer harvest reduced to 81% of baseline level (37% of baseline within caribou ranges)
- Deciduous harvest reduced to 96% of baseline level (38% of baseline within caribou ranges)

Chinchaga

- Conifer harvest reduced to 78% of baseline level (51% of baseline within caribou range)
- Deciduous harvest reduced to 88% of baseline level (52% of baseline within caribou range)

Wandering River

- Conifer harvest reduced to 81-86% of baseline level (28-45% of baseline within caribou range)
- Deciduous harvest reduced to 84-87% of baseline level (33-54% of baseline within caribou range)