Old Growth Strategic Review Panel
Ministry of Forests, Range, Natural Resource Operations and Rural Development

January 31, 2020

As one of the largest forest sector contributors in the province of British Columbia, Canfor has a keen interest in the management of healthy forests in our operating regions. Our company has been more impacted than most by the forest health crisis of the mountain pine beetle, alongside recent years of intense, uncontrolled wildfire.

Our professionals who work and live in BC's forests see the need for smart, science-informed management of BC's interior forests to improve forest health and resiliency while providing critically important economic, cultural and ecosystem benefits. We hope that the Province's review of old growth management strategies provides an opportunity to advance these important objectives.

The majority of BC's interior forests are not naturally static – predominantly, these ecosystems are disturbance-driven, and frequent low intensity and regular stand-replacing disturbance events have maintained healthy forest conditions historically. Contrary to these natural patterns, BC has adopted a static approach to managing forest values – delineating areas where a fixed condition is to be maintained on the land base. Such an approach in a dynamic ecosystem has not been successful, and the negative impacts of this approach will intensify with climate change.

Recommendations:

To effectively manage old growth forest values in the BC, we must adopt a policy framework that:

1. Clearly defines 'old growth'.

- **Old growth needs to be clearly defined in BC, in both a general sense and for different ecosystems, and quantitative indices of "old-growthness" developed for different ecosystem/stand types.** This Index should be a measure of the quality of old growth for any particular ecological unit.
- **The current amount and location of old growth in BC needs to be determined, rated, mapped and made publicly available.** Utilization of LiDAR would help enormously in this regard and for the current multi-year acquisition effort to expand LiDAR coverage to the entire province needs to be rapidly accelerated.
- **Historic levels of old growth should inform management actions, but not form hard targets.** The amounts of old growth that existed under historic disturbance regimes are not realistic hard targets to set for future conditions given rapidly changing disturbance regimes we are experiencing now, and the extensive changes that have occurred to many landscapes. As important as amounts are spatial patterns at stand and landscape scales.

2. **Rapidly transitions from our current forest ecosystem management model of static land preservation and adopts an adaptive management framework that embraces the role of active forest management.**

    - **Simply preserving old growth stands in a static management approach such as the establishment of old growth management areas (OGMAs), will not ensure forest resilience or persistence. Impacts and risks from climatic-induced events such as drought, insects, disease and severe wildfire must be factored into an adaptive management framework or model. Active forest management must be embraced to manage dynamic ecosystems faced with changing climate conditions.** This dynamic management approach often requires use of spatial reserves that are managed temporally, and in certain areas will require human intervention to create and restore various forest types. Maintaining and restoring old growth in ecosystems with low and moderate severity fire regimes involves restoring successional diverse landscapes resistant and resilient to current and future stressors.
    - **Old growth is only <u>one component</u> of a comprehensive strategy to maintain biodiversity in forested ecosystems**. Appropriate management of early seral stands, riparian areas, in-block retention and reserves, roads, and so forth must also be duly incorporated, as well as regeneration and restoration activities.

The age of the trees in a forest – particularly in interior, disturbance-driven ecosystems – is a poor proxy for forest health and ecosystem value. We cannot manage old forest values in isolation, and instead must consider the full range of forest values and forest ecosystem health indices.

Given what we have learned and witnessed first-hand in British Columbia forests, we strongly urge the Government to adopt dynamic, science-driven and adaptive approaches to managing old forest values in the province.

Important Supporting Information and Analysis regarding Interior Old Growth Forests

The following information and analysis underpins the recommendations in this submission to the Old Growth Strategic Review. We believe this is important contextual information for the Panel to consider as you formulate your recommendations to Government.

Definitions, Characteristics, and Concepts:

Definition in BC – Old-Growth is not formally defined in BC, which must be remedied to create a workable policy regime. 'Old' forest is defined strictly on the basis of age: forest > 250 yrs on the coast and in some wet interior ecosystems, and > 140 yrs in drier forests in the interior. Age is typically taken from VRI maps which can be highly inaccurate.

Scientific Definition of 'Old Growth' - There is no consensus definition of 'old growth' in the scientific literature. A 'forest containing old trees' is the most basic, but this has been superseded by ecologically-based definitions which include the structural attributes and complexity associated with later stages of stand development (i.e., variability in tree age and sizes, including large old trees; large CWD; large dead and dying trees; multiple canopy and vegetation layers; diverse vegetation species composition). Many different terms have been used to describe these forests: late-successional, climax, ancient, primary, etc.

Variety within and among Ecosystems – A large variety of old growth types exist due to variability in tree species and vegetation composition, site productivity, etc. Quantitative structural definitions are ecosystem specific, for example, fire-maintained old growth Ponderosa Pine does not have multiple canopy/vegetation layers or high volumes of CWD but old growth coastal Douglas fir does.
Due to this variability, the only features distinguishing old-growth from other forests, across all forest types, are the dominance or codominance of old, large, live and dead trees.

There are no distinct 'old growth thresholds' – Stands are dynamic and lie on a continuum of development. Stand age alone is a poor measure of whether old growth structural characteristics are present.

Old Growth Indices – For management purposes, an index of 'old-growthness' which classifies stands into categories or rates them on a scale based on quantitative factors has proven helpful in monitoring. A good example of a simple index based on structure is that developed by the Northwest Forest Plan in the US after 20 years of monitoring (density of large live trees, diversity of live tree size classes, density of large snags, cover of CWD to produce a rating on a scale of 1-100). The NWFP index has proved useful to quantify and monitor old growth across very large landscapes for over 20 years. Note that different indices would have to be developed for different stand types/ecosystems.

Old Growth is not Spatially Fixed – Old growth does not occur in permanently fixed locations, due to natural disturbances that inevitably occur. However, some locations are more likely to support OG than others due to differences in natural disturbance rates arising from factors such as terrain, soil moisture levels, proximity to water bodies, etc.

Some Old Growth Types Require Disturbance for Maintenance - Western Larch and Ponderosa Pine stands require frequent low or mixed-severity fires to create and maintain stands dominated by large,

old trees. The remaining old growth stands of these types are threatened by the build-up of high fuel loads due to fire suppression. Simply protecting these stands from forest harvest will not ensure their persistence; treatments are necessary.

Old Growth and Biodiversity

Vertebrates – In BC there are no distinct old growth bird, mammal, or amphibian/reptile communities, and very few vertebrate species known to be dependent on old growth (e.g., marbled murrelet). Vertebrates most strongly associated with old forest are typically found in both mature and old stands, or are more closely tied to specific structural elements such as down wood, shrubs, or cavity trees than 'old growth' per se (e.g., Pileated Woodpecker, marten). However, these species may reach their highest densities in old growth, due to the high densities of structural attributes present in these stands. The northern goshawk, a species often thought to be dependent on old growth, is associated with mature and old forests. In interior BC it nests in forests > 80 yrs. and in coastal forests has been found nesting in stands as young as 45 yrs.

Non-Vertebrates – Many invertebrates, understory plants, fungi, mosses, and soil organisms are thought to be old growth specialists, but knowledge of many of these species is scant. A study comparing understory plant communities in forested landscapes found fewer species specialized to old growth forests in Central Europe, where forests have been managed for centuries, than in boreal Western Canada, where forest management is relatively recent.

Lichens – Lichens are a group often cited as being old-growth dependent, but a recent study from BC suggests that most macrolichen species found in old forests can also occur in 70- to 165-year-old forests dating from stand-replacing fires. Research has found that old western red cedar forests provide important habitat for oceanic epiphytes at the edge of their ecological range in the interior of British Columbia. Some species have been found to be good indicators of old-growth forests in certain regions but not in others.

Considering all species and genetic traits, biodiversity is considered to be highest in old growth as compared to other seral stages.

Climate Change and Resilience

Old Growth Forests are dying due to Climate Change – Major die-offs due to climate change are being seen in old growth yellow cedar in coastal Alaska and BC (reduced snowpack makes the shallow roots vulnerable to sudden cold weather). Indirect die-offs due to increased drought and bark beetles have and are being seen in pine and spruce in interior BC.

Wildfire is increasing and with it the risk to Old Growth Forests– Western Canada is experiencing more extreme fire weather with longer fire seasons and increased fire intensity. Potential fire intensity increases with the build-up of fuels. Large, old trees are naturally fire-tolerant, but today are often threatened by dense understory cohorts that create fuel ladders that alter likely post-fire successional pathways. Closed-canopy, multi-layered patches than develop in hot, dry summer environments are vulnerable to droughts, and increase landscape vulnerability to insect outbreaks and severe wildfires.

Maintain and Restoring Old Growth in ecosystems with low and moderate severity fire regimes involves restoring successionally diverse landscapes resistant and resilient to current and future stressors. Specific recommendations for how to do this have been made (e.g., Hessburg et al) and there are good examples of implementation in progress that BC could follow.

Old Growth and Carbon Dynamics

Carbon Dynamics – Old growth forests store significant amounts of carbon both above and below ground, but are not always carbon sinks. A recent study in Maine found old growth forests to be a source of carbon due to attack by beech bark fungus leading to mortality of large diameter beech trees. The mountain pine beetle epidemic in BC was estimated to convert the pine forest from a small net carbon sink to a large net carbon source during and immediately after the outbreak.

Uncertainty with Carbon Estimates – The highest uncertainty is associated with soil and dead wood carbon pools. There are very few empirical studies completed at present to resolve the issue.

Logging has variable impacts on carbon dynamics, depending on forest type, amount of soil disturbance and amount of retention - In boreal-mixedwood stands in NW Alberta, soil carbon dynamics returned to baseline levels after 6 years. Winter harvest partial-cut stands even became sinks for 2 years following harvest, before returning to baseline levels after 6 years. Wildfire burned stands were still sources after 15 years.

Amounts of Old Growth

The Current Amount in BC is Unknown or Not Publically Available – There is no publicly available data for the amount of old growth in the province or its spatial distribution.

The Amount Calculated Depends on Landbase and Old Growth Definitions– Significant differences in the amounts of old growth present can arise from:

1) Differences in the CFLB and THLB definitions used. Government and industry often use different definitions, and there are significant variances around private land (industry has better data in the East Kootenay for example). There is often a question of whether parks should contribute or not.

2) Whether age-based or structure-based definitions are used. Recent studies from the Cranbrook and Invermere TSAs with both LiDAR and VRI show structure-based definitions find more old growth than age-based definitions. There is high variability and significant error in the VRI associated with age and structure. LiDAR offers a quantitative measure of stand structure that could be used to great advantage in identifying the best old growth stands, as measured by an index.

Historic amounts varied with historic disturbance regimes – The amount of old growth in an ecosystem depends on the type, frequency and severity of the disturbance regime. Ecosystems dominated by gap-replacement disturbance with infrequent severe fires/windstorms would typically have more old growth than ecosystems with a disturbance regime dominated by severe wildfire occurring at moderate intervals.

Current vs Historic amounts in Southern Interior Forests – Results from dry mixed conifer forests in western North America, including the East Kootenay, show that amounts of closed canopy old forest are higher than historically present under natural disturbance regimes, but that amounts of open canopy old forest are lower. This demonstrates the need to focus on stand structure and not just age.

Can Forestry Enhance Resiliency and Accelerate Old Growth Structure Development?

Potential treatments to maintain and/or enhance old growth attributes include the following:

- Higher within block retention (single tree and/or patch)
- Thinning from below, with retention of OG characteristics
- Pre-commercial thinning
- Longer rotations

There is a certain amount of risk association with these treatments, due to uncertainty and novel factors like invasive plants.

Harvesting Trials – Various trials around the province (i.e, Invermere TSA, Skeena TSA) demonstrate that old growth associated species such as cavity nesters can be maintained with selective/partial harvesting.

Policy changes may be required in order to make it feasible and attractive for industry to conduct appropriate treatments. Examples include:

- Appraisal system – add incentives to encourage treatment of old growth stands with high fuel loads or over-stocking, to reduce the risk of mortality due to fire or drought.
- Stocking standards – modify stocking requirements to reflect variability in stocking under historic disturbance regimes, and allow for a greater range of variable retention at harvest (i.e., drop the basal area requirements for fully stocked stands)
- Regional Land Use plans – depending on the region, allow entries to a percentage of legal spatially located old growth stands to accelerate or enhance old growth characteristics.

Key References

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