



NSERC INDUSTRIAL R&D FELLOWSHIP FINAL REPORT

Stand dynamics of residual secondary structure after Mountain pine beetle attack: growth, regeneration and mid-term timber supply

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Lodgepole pine (*Pinus contorta* var. *latifolia* Engelm.) in forests of British Columbia (BC) are experiencing the largest mountain pine beetle (MPB) (*Dendroctonus ponderosae* Hopkins) epidemic in recorded history. The province's forested land base is an important economic, social and environmental resource in the lives of many British Columbians. Pine leading stands (> 50% pine) represented about 5 million hectares in the operable land base pre-MPB, about 1 million hectares has been salvage logged until now. Salvage logging is considerably slowing down and it is likely around 3.5 million hectares of pine-leading MPB-damaged stands will remain unsalvaged. It is critical to know what is happening to those stand types and how to manage them?

Objectives:

The objectives of this project were:

1. to understand stand dynamics of post-MPB attack and describe the growth response of residual secondary trees by time since attack and level of MPB attack,
2. to understand how different factors (tree species, size, condition and damage) affect the magnitude of secondary structure release response and,
3. use the growth information to help inform decisions around mid-term timber supply.

Data sources:

A significant number of permanent sample plots (PSP) data was obtained from BC Ministry of Forests, Lands and Natural Resource Operations and different private consulting agencies.

Results:

Pine stands are not dead and showed considerable variability in abundance of surviving trees across the landscape. The most interesting and important result of this study to date is that the vast majority of stands had greater, and often much greater, than $10 \text{ m}^2\text{ha}^{-1}$ of residual secondary structure basal area in post-beetle condition. These stands could often produce $\geq 150 \text{ m}^3 \text{ ha}^{-1}$ timber within thirty years of MPB attack. This implies that mid-term timber supply short falls may not be as big a concern as previously projected. Moreover

none of these stands require any further management intervention. In addition the preliminary growth analysis clearly showed increased radial growth response for surviving trees in post-beetle condition compared to their growth in pre-beetle condition. The extent of growth release was varied by species from stand to stand and ranges from 800 to -400%. Based on the initial findings, this study suggests that:

1. stands in the current epidemic appear to be recovering rapidly which will help mitigate the mid-term timber supply,
2. the occurrence of the MPB epidemic has resulted in more structurally and compositionally diverse forest stands.

In addition this study also provides guidance to forest managers for selecting appropriate stands for harvest or retention in post-beetle landscape.

Final note:

Although Amalesh Dhar left the Bulkley Valley Research Centre without completing the project he will continue to support this project until it is completed as the Bulkley Valley Research Centre has decided to continue this project.