

Stand dynamics in even-aged lodgepole pine stands following mountain pine beetle outbreaks

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Objectives

- Study mountain pine beetle (MPB) outbreak affect on stand dynamics:
 - Characterize current stand structure using mensuration data
 - Reconstruct long-term temporal patterns of outbreaks and other disturbances using dendrochonology
 - Combining analysis to develop models of stand dynamics in even-aged stands



Not all trees are killed



- MPB is a natural thinning agent •promotes increased growth among the surviving trees • allows for the establishment
- of seedlings in understorey



Life after beetle

- MPB is a natural thinning agent that promotes increased growth among the surviving trees
- allows for the establishment of seedlings in understory





Methodology

- Establish subplots in selected stands
- Collect mensuration data, increment cores, and discs from living and dead trees





A dendroecological approach

- Tree rings maintain a record of the canopy disturbance history for a locality, and are useful indicators of ecosystem function
- Tree rings have been used to examine historical outbreaks of bark beetles

Trees that survive show a <u>release</u> in the rings as a result of canopy disturbance









Sampling for a comprehensive history of the MPB





Results

- Characterized current stand structure
- Developed tree ring chronologies for host and nonhost species
- Developed disturbance chronologies from scarred material
- Identified mountain pine beetle outbreaks in tree-ring record
- Developed conceptual model of stand dynamics for even-aged lodgepole pine



Example of a lodgepole pine stand in southern BC





• Example of scarred lodgepole pine disc





Heath and Alfaro 1990 (re-surveyed in 2001)









Bull Mountain 2001:

A 320 year old tree: outbreaks every 52 years.











• MPB return intervals from tree-rings

	Province	No of stands sampled	Average first year of chronology	Duration of release - years	Beetle return interval - years
				(min-max)	(min-max)
	BC	80	1876	8 (3-33)	40.2
					(6-90)
	Alberta	9	1853	8 (3-20)	32.0
					(11-91)
the contraction	All	89	1874	8 (3-33)	40.3
					(6-91)
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Opportunities for Foothills

- To ascertain disturbance histories using dendroecological techniques:
 - Reconstruct stand histories to gain an understanding of stand dynamics and structure over time
 - Study the stand dynamics between lodgepole, transitional/hybrid and jack pine stands
 - Study historical fire frequency and relationship to possible mountain pine beetle outbreaks
 - Reconstruct temperature and precipitation using tree-rings
 - Determine relationship between outbreak patterns and varying climate conditions



So What?

- Ecosystem management baselines -> what is *normal*
- Determine departures from normal disturbance regimes
- Establish future productivity with MPB and changes in fire regimes

