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Abstract

Effects of fire return rates on traversability of lodgepole pine forests for mountain pine beetle: Implications for sustainable forest management

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The spread of mountain pine beetle (MPB) depends on climate, weather, and topography, among other factors. In predicting the spread of the MPB in British Columbia, foresters should specifically consider the susceptibility and traversability of lodgepole pine forests to MPB. In order for beetle infestations to spread through the forests at endemic or incipient beetle population levels, patches of susceptible forest must exist, and these patches must be close enough together that beetles can disperse from one to another. This study determined stand susceptibility by examining simulated effects of fire return rates on the equilibrium age structure of a 1 million ha lodgepole pine forest, and then using the results to generate mosaics of susceptibilities to MPB attack. At the landscape level, traversability describes the condition of a forest that allows an incipient beetle population to disperse across it according to defined rules of susceptibility and maximum distance for dispersal through unsuitable habitat. We found that: (1) long fire cycles and fire suppression yielded an age structure that is highly susceptible to beetle attack; and (2) harvesting reduced the mean susceptibility to MPB attack as well as traversability. A combination of early harvesting and moderate fire suppression would theoretically yield an equilibrium forest structure that minimizes both susceptibility and traversability for MPB.

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