

Bark Beetle-Induced Changes in Conifer Fuel Complexes in the Intermountain Region

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1 Introduction

Currently, throughout the Intermountain region, forests have been experiencing widespread outbreaks of bark beetles. Most notably the mountain pine beetle (*Dendroctonus ponderosae* Hopkins) and the spruce beetle (*Dendroctonus rufipennis* Kirby). Severe outbreaks of these bark beetles have been known to alter the amount, composition, and arrangement of living and dead biomass in their representative fuel complexes. However, we currently lack quantitative descriptions of the bark beetle caused modifications to forest fuels and how these changes vary through time. Specifically, relatively few studies have described the relationships between bark beetles and fuel/fire interactions. This study will attempt to quantify the bark beetle caused changes to the fuels complex for three bark beetle species; the mountain pine beetle, the spruce beetle, and the Douglas-fir beetle (*Dendroctonus pseudotsugae* Hopkins) during endemic, epidemic, and post-epidemic beetle populations.

2 Methods

Study sites were selected using Forest Health Monitoring aerial detection surveys along with Forest Inventory and Assessment data (Fig. 1). Within each study site, we identified stands with endemic, epidemic, and post-epidemic beetle populations (Figs. 2,3,4). Variable radius plots were systematically distributed within each stand. From plot center down woody fuels (1, 10, 100, and 1000 hour fuel class sizes, duff, litter) were measured using Brown's planar transect method. Additionally, information on shrubs, herbaceous vegetation, and regeneration were collected on fixed microplots (Fig. 5). Year since attack along with diameter at breast height and proportion of needles remaining in the crown was also recorded for all attacked 'in' trees.

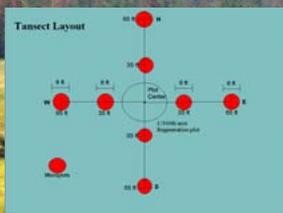


Figure 5. Planar transect layout for each plot

3 Accomplishments 2004

- Design and layout of plots completed
- Study sites selected
- Fieldwork started

4 Objectives 2005

- Complete fieldwork
- Data analyses
- Peer-reviewed publication

5 Discussion

The current literature lacks studies which quantify the nature of the bark beetle-fuel-fire interactions. This study will provide descriptions of the quantity and quality of forest fuels with varying levels of bark beetle activity and a greater understanding of bark beetle-caused tree mortality on forest ecosystems. Development of custom fuel models along with associated changes in fire regime condition classes will be assessed through time, which will help fire planners and land managers predict fire danger and potential fire behavior in bark beetle-affected landscapes.

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Figures 2,3,4. Endemic, (A) Epidemic, (B) Post epidemic, (C) conditions in Douglas-fir, lodgepole pine, and Engelmann spruce, respectively

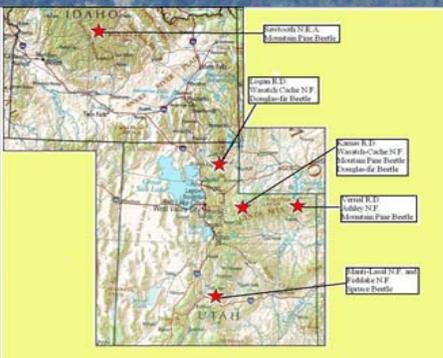


Figure 1. Study site locations