

## Project Summary

### Rocky Mountains Cooperative Ecosystem Studies Unit

**Project Title:** Bark beetles, fuels and future fire hazard in contrasting conifer forests of Greater Yellowstone

**Discipline:** Natural  
**Type of Project:** Research  
**Funding Agency:** National Park Service  
**Other Partners/Cooperators:** Colorado State University  
**Effective Dates:** 7/1/2009 - 9/30/2012  
**Funding Amount:** \$27,716

**Investigators and Agency Representative:**

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**Project Abstract:** Recent increases in insect and fire activity throughout the western US have presented forest managers with formidable challenges. The extent and severity of bark beetle (Curculionidae: Scolytinae) epidemics have reached unprecedented levels, and the number of large, severe fires continues to increase. These trends are expected to continue because climate change is implicated for both disturbances. Insects and fire have tremendous ecological and economic effects in western forests, yet surprisingly little is known about how fire hazard may change following bark beetle epidemics, and the efficacy of alternative forest management practices (e.g., removal of beetle-killed trees or remaining small trees) designed to reduce future fire hazard is largely unknown. We propose to employ a powerful combination of field studies, remote sensing and simulation modeling to understand how bark beetle infestation affects fire hazard in two widespread but contrasting forest types, lodgepole pine (*Pinus contorta*) and Douglas-fir (*Pseudotsuga menziesii*). Lodgepole pine and Douglas-fir forests are key components of Rocky Mountain landscapes, and both are experiencing extensive and severe bark beetle outbreaks. Published research on beetle effects on fire in lodgepole pine forests is inconclusive, and almost no studies have examined Douglas-fir. We hypothesize that differences in fire regime, stand structure, regeneration potential and decomposition of woody fuels lead to important differences in fuel profiles, fire hazard and, in turn, the effectiveness of alternative mitigation strategies in lodgepole pine and Douglas-fir. Our studies will be conducted in the Greater Yellowstone Ecosystem (GYE), where we build on > 20 yrs of research and our recently initiated studies of bark beetles and fire in lodgepole pine forests. We will test specific hypotheses as part of addressing three major research questions.

- 1) How do effects of bark beetle outbreaks on fuel profiles and subsequent fire hazard differ between lodgepole pine and Douglas-fir forests?
- 2) How was the severity of recent fire in lodgepole pine and Douglas-fir forests affected by prior bark beetle infestation, and does the combination of beetle infestation and fire compromise forest recovery?
- 3) What post-beetle fuel treatments are likely to change the hazard of subsequent severe fire in lodgepole pine and Douglas-fir forests?

**Outcomes with Completion Dates:** 30 September 2012

**Keywords:** bark beetles, fire, conifer forests, Greater Yellowstone Region, Yellowstone National Park, Colorado State University