

## **Project Summary**

### **Rocky Mountains Cooperative Ecosystem Studies Unit**

**Project Title:** Assessment of spruce beetle, western balsam bark beetle, and Douglas-fir beetle in and adjacent to Rocky Mountain National Park, CO

**Discipline:** Natural Resources  
**Type of Project:** Research  
**Funding Agency:** National Park Service  
**Other Partners/Cooperators:** Colorado State University  
**Effective Dates:** 8/1/2013 - 6/30/2016  
**Funding Amount:** \$89,100

**Investigators and Agency Representative:**

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**Project Abstract:** Whereas the decade-long mountain pine beetle (*Dendroctonus ponderosa*) outbreak in the Northern Colorado Front Range appears to be waning, populations of other bark beetles are potentially on the rise. Specifically, spruce beetle (*Dendroctonus rufipennis*) in Engelmann spruce (*Picea engelmannii*), western balsam bark beetle (*Dryocoetes confusus*) in subalpine fir (*Abies lasiocarpa*), and Douglas-fir beetle (*Dendroctonus pseudotsugae*) in Douglas-fir (*Pseudotsuga menziesii*) are all currently active in the region. Moreover, recent blowdowns and fires, which are known to instigate spruce beetle and Douglas-fir beetle outbreaks respectively, and continued weather conditions conducive to bark beetle population growth would be expected to facilitate outbreak initiation or expansion of these beetles. Nonetheless, these three bark beetles have not been the focus of significant recent research in the Northern Front Range. The lack of information regarding the current status and potential for outbreaks of these bark beetles is a major stumbling block to proactive ecosystem management activities. The proposed research will focus on these three bark beetle species with a primary focus on Douglas-fir beetle in the upper-montane forests in Rocky Mountain National Park (RMNP) and adjacent Arapaho-Roosevelt National Forest (ARNF). We will focus on Douglas-fir beetle because little is known of the beetle in Colorado and because it could have significant consequences for ecosystem management in the wildland-urban interface. We will identify the current status of all three species of bark beetle, rate stand susceptibility to outbreaks, and provide a more detailed analysis of Douglas-fir beetle. Specific questions that we will address for Douglas-fir beetle include:

- 1) Have synchronous, landscape-scale Douglas-fir beetle outbreaks occurred in the past?
- 2) Has fire suppression altered the risk of beetle outbreaks at the stand and landscape scales?
- 3) Which stands are at highest risk for high-severity outbreaks?

To accomplish this research we will sample plots in spruce-fir and Douglas-fir forests. Forest plots will be 1000m<sup>2</sup> and will be randomly located within each forest type. Plots in the Douglas-fir forest type will be located in both RMNP and ARNF. Within all plots we will identify recent and current bark beetle activity, and stand susceptibility to bark beetles by quantifying basal area, stem density and host species vigor. To quantify host vigor we will remove an increment core from 10 trees from each plot and use radial growth as a proxy for vigor. To address the more detailed questions in the Douglas-fir forest type, we will also use dendroecological techniques to reconstruct forest demographics and disturbance history (fire and bark beetle outbreak). Standard dendroecological laboratory techniques will be used to process tree-ring samples.

**Outcomes with Completion Dates:** Final Report - February 1, 2016

**Keywords:** spruce beetle, western balsam bark beetle, Douglas-fir beetle, Rocky Mountain National Park and Preserve, Colorado State University