Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Imagining landscapes of the future: predicting the impacts of climate change, insect outbreaks, and fire on Colorado lodgepole pine forests.

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Colorado State University
Effective Dates: 5/20/2008- 3/31/2011
Funding Amount: $16,500 (FY08: $8,000; FY09: $8,500)

Investigators and Agency Representative:
NPS Contact: Nathan Williamson, Fire Ecologist, Rocky Mountain National Park, 1000 Highway 36, Estes Park, CO, 80517; 970/586-1434; Nathan_Williamson@nps.gov

Investigator: Monique E. Rocca, Assistant Professor, Dept. of Forest, Rangeland, & Watershed Stewardship, Colorado State University, 1472 Campus Delivery, 123 Forestry Building, Fort Collins, CO 80523-1472, (970) 491-2112 (voice), (970) 491-6754 (fax), rocca@warnercnr.colostate.edu

Project Abstract: A major outbreak of the mountain pine beetle (*Dendroctonus ponderosae*) has swept through the mountains of north-central Colorado during the past 6 years, and similar outbreaks are occurring in several other western states. It is estimated that the beetles killed some 7.4 million trees on 1.5 million acres in Colorado in the past ten years. One of the hardest-hit areas is the upper Colorado River valley around Winter Park and Granby -- including most of the western half of Rocky Mountain National Park (RMNP). We will sample a large number of stands on the ground, representing a range of beetle-caused mortality from light to heavy, to characterize changes in tree density, basal area, canopy fuels, and species composition. From these data, we will characterize landscape patterns of change in forest structure, at multiple spatial scales, including percent tree mortality and patch sizes of various mortality classes. We will apply the field-collected fuels data to a variety of forest growth models (e.g., the Forest Vegetation Simulator, FVS), and fire behavior models (e.g., the FVS Fire Fuels Extension (FFE) and NEXUS) to explore future forest structure and potential fire behavior under a range of likely weather conditions. We will utilize prescribed fire in beetle-impacted stands to investigate three important issues: the flammability of lodgepole pine crowns, the mechanisms of pine seed dispersal following beetle attack, and survival of beetle larvae following burning.

Outcomes with Completion Dates: Due by June 30, 2010: (1) A final report describing lodgepole pine mortality patterns in the park; effects of prescribed burning in beetle-impacted stands on flammability, seed dispersal, and beetle larva survival post-burn; and projected forest compositional and structural trajectories for the next 50-100 years, (2) presentation of results to park staff so they will be able to better communicate the implications of the beetle outbreak to the public, and adapt management strategies to ensure the ecological integrity of affected parts of the park, and (3) three Colorado State University graduate students theses, and their associated journal publications, will stem from this project

Keywords: mountain pine beetle, lodgepole pine, fire, Rocky Mountain National Park, Colorado State University