

## **Project Summary**

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

**Project** Developing methods for monitoring change in conifer cover across biophysical gradients in national parks

**Discipline:** Natural  
**Type of Project:** Technical Assistance and Research  
**Funding Agency:** National Park Service  
**Other Partners/Cooperators:** Montana State University  
**Effective Dates:** 8/15/2010 - 12/31/2012  
**Funding Amount:** \$50,123

**Investigators and Agency Representative:**

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Project Abstract Sagebrush steppe communities occur widely throughout NPS units in and around the Great Northern Landscape Conservation Cooperative (GNLCC) area of interest. Understanding the dynamics of disturbance and growth within the lower treeline ecotonal conifer woodland, sagebrush steppe, and grassland community boundary is critical to interpret the current status of the landscape and the processes likely to control the landscape with respect to climate change.

Ground based methods for monitoring sagebrush are in place at UCBN and for monitoring sagebrush, grasslands, and woodlands ROMN with plans to develop similar monitoring at BICA. However, some climate change effects to these communities are predicted to occur at ecotonal boundaries. These changes are unlikely to be adequately described with ground based measurements therefore a landscape level analysis is required. Landscapes within and surrounding protected areas, including GRYN, ROMN and UCBN parks, are undergoing varying degrees of anthropogenic and natural modification that can have cascading effects on park resources. The parks in these three networks include both relatively large landscapes composed of interacting yet heterogeneous ecosystems and smaller areas that are often critically influenced by the surrounding landscape structure and use. Although the effects of landscape dynamics differ in scale and intensity, concerns about potential ecological consequences are similar; landscape-scale mechanisms are well-recognized as important drivers impacting all three networks. Climate change is one of the most important broad scale drivers that is influencing these landscapes and interacting with anthropogenic drivers. This project will develop a protocol to track changes in lower elevation conifer cover and resultant changes in sage steppe and grassland communities in Big Hole National Battlefield, Bighorn Canyon National Recreation Area, City of Rocks National Reserve, Craters of the Moon National Monument, Florissant Fossil Beds National Monument, Glacier National Park, Grand Teton National Park, Great Sand Dunes National Park and Preserve, John Day Fossil Beds National Monument, John D. Rockefeller Jr. Memorial National Parkway, Nez Pearce National Historical Park, Rocky Mountain National Park, and Yellowstone National Park.

This project is implemented as a two-phased effort with funds separately obligated for each project phase. Phase 1 includes defining the three test transects, one each in the GRYN, ROMN, and UCBN; collecting all necessary documents and products such as vegetation sampling protocols and data and aerial photographs; conducting initial assessments of the three test transects; and initial documentation of monitoring protocols. Phase 2 will complete the test transect analysis, complete protocol and SOP development, complete the Prototype report based on data collected and analyzed in the GRYN in an earlier effort by the PI, and complete the evaluation of current NPS ground-based monitoring protocols. It also includes developing the final project report, NPS report review, transmitting final geospatial data and metadata to the NPS, and final report submittal.

**Outcomes with Completion Dates:** August 15, 2012

1. Analysis and determination of change in conifer cover at ecotonal boundaries on three "test" transects from low elevations through the alpine zone. One transect will repeat a portion of the earlier work conducted by the PIs in the GRYN; one transect will be in a park in the ROMN, probably Glacier; and one transect will be in a park in the UCBN, to be determined with UCBN staff.
2. Written Protocol and Standard Operating Procedure(s) (per Oakley et. al. 2003) for monitoring the change in spatial extent and average rate of change in conifer cover across biophysical gradients at the lower treeline and alpine ecotonal boundaries of conifer woodlands, grasslands, and shrublands;
3. Prototype report based on existing data previously analyzed by the PI in the Greater Yellowstone Ecosystem

4. Evaluation of current UCBN, GRYN and ROMN field protocols relative to detecting conifer encroachment (and loss). Recommendations for modifying/adding to these protocols for this purpose and to validate remote sensing approaches (#1 above).

**Keywords:** Montana State University, Greater Yellowstone Network, Vital Signs Monitoring, statistical assistance