Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Plant community effects on alpine ecosystem response to nitrogen deposition

Discipline: Natural Resources
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: University of Colorado at Boulder
Effective Dates: 5/1/2012 - 12/31/2014
Funding Amount: $19,425

Investigators and Agency Representative:
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Project Abstract:
The chronic ambient deposition of nitrogen (N) in alpine ecosystems can have cascading effects on plants, soils and hydrology in both the alpine and areas downstream through leaching and ecosystem export. Interacting with changes in climate, the deposition of anthropogenically derived nitrogen is a concern for the resilience of alpine systems in the long term. Thresholds for monitoring ecosystem resilience to N deposition have been established for lakes, soils and changes in plant community composition at Rocky Mountain National Park (ROMO). These thresholds offer a target for land managers to prevent significant changes in ecosystem function; however the underlying feedbacks controlling ecosystem resilience have not been fully examined. Research proposed in this study focuses on understanding the effect of plant community composition on mitigating directional disturbance of N deposition through stabilizing or amplifying feedbacks between plants and soils. We plan to examine 1) plant community variation in response to same levels of ambient N deposition and 2) variation between plant community-soil interactions along gradients of N deposition within the Rocky Mountains of ROMO and Yellowstone National Park (YNP). Results from this study will contribute to the refinement of thresholds for plants and soils to chronic N deposition for ROMO and establish thresholds for similar plant communities in YNP. Ecosystem resilience to disturbance as quantified using thresholds are useful for advocacy of protection of wild places and the understanding of underlying interactions creating the resilience will allow future work examining the combined disturbances of both N deposition and changes in climate.

Outcomes with Completion Dates: December 31, 2014

Keywords: nitrogen, atmospheric deposition, alpine, plant, soil chemistry, Rocky Mountain National Park, University of Colorado at Boulder