Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Atmospheric deposition of nitrogen in Grand Teton NP: determining biological effects on algal communities in alpine lakes

Type of Project: Research
Discipline: Natural
Funding Agency: National Park Service
Other Partners/Cooperators: University of Colorado at Boulder
Effective Dates: 5/1/2010 – 12/31/2012
Funding Amount: $80,190 (FY11: $24,800; $55,390)

Investigators and Agency Representative:
NPS Contact: Susan E. O'Ney; National Park Service, Grand Teton NP, P. O. Drawer 170, Moose, WY 83012; 307-739-3666; susan_o'ney@nps.gov

Investigator: Sarah A. Spaulding, Research Scientist, INSTAAR; 1560 30th Street; Boulder CO 80303Tel: 303.492.5158; Email: sarah.spaulding@usgs.gov; sarah.spaulding@colorado.edu

Project Abstract: We propose to analyze alpine lake sediments to reconstruct the recent history of atmospheric inorganic nitrogen (N) deposition in relation to diatom species composition in Grand Teton NP (GRTE). Our objective is to determine the chronology of deposition of atmospheric N and its relationship to change in high elevation aquatic ecosystems. In order to accomplish the objective, we will 1) Determine effects of atmospheric N on diatoms of five high elevation lakes, 2) Determine sources of nitrogen within selected alpine watersheds, 3) Consider shifts in diatom species in the context of endemic, invasive, and acidophilic taxa, 4) Evaluate N impacts on GRTE lakes within a regional context of the Rocky Mountains and the Greater Yellowstone Ecosystem, 5) Address the interaction of atmospheric deposition of N and climate change impacts on these high elevation lakes, and 6) Calculate critical loads for the impact of inorganic nitrogen on diatom communities and ecosystems. The research approach will build on previous success in reconstructing paleolimnological nutrient history in the Loch Vale Watershed of Rocky Mountain National Park. This research will add to the growing body of diatom data collected throughout the Sierra Nevada, the Cascades and the Rocky Mountains. This project assembles an interdisciplinary team of researchers at USGS, University of Alberta, University of Colorado and GRTE staff in order to complete field collections and scientific analyses. The results of this research will not only reveal the current and historical condition of sensitive lakes in GRTE, but the results will be incorporated into the larger information base on mountain ecosystems of western North America. These data can then be used by Federal land managers and regulators to set critical loads for inorganic nitrogen to protect air quality related values in Class 1 areas of the western United States.

Outcomes with Completion Dates:

a. Annual Accomplishment Reports will be submitted no later than October 30, 2010 and 2011 to WASO (Project Coordinator). The accomplishment report shall contain an abstract not to exceed 300 words in length as a stand-alone document. - *Spaulding*
b. Final Accomplishment Report will be submitted, consisting of a one paragraph (300-word) abstract of the work completed during the entire project. The report will include details (including interpretive component) on any portion of the implementation plan that has not been completed. Due into PMIS by October 30 2012. - *Spaulding*
c. Completion and posting of at least ten taxon pages for the Western Diatom Taxonomic and Ecological Resource, a publicly accessible taxonomic database of diatoms in the western US by March 2011. Each taxon page will include taxon description, images, and key features. – *Spaulding, and post-doctoral fellow*
d. Development of USGS fact sheet by October 30, 2012.
e. Submission of manuscript for publication in peer-reviewed journal by October 30 2012. – *Spaulding, Baron, Wolfe, and post-doctoral fellow*

Keywords: Nitrogen, atmospheric deposition, algal communities, diatom composition, alpine lakes, Grand Teton National Park, University of Colorado at Boulder