

ANNUAL ACCOMPLISHMENT REPORT PMIS # 104675

Title: Assessment of nitrogen deposition and its possible effects on alpine vegetation in Grand Teton National Park

PMIS # 104675

Contact: Helga Van Miegroet, Utah State University

The objective of this two-year project is to assess the impact of atmospheric N deposition on the structure and function of alpine ecosystems in Grand Teton National Park (GRTE), based on field measurements and experimental manipulation of N loadings in alpine sites with contrasting (wet/dry) edaphic conditions and assumed N input regimes. Specific goals for year 2 were (1) to continue vegetation, soil, N deposition and microclimatic data collection at three sites along a modeled N deposition gradient: Moose Basin (High), Paintbrush Canyon (Low) and RendezVous Mountain (Medium/Low); and (2) to increase N inputs to half of the 36 field plots by application of 4 kg of N.

Due to early snowmelt and dangerous avalanche conditions in Spring 2007, no snow survey could be performed. In Summer 2007, the field crews installed a new set of "Fenn" exchange resin collectors to measure summer deposition, removed the "Johnson" resin collectors that had been at installed at the sites in Summer 2006 to measure total N input over a one-year period for 1 year, and deployed a new set to be removed in Summer 2008. In addition, the crew removed the PRS probes that had been in the ground over Winter of 2006-2007 to measure soil nutrient fluxes, and installed a new set. Soil temperature data collected with Onset Tidbit dataloggers were successfully downloaded. Several dataloggers hooked up to the ECH2O soil moisture probes malfunctioned and the only successful readings obtained from the Rendezvous wet and dry sites, and a Moose basin wet site. However, soil moisture readings were made at all sites using a handheld device.

Field crews conducted floristic surveys for species richness and abundance, and collected soil samples for KCl-extractable inorganic N, nitrification potential, microbial biomass, and root biomass. All samples are currently being processed at Utah State University for chemical analysis. In early summer, the equivalent 4 kg N /ha was applied to the 18 plots designated for fertilizer treatment, by spraying each plot with a solution containing 7.14 g of N as ammonium-nitrate using handheld spray bottle

Positive outcomes: First measured (rather than modeled) N deposition loading data to the alpine sites at GRTE; background information on plant composition and plant and soil nitrogen status across a number of sites; this study indicates that small differences in N deposition is reflected in soil microbial activity, and that these may prove useful as early indicators of ecosystem change under increasing N deposition. First finding will be presented as a poster at the Annual Meeting of the Soil Science Society of America in New Orleans (4-8 November, 2007).

Total project cost: \$100,002

Funds expended in FY 07: \$32,400.52

Note - Award/Budget Period for USU different from FY: 1 January 2006 – 31 March 2008 (Cooperative Agreement H1200040001, Task Agreement J1460050008); Cumulative budget expended to date: \$59,922.42 of the total project budget allocation; mostly on purchase of equipment, travel to the site, and stipends and wages for graduate and undergraduate students, ad sample analysis; the remainder will be spent during the rest of the second cooperative agreement period on sample analysis and student stipends.

PHOTOS:

MB_floral_survey_2007.jpg

Moose Basin: 2006 and 2007 Floristic Survey

PRS_removal_installation_2007.jpg

Moose Basin: Summer 2007 - Removing old PRS probes and installing new set

RDV_fall_2006.jpg

RendezVous Mt: Fall 2006 : Removing old PRS probes and installing new set

RDV_equipment_removal_fall2007.jpg

RendezVous Mt: Fall 2007: Removing deposition collectors and downloading dataloggers under snowy conditions

ML_2007.jpg

PaintBrush Canyon: Summer 2007: Overview of sites with deposition collectors installed