Project Completion Report
Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)

Project Title: Wetland Ecological Integrity Data Analysis and Reporting

Project Code: CSU-RM-242

Type of Project: Research

Funding Agency: National Park Service

Partner University: Colorado State University

NPS Agreement Technical Representative:

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Start Date of Project: 12/27/11

End Date of Project: 12/31/12

Funding Amount: $10,379

Project Summary, including descriptions of project deliverables, work accomplished and/or major results. If the information is restricted (e.g. location of endangered species or cultural resources), indicate the title and location of the final report. Also add web sites where project-related information may be found.

CSU affiliates provided assistance to the Rocky Mountain Region Inventory and Monitoring Program in reporting on the Wetland Ecological Integrity (WEI) Protocol in Great Sand Dunes (GRSA) National Parks.

During the 2010 and 2011 field seasons, there were 93 sample events at 83 unique sample sites in 65 wetland complexes across the park. We sampled 8 sites in two high elevation wetlands, 7 fens and 1 subalpine wet meadow, and 75 sites at lower elevations on the sand sheet, 9 marshes, 4 riparian, 19 salt flats, and 43 wet meadows. There were 12 revisits during this first season.

Over 604 vascular plant species have been identified in the park and preserve. Wetlands and salt flats occupy approximately 4.7% of the area of the park. In .81 hectare sampled, we encountered approximately 32% of the vascular plant taxa in the park identified at the species level. We found that only 9.7% of the vascular plant species encountered in sampled wetlands were nonnative. Species indicator analysis of sand sheet sites indicated that no vascular plant species in sampled sites are unique to salt flats, but there were 126 species found in wet meadows, but not in salt flats. Eighteen species were significantly ($p < 0.05$) correlated with a specific group, 3 with salt flats and 15 with wet meadows.

The development of wetland bioassessment models are a key component of the WEI protocols in ROMN parks. These models center on vegetation in relation to a Human Disturbance Index (HDI) based on landscape context and alterations, hydrological alterations, and physical/chemical disturbances. Existing models based on vegetation metrics developed for other ROMN parks showed no discernible pattern in relation to the HDI. This indicates that there may be some vegetation or disturbance variables or important physical gradients not accounted for in the models. We found that the bioassessment tools need to be customized to GRSA wetlands due to the unique habitat, physical settings and wetland types present in the park. The HDI indicated that marshes were the most disturbed wetlands and fens and subalpine wet meadows were the least disturbed. The HDI also indicated that approximately 15% of wetlands on the sand sheet in areas west of the main dune field may be considered highly disturbed based on metrics included in the index such as number of diversions, buffer width around wetland complex, and land use in and surrounding wetlands.

Subtle patterns did emerge among a few measured abiotic variables and vegetation metrics. Soil pH was correlated with mean salt tolerance score, invasive species richness, and absolute cover of native species when all samples were included. This indicates that edaphic factors are an important component that may need to be controlled for in future modeling efforts to assess ecological integrity in GRSA wetlands.

Three wetlands west of the main dune field on the sand sheet and two in subalpine wetland complexes were selected for intensive, annual monitoring to assess site-specific patterns in wetlands that are either unique or considered a critical park resource. Sand sheet sites included a perennial stream, interdunal complex and marsh. Data from depth to water table loggers exhibited a consistent pattern within sites, but varied between sites. Based on inspection of the hydrograph record overlaid with climate data, all sites exhibited some fluctuation with local-scale precipitation events, but seem to be most influences by the regional groundwater, showing strong annual fluctuations tied to changes in groundwater levels. Similarly, in the two subalpine intensive complexes, groundwater levels exhibited a response to precipitation events, but seem to be most influenced by groundwater. In this case, groundwater levels may be more tied to local-scale climate being charged by annual snow pack and recharged by late summer monsoon events. Explicit modeling of climate variables to groundwater in future reporting will allow more detailed assessment of how groundwater may react to variation in local and regional-scale climate.

Number of students participating in this project: undergraduates, graduate students, degrees conferred.

1 graduate student participated in this project – 0 degrees conferred