

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

**Project Title:** Ph.D. Graduate Assistantship to assist with vital signs development for the Southern Plains I&M Network

**Project Code:** CSURM- J7350060006

**Type of Project:** Technical Assistance/Education

**Funding Agency:** National Park Service

**Partner University:** Colorado State University

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**Start Date of Project:** April 17, 2006

**End Date of Project:** December 31, 2010

**Funding Amount:** 4 year total \$127,981

**Project Summary:**

The PhD Student assisted in the development of monitoring protocols for grassland and riparian vegetation, soil structure and chemistry, and fire effects. The student did a thorough literature review of these topics, interacted with other NPS and non NPS organization to determine what had successes and failures had been encountered, and prepared several iterations of the protocols.

Grassland vegetation is the most widespread vegetation type occurring in the Southern Plains Network (SOPN). Exotic species invasions, expanding row-crop agriculture, overgrazing, mineral exploration and establishment of woodlots and shelterbelts have all contributed to

grassland degradation and loss of genetic diversity. Monitoring grassland vegetation communities will help SOPN park managers better understand the dynamic nature of these ecosystems and the processes that control them. Monitoring will also provide an early warning of abnormal conditions, which will allow managers to make effective decisions for mitigation.

Wetlands play an important role in Southern Plains hydrology by storing surface water, moderating floods, improving water quality, and recharging groundwater. Furthermore, wetlands are highly productive environments that serve as habitats for many birds, fish, and other wildlife. The disruption of natural processes (e.g., climate, fire, and grazing) that help maintain ecological integrity has led to drastic changes in species composition and community structure of wetland plant communities, particularly with the invasion of exotic species. Management of wetlands is now considered among the highest management priorities for the network parks that contain them.

Soils are commonly overlooked as important indicators of ecosystem health. However, soils have profound influences on both natural and cultural resources, and those occurring within the Southern Plains Network Parks are no exception. Therefore, knowing the status and trends of soil conditions within the SOPN is critical for maintaining the integrity of the parks. Monitoring the soil structure and chemistry vital sign will help managers make informed decisions on preventing erosion, blocking the invasion of native and non-native plant species, averting the degradation of the soil biota, and avoiding the inhibition of important ecological services that soils provide (e.g., nutrient cycling).

Fire is one of the most influential disturbance processes in Great Plains ecosystems. Fire is an important aspect to monitor because it influences vegetative succession and distribution, wildlife habitat, soil parameters, hydrology, water quality and air quality. In addition, the natural fire regime (fire frequency, fire extent and severity) is likely to respond to local and global climate changes. Baseline monitoring of fire parameters will provide explanatory variables for other ecological changes detected.

There will be a Natural Resource Technical Report prepared by Spring 2011 that summarizes the work of the graduate student.

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

1 PhD Student

**Lessons Learned from this project.**

This project helped us to focus our efforts in developing monitoring protocols. The direction of efforts changed several times during the course of this project due to realizations of funding limitations, shifting emphasis, and the establishment of partnerships. Thus, one of the key things we learned from this effort is the need to understand our core goals, but to remain flexible in the detail. This project was certainly not without its trials and errors (many of which were due to

changes on SOPN's part), and the importance of good communication was also a lesson well learned. When all is said and done, we have now established partnerships with the Southern Plains Fire Group for our monitoring of Grassland Vegetation, Soils, and Fire Effects. We have also established a partnership with the Sonoran Desert Network for our riparian vegetation monitoring. Both of these efforts are now being piloted in the field and final versions of the protocols are being completed.