

## **RM-CESU - Project Completion Report, FY06**

**Project Title: Wetland Mapping and Impacts of Irrigation on Wetlands of the Elk Ranch within Grand Teton National Park, WY**

**Park: Grand Teton National Park**

**Funding Sources: Rocky Mountains CESU (\$4,080)**

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**Student Participant: Sarah Rothschiller**

### **Project Description:**

Irrigation at the Elk Ranch in Grand Teton National Park has been ongoing for more than 50 years. As grazing use decreases in GRTE managers want to characterize the lands that have been grazed in the past, their condition, soils, and vegetation. At the Elk Ranch it is unclear whether wetlands pre-date cattle operations or are irrigation-created. The research objectives are to characterize soils, plant communities and shallow groundwater in the flood-irrigated hay-meadows of the Elk Ranch, test for relationships between vegetation communities, soils, and groundwater, and determine if those relationships can be used to differentiate between pre-existing and irrigation-created wetlands.

### **Data Collection:**

In 2006 aerial photographs were used to stratify the irrigated hay-meadows into eight vegetatively similar blocks. Two of the blocks were categorized as natural wetlands; one block appeared to be upland; four blocks appeared to be upland areas that have developed wetland vegetation through irrigation; one block appeared to be transitional between upland and wetland. Field assessment of the blocks included collection of soil and vegetation data from each block. Seventeen sample plots were randomly selected. Soil sample pits were excavated to observable groundwater, soil mottling, or 1.5 meters depth. Soil horizons were photographed and characterized using four methods. A 150-gram sample was extracted from each soil horizon for lab analysis. Sample points were documented using GPS.

Laboratory analysis of soils, assessment of wetlands will continue in winter 2006-2007. Sample sizes will be assessed, and if needed additional fieldwork will be conducted in 2007. After completion of all field and laboratory analysis (by October 2007) statistical comparisons will be made using a 2-way ANOVA of block vs. soil and groundwater attributes. Regression analysis of vegetation and soil attributes within the blocks will be used to determine the power of relationship between soil/groundwater characteristics and

wetland vegetation indicators. The set of predictive soil characteristics with an  $R^2 > 0.5$  will be used for identification of areas that were historically wetland or upland. These predictive characteristics will then be applied to the Elk Ranch in its entirety to identify the areas that would continue to function as wetlands in the absence of irrigation, and those that would likely transition to uplands.

**Preliminary findings:**

The initial site investigation of 15 out of the 17 plots met the vegetative, soil, and hydrologic criteria for wetlands as defined by the Wetland Training Institute, Inc. Soil texture has been analyzed, organic matter content has been obtained, but not calculated, and vegetation data has been summarized.

**Publications, other reports expected/ with dates:**

This project serves as part of the M.S. thesis for Sarah Rothschiller, and will be published as part of that body of work. In addition Dr. Clayton Marlow is planning to pursue further work in the area. Both intend to publish a peer review article when the work is complete.