

# **Project Progress Report**

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

**Project Title:** Identification of Interflow Pathways and Potential Wetland Sites in the Kelly Hayfields

**Project Code:** J1242100010, MSU-213

**Type of Project:** Research

**Funding Agency:** National Park Service

**Partner University:** Montana State University

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**Start Date of Project:** May 1, 2010

**End Date of Project:** December 31, 2011

**Funding Amount:** \$10,000

### **Project Summary**

The primary goals of this collaborative effort are 1) to inventory the Kelly Hayfields for the location of stream channels and wetland areas that existed prior to homesteading and 2) evaluate the utility of wetland criteria developed on the Elk Ranch Hayfields for identification of historic wetland areas in the Antelope Flats area. Successful identification of pre-existing stream and wetland locations will enhance National Park Service restoration efforts of the Kelly Hayfields and other abandoned agricultural lands within Grand Teton National Park.

The following objectives serve as the guideline for this study.

1. Identify areas within Antelope Flats and the Kelly Hayfields that may have contained active stream channels and wetlands before homesteading began in the early 20<sup>th</sup> Century.
2. Describe present day vegetation and soil characteristics at representative sites within potential channels and wetland sites and compare these outcomes to wetland criteria developed at the Elk Ranch Hayfields.
3. Stratify the inventory sites from highest to lowest potential based on wetland criteria for groundwater monitoring.
4. Install and instrument shallow groundwater wells at high potential sites to confirm/reject wetland designation.
5. Refine/amend Elk Ranch riparian criteria

### ***2010 Field Season:***

An initial survey grid was anchored along the eastern flank of Blacktail Butte and extended roughly east/southeast across the Kelly Hayfields (Fig. 1) based on a field reconnaissance completed with Park Service biologists in May 2010. Over the next 3 months 23 hand excavated soil pits and 8 mechanically drilled bore holes were used to describe subsurface stratigraphy, soil texture and the presence/absence of redoximorphic features at randomly located points along the transect lines (Fig. 1). A GPS location of each soil pit and bore hole was recorded to aid in the accomplishment of objectives 2 and 3.

A 50g soil sample was removed from layers with apparent textural changes or inclusions of glacial/stream debris in each pit and bore hole. Collected material was bagged separately and taken to the Animal and Range Sciences laboratory, Montana State University – Bozeman campus for pH and textural analysis. Information included in this report must be viewed as preliminary because full analyses of the nearly 100 individual samples will not be completed until January 2011.

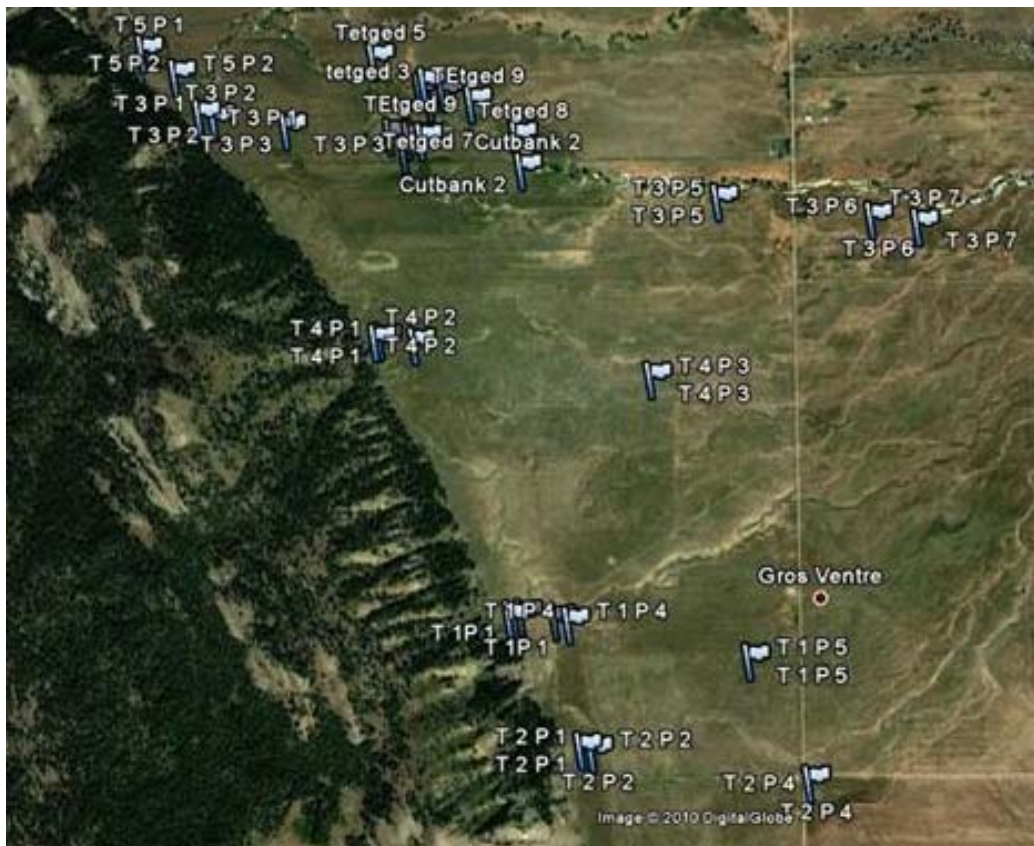


Fig. 1. GPS locations of soil pits and bore holes excavated as part the initial survey of potential wetland sites within the old Kelly Hayfields, Grand Teton National Park.

### **2010 Results:**

Summarization of soil depths across the sampling transects indicates a general thinning of soils eastward across the old hayfields. On the easternmost edges of the sampling area soils integrate with late Pleistocene (Hedricks Pond) aged glacial outwash. Based on samples analyzed for texture and pH Kelly hayfield soil reflects a low energy depositional environment; possibly a glacial kettle lake. Soil pH ranges from nearly neutral (6) to strongly basic; 7.9. To date, only one pit exhibited the clayey texture expected in wetland environments; all other sampled soils were coarser textured; ranging from sandy clays to silty clay loams (Fig. 2). Importantly, no redoximorphic features were noted at any depth at any of the 31 test locations. This suggests few if any wetlands existed in the Kelly hayfields prior to homesteading (Objective 1). However, this observation may have to be modified with completion of all soil analyses in January 2011.

A general profile survey of the Ditch Creek channel in 2010 indicated the original streambed has downcut as much as 14ft. It is possible that incision to this depth has caused a loss of shallow groundwater in areas close to the historic channel. This might explain the lack of soil wetland indicators noted in another historic hayfield at the Elk Ranch.

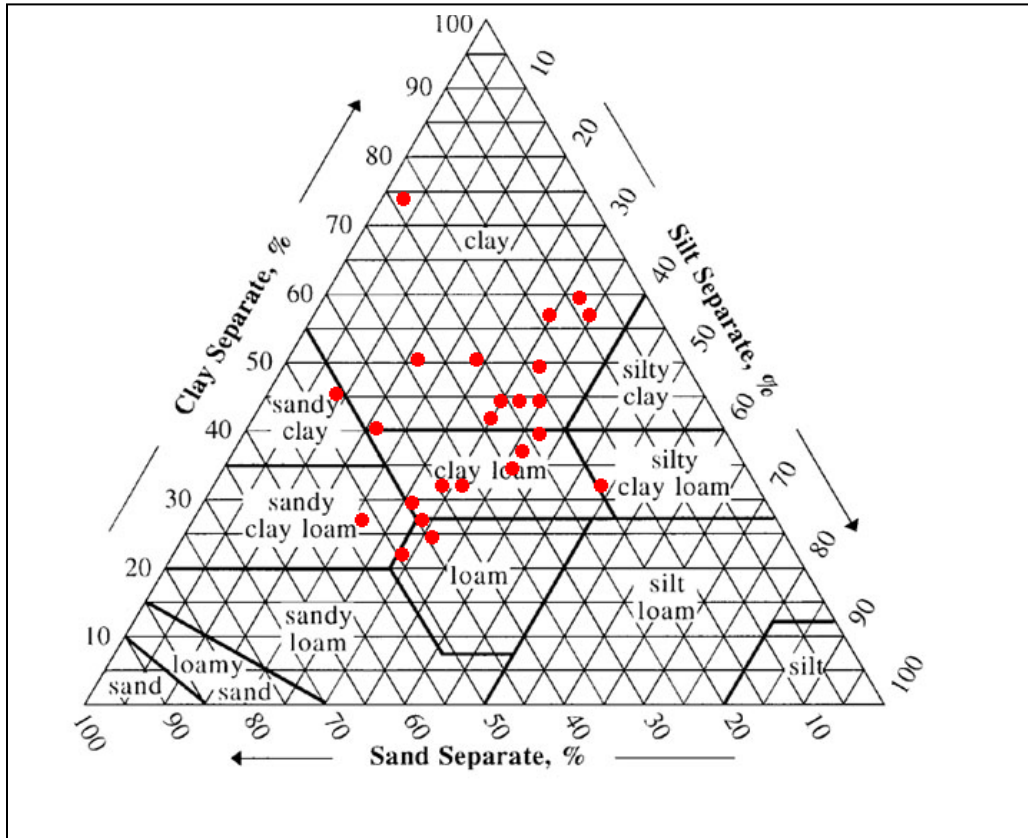


Fig. 2. Description of texture for soils occurring in the Kelly hayfields, Grand Teton National Park. Samples represent continuum from surface to depths of 40+ inches.

***Anticipated Efforts for 2011 Field Season:***

The sampling plan for achieving objective 4 has to be modified because of the 2010 fieldwork. Originally the approach was to install shallow groundwater monitoring wells in areas where soils exhibited redoximorphic characteristics to quantify the period of time soils were saturated. The lack of these wetland indicator features throughout the Kelly hayfields shifts our attention to the areas immediately adjacent to Ditch Creek and the Savage Ditch. It is possible that historic irrigation practices caused Ditch Creek to cut below the groundwater recharge zone ultimately “draining” historic wetlands near the stream. With this in mind we will install shallow groundwater wells along subreaches of Ditch Creek and Savage Ditch in early May 2011 to track water movement away from the channels. This approach will create a hydrologic description for existing drainages within the Kelly hayfields that can be the basis for restoration planning.

Plant community composition at each of the soil pit locations will be measured during July and August 2011. This information will be used to confirm/amend the interpretation of historic wetland patterns in the Kelly hayfields. Further refinement of the wetland diagnostic criteria developed at the Elk Ranch can be accomplished with the same vegetation analysis. Realistically there may be the need for additional soil sampling in 2011 to increase the reliability of interpretations developed during the initial soil survey (2010).

**Outcomes:**

1. Soil/hydrologic information platform for re-design of 2011 field season sampling protocol.
2. Subset of 2010 soils and channel profile data used to develop a Masters level research program,