

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

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

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Montana State University
Effective Dates: 5/1/2010 - 12/31/2011
Funding Amount: \$10,000

Investigators and Agency Representative:

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Project Abstract: The Kelly Hayfields area in Grand Teton National Park is an area that was intensively homesteaded and cultivated prior to park establishment. During the period of active homesteading nearly 4500 acres of native vegetation were cleared and replaced with non-native pasture grasses. A network of irrigation ditches was dug to divert water from nearby surface streams to water the pastures. The Kelly Hayfields are no longer in agronomic use, and the irrigation ditches have been largely abandoned. The park is now formalizing a long-term restoration strategy to return native plant communities to this area—a high priority for the park's natural resource management program, as identified in the 2007 *Bison and Elk Management Plan for Grand Teton NP and the National Elk Refuge*. Unfortunately, little is known about the pre-settlement hydrology and its impacts on the distribution of upland and wetland vegetation. There is anecdotal evidence to suggest that the western portion of the Kelly Hayfields was a mosaic of wetland and upland vegetation, but due to road construction, water diversions, and other land-use factors, the wetland component of the area has largely disappeared. The available information suggesting prior wetlands includes the existence of a series of travertine deposits, a series of cottonwoods growing along what appears to be an abandoned streambed rather than a constructed irrigation ditch, and aerial photos dating to 1945, which show a stream along the west side of the hayfields and a tributary stream flowing from east to west towards the larger stream.

The park's vegetation managers need a study of the western Kelly Hayfields area to determine the extent of wetlands that may have existed prior to agricultural conversion and what hydrologic/soil factors were responsible for their creation and maintenance. Knowing the location and extent of prior wetlands would allow us to identify biophysical pathways that linked wetlands to broader landscape processes. Outcomes from similar efforts at the Elk Ranch Hayfields indicate that ecological markers could be identified for determining whether wetlands were natural or had been created through long term irrigation. Development of a similar knowledge platform for the Kelly Hayfield site would establish criteria for determining whether wetland recovery would be supported by the current hydrologic patterns, or if restoration of previous hydrology will be necessary as part of the large-scale effort to restore the Kelly Hayfields. While the vast majority of the 4500-acre restoration effort begun in this area has focused on the shrub-steppe vegetation community, linked recovery of former wetlands on the western Kelly Hayfields site would increase plant and wildlife species diversity, and provide an additional suite of ecological values. Hence knowing if wetlands existed and the probable area occupied within the historic hayfields will facilitate appropriate site restoration—for which NRPP funding to initiate the first phase will become available from 2011-2013.

The use of multiple technologies for gathering information at this site will further the evaluation of the utility of the various techniques for analysis of ecological state and transition patterns at other sites in the park. Toward this end the park has also submitted proposals independently and in conjunction with Teton County Conservation District and the US Geological Survey to acquire multi-return airborne LiDAR imagery for this area of the park—imagery that would provide valuable data in assessing changes in hydrologic and vegetative patterns since farming began. Wetland research recently completed in another area of the park indicates a close association between historic flood irrigation management and certain soil/vegetation characteristics. The ecological markers discovered in this study would be coupled with new information generated from fieldwork in the western Kelly Hayfields to identify areas and drainage ways that would have supported wetland communities prior to homesteading, versus those created by decades of flood irrigation. This information, in turn, would enhance the likelihood of successful restoration by highlighting rehabilitation actions for upland areas that would simultaneously feed into and promote wetland recovery.

SCOPE OF WORK:

1. Review existing data (aerial photos 1945-present, Digital Ortho Quarter Quadrangles, Landsat imagery, vegetation plot data, travertine deposit location, recent and historic maps, historic accounts) and conduct fieldwork to determine pre-settlement hydrologic pathways and wetland presence within the western Kelly Hayfields (~900 acres) to the extent possible.
2. Using available and collected data, assess the effect of irrigation ditches, existing diversion structures, and roadways on current hydrologic function to determine if revegetation will be sufficient to re-establish former wetlands or if pre-settlement hydrologic patterns will have to be restored to achieve this goal. Supportive remediation information will be drawn from review of changes that apparently occurred to Kelly Warm Springs hydrology, as evidenced by recently discovered travertine deposits, following the nearby Gros Ventre slide.
3. Use this information platform to assess what physical changes, if any, in the roads, ditches or other man-made structures could be made to restore previous hydrologic function, and determine if/how many potential wetland acres might be restored through these actions.

Outcomes with Completion Dates: March 30, 2011

List of Products:

1. A map(s) of the location and extent of former wetlands in a 900-acre portion of the Kelly Hayfields.
2. Description of the infra-structure and biophysical factors related to loss of wetlands during homesteading and whether or not these factors still limit riparian/wetland recovery on the Kelly Hayfield landscape.
3. Identification of riparian/wetland monitoring sites to validate the Elk Ranch criteria for delineating former wetlands. Monitoring will also be used to solidify prioritization of selected localities for further restoration actions.
4. Produce 1 Masters level thesis, 2 published conference proceedings and 1 scientific journal manuscript from the accumulated data.

Keywords: restoration, pre-settlement hydrology, Kelly Hayfields, Grand Teton National Park, Montana State University