

Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Hydrological Analysis and Pilot Restoration Project for Weippe Prairie, Nez Perce National Historical Park, Idaho

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Colorado State University
Effective Dates: 6/15/2011 - 12/31/2013
Funding Amount: \$41,195

Investigators and Agency Representative:

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Project Abstract:

Native Americans of the interior Columbia Plateau, especially the Nez Perce people, have relied on Camas lily (*Camassia quamash*) as an important winter food for thousands of years, and it remains important for many tribal members today. Camas stores constituted nearly 80 to 90% of the historic winter diet for the Nez Perce. One of the primary historic sites utilized by the Nez Perce to gather camas was the Weippe Prairie, currently a unit of Nez Perce National Historical Park, located in present day North-Central Idaho near the community of Weippe, Idaho (Z11 E583166m N5133723m).

It was during the fall camas harvest in 1805 that members of the Lewis and Clark expedition first encountered the Nez Perce at Weippe Prairie. The Nez Perce people provided the expedition party with food (including camas) at a time when game was very scarce and food had become a serious problem for the expedition. It is because of this "first contact" between northwest native peoples and representatives of the US Government that the Weippe Prairie site was included as a unit of the NPS through the Nez Perce National Historical Park Additions Act (P.L. 102-576). The NPS acquired the 280-acre Weippe Prairie site in 2004.

In addition to Weippe Prairie's NPS status, the site is also a designated National Historic Landmark and is listed on the National Register of Historic Places. All of these designations are related to the historic presence of camas, and maintenance of a camas-dominated meadow landscape is vital to the preservation of these nationally significant resources.

The Weippe Prairie is noted as the "type site" for *Camassia quamash*, as the first specimen recorded to science was gathered here and described by Meriwether Lewis on June 23, 1806 during their return to the East Coast. Earlier, in September 1805 when he first encountered the Nez Perce at the Weippe Prairie site, William Clark noted in his journal an "emence quantity of the quawmash or Pas-shi-co root gathered & in piles about the plains." It has been noted by many Nez Perce elders and by early historic accounts that camas populations were dense enough in places like the Weippe Prairie that one individual could gather sufficient camas stores in just a couple weeks time to sustain a family of four throughout the winter.

Historically, camas thrived at Weippe Prairie. The wet meadow environment with seasonally saturated soils supported a productive plant community used by the Nez Perce for thousands of years. In his 1989 dissertation, Alston Thoms, summarizing a combination of both qualitative historical and limited quantitative botanical information, presents estimates of historical camas density as it was encountered during and shortly after the contact period of the 19th-century. Density in high quality camas meadows, such as the historic Weippe Prairie, was estimated to be between 150 and 300 plants/m². These numbers are supported, in part, by historical accounts of early botanists visiting the region who described camas growing "in 'vast' wet meadows by the 'millions'" and "so plentiful in many places that it is no exaggeration to say that...more than one-half of the total herbaceous vegetation in the lowlands was composed of this one species."

Recently, Dr. Susan Kephart of Willamette University successfully planted camas bulbs in densities of 100 plants/m², and views the range of numbers presented by Thoms to be a plausible approximation of historic high density conditions. Current camas density monitoring conducted by the NPS Upper Columbia Basin Inventory & Monitoring Network (UCBN) and NEPE staff at Weippe Prairie ranged from 0.44 to 61plants/m². Given the historical importance of the camas harvest at this location, it is reasonable to conclude that current camas populations at the Weippe Prairie site are dangerously below historic levels.

Over the past 100+ years, since Euro-American settlement of the area, the prairie has been used for hay production and livestock grazing made possible by the construction of ditches and drains to dry the meadows. European pasture grasses, which provide homogenous and highly productive cover, have also been introduced. Thus the hydrologic regime and vegetation of the prairie has changed dramatically from the condition experienced by the Nez Perce and members of the Lewis and Clark expedition.

Dominant plants on much of the Weippe Prairie now are smooth brome grass (*Bromopsis inermis*), timothy (*Phleum pratensis*), red top (*Agrostis gigantea*), and meadow foxtail (*Alopecurus pratensis*), all grasses that are native to Eurasia where they have been bred for hay production. In addition, orange hawkweed (*Hieracium aurantiacum*), oxeye daisy (*Leucanthemum vulgare*) and Canada thistle (*Cirsium arvense*), all listed as noxious weeds in Idaho, are present and aggressively spreading in the drained meadows of Weippe Prairie. These and other invasive species are taking advantage of the drainage and other disturbances at Weippe Prairie and are a tremendous threat to the historically camas-dominated meadow flora. In addition, Jim Ford Creek (the main drainage channel through the site) and the various drainage ditches that are tributary to it are undergoing rapid incision, which is worsening the soil drainage issue and causing erosion.

NEPE managers, in conjunction with their Nez Perce tribal partners, are extremely concerned about the effects of artificial drainage, and the associated rapid pace of non-native plant invasion, on camas populations at Weippe Prairie. They are especially concerned that, once established, these weeds will change the prairie ecosystem so dramatically that restoring the native camas will become extremely difficult, if not impossible. Therefore, park staff contacted the Water Resources Division's Wetlands Program staff and wetland ecologist Dr. David Cooper of Colorado State University (CSU) in 2010 to seek immediate assistance in evaluating the effects of artificial drainage on the hydrology of Weippe Prairie and in proposing steps for restoring the wet meadow environment in which camas roots proliferated in past centuries.

During a site visit in the fall of 2010, Dr. Cooper discussed a series of analyses with Jason Lyon and Jannis Jocius of NEPE, Joel Wagner of the NPS Water Resources Division, and Lisa Garrett of the UCBN, that would lead to a greater understanding of site hydrologic processes and impacts from drainage. These data could then be used to conceptualize and implement a pilot restoration project that could lead to larger-scale restoration efforts on the prairie.

CSU will:

1. Install and monitor a network of shallow ground water monitoring wells, piezometer nests, and stream and ditch staff gauges for the NPS-owned section of prairie. Also included would be at least one rain gauge, continuous ground water loggers in key locations, staff gauges to measure surface water stage, and if possible, stations to measure soil redox potential. We would also link our large-scale hydrologic evaluations with detailed soil moisture measurements being made by Dr. Paul McDaniel (University of Idaho) at 6 locations on the Weippe Prairie.
2. Conduct detailed mapping and topographic analyses of all ditches and channels and develop cross sections to characterize their width and depth and calculate flow.
3. Analyze all available air photographs to identify the historic and modern site conditions and to develop a time sequence of ditch construction, channel incision, and vegetation changes, where possible. It would also be desirable to analyze the General Land Office records from the period of settlement to determine if they contain information on prairie condition at the time of settlement.
4. Install a denser well and staff gauge network in the southwestern corner of the prairie within NEPE, where a pilot hydrologic restoration project would be implemented.
5. Conduct detailed topographic mapping of Weippe Prairie, and determine the elevations of all wells. These data would be combined with existing LIDAR data to create detailed topographic maps of the study site.
6. Establish an undisturbed reference area on Forest Service land east of the Weippe Prairie to collect data on water levels that support natural wet meadows with healthy populations of camas. Musselshell Meadow was visited during the 2010 site visit and was suggested as a potential reference site.
7. Analyze all data and produce a report that documents the results and conclusions. The report would include results of the pilot restoration and recommendations and priorities for larger-scale hydrologic restorations at Weippe Prairie.

Outcomes with Completion Dates: Finalize report and prepare recommendations - November/December 2013

Keywords: hydrologic processes, restoration, Camas lily (*Camassia quamash*), Weippe Prairie, Nez Perce National Historical Park, Colorado State University