

Big Meadows Project - A Brief Overview

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In 2003, Fly Fishers for Conservation (Fresno, California) received funds from a member to work on a conservation project. Local members suggested a high Sierra meadow they had fished since the early 1970's and watched the stream degrade and fish disappear over the last 30 years. The funds provided the initial funding to plan and implement the Big Meadows restoration project. Big Meadows is a high elevation (2317 m, approximately 7600 feet) meadow in the Sequoia National Forest located in Tulare County. Big Meadows Creek flows across the meadow towards its confluence with the Kings River in Kings Canyon National Park.

To develop a collaborative effort to plan and implement the restoration project, the group contacted CSU Fresno and ultimately funded student Jason Olin's Master's thesis research on the meadow. This thesis provided the scientific research to design and implement an intervention to re-water the meadow. Dr. Roland Brady, Engineering Geologist and professor at CSU Fresno, suggested collaborating with Jim Wilcox, an innovative practitioner from Plumas County who developed a holistic meadow re-watering technique based on Rosgen theory referred to as 'pond and plug'. Mr. Wilcox became an integral element supervising and teaching in this restoration project and guiding our efforts to increase technical and institutional capacity in the Southern Sierra.

In the 1960s, check dams were installed by the US Forest Service to try to slow sediment movement downstream in the meadow subsequent to the first grazing allotments. In the 1980s, the check dams effectively built up sediment behind them (upstream) and raised the stream grade. However, the stream channel between them remained downcut. This condition concentrates flood flow resulting in accelerated erosion degrading aquatic and riparian habitat. The streambed elevation and water table in the meadow remained approximately 2.5- 4.0 feet lower than the historic floodplain. The lower streambed elevation was draining the meadow of groundwater. This caused the plant community on the upper terrace to favor dry, upland plants.

During September 2007 the project was installed. A key element of the project was to utilize this work as a demonstration site for the technique used. The project accomplished three activities:

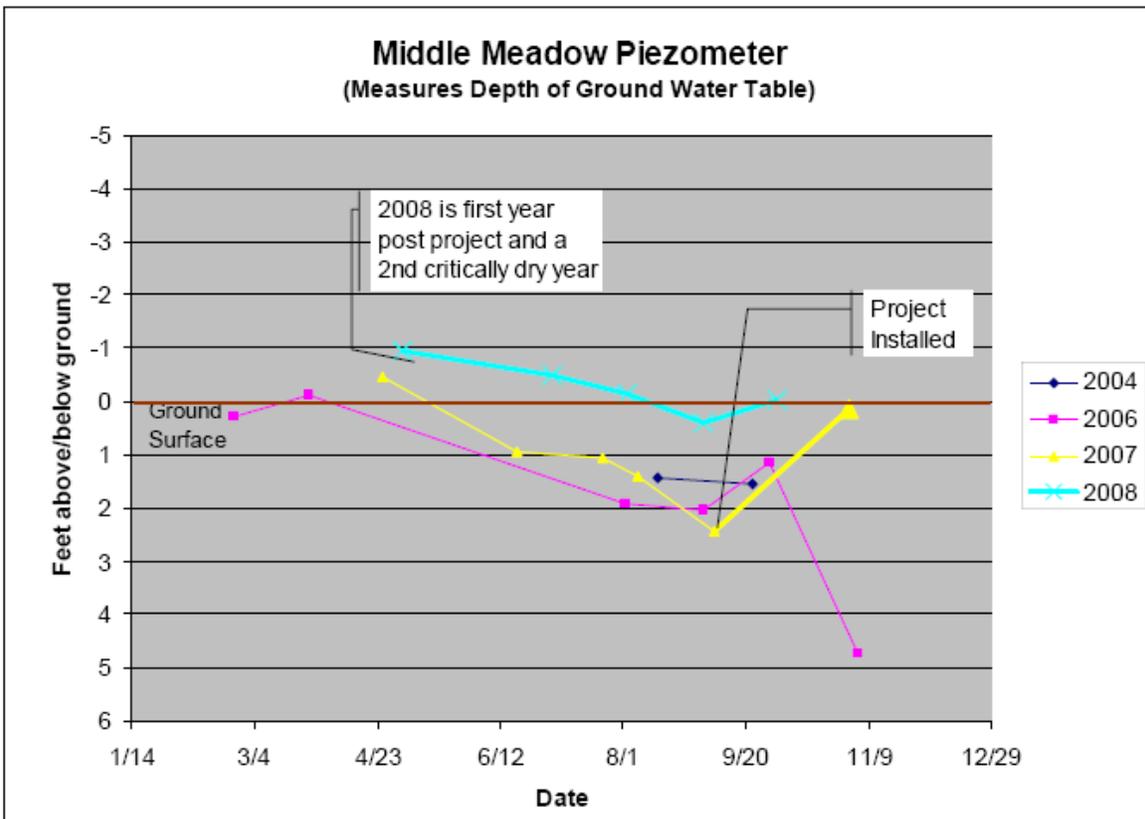
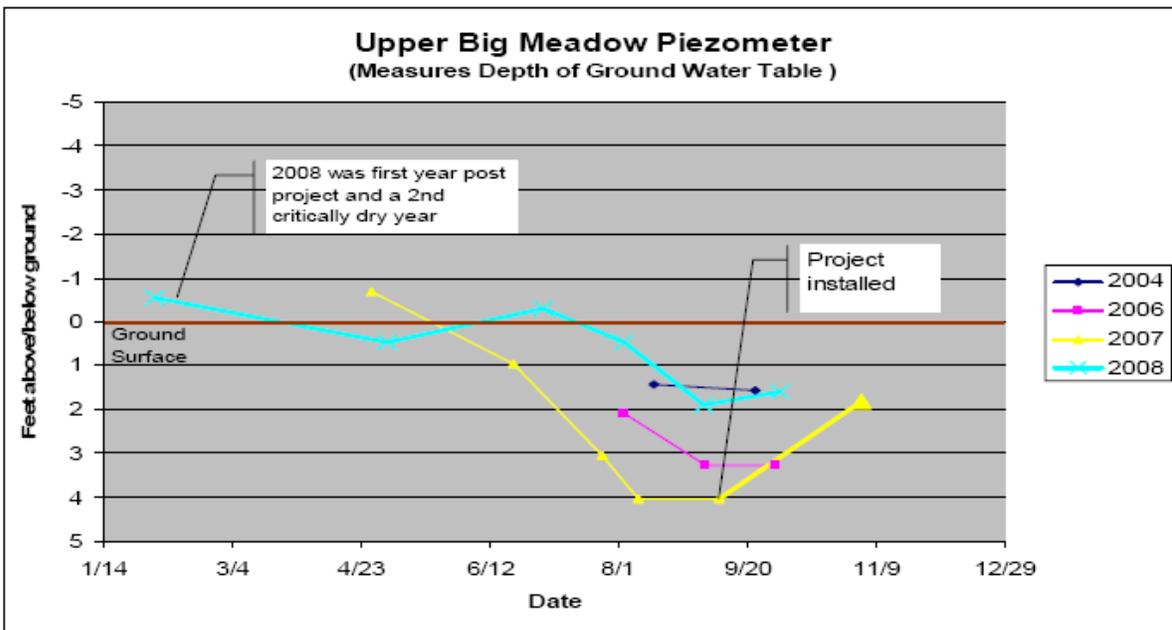
1. Gully elimination using the pond and plug technique, incorporating whole trees into the meadow channel and ponds, and the staging and installation of a rock/vegetation valley grade feature at the lower end of the meadow to address the need to restore the natural meadow and stream water table, stream channel characteristics, and vegetation components.
2. Three volunteer days of vegetation work, one volunteer day of Electro-shocking fish and moving them before the work on the project.
3. Monitoring of restoration areas weekly for two months, then monthly.
 - a. First, ground water table levels are recorded from piezometers. Initial levels were captured in the Fall of 2005 during the thesis work.
 - b. Second a Datalogger was installed below the project in December of 2006 prior to the installation.
 - c. Third, the project coordinators are producing a study of "Benthic Macroinvertebrate Populations in Big Meadows Pond and Plug Restoration". This study will establish

macroinvertebrate populations in the year following restoration and to continue to monitor the changes in populations in subsequent years.

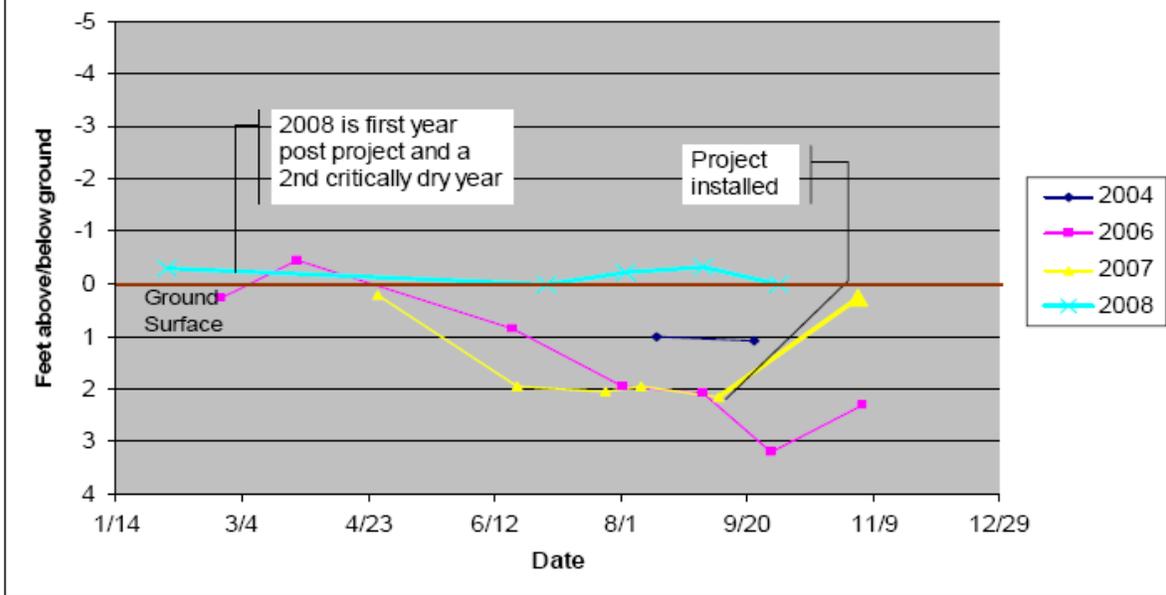
- d. Water Temperature in the Ponds is being collected via Hobo temperature loggers. This was established in October 2008, and will be collected annually and plotted.
- e. Avian study was performed by Jeff Cordes, Biologist for Sequoia National Forest.
- f. Hydrogeologist Stephen Lee was hired for the 2008 year to monitor the project.
- g. Sequoia National Forest completed a new survey of the meadow post project and will compare this annually.
- h. A Stream Condition Inventory was completed post project 2008 and in 2009 and will continue.
- i. Sequoia National Forest also completed a range plot inventory in 2009.

Initial results suggest that employing this method in such a damaged ecosystem as this was effective in reducing erosion, improving habitat for key species such as cold water fishes and macroinvertebrates as well as wetland plants. In addition, the meadow's groundwater rose significantly after restoration (see figures) and the meadow returned to a perennially wet state, slowing flows, but retaining cold water conditions and improving wetland habitat for native species.

Peizometer Monitoring Data



Lower Meadow Peizometer (Measures Depth of Ground Water Table)



Big Meadows June 2004 Pre-Restoration



Lower reach, eroded & trampled banks, failed gabion.



Upper reach, eroded banks



Upper reach, eroded banks



Upper Peizometer Looking upstream

July 6, 2008

One year post project



Lower photopoint



Middle photopoint



Upper photopoint

Restoration Schematics:

