

# Restoration Highlights

## Society for Ecological Restoration Northwest Chapter



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### Elwha River Dam Removal to Begin, At Last, in Late 2011

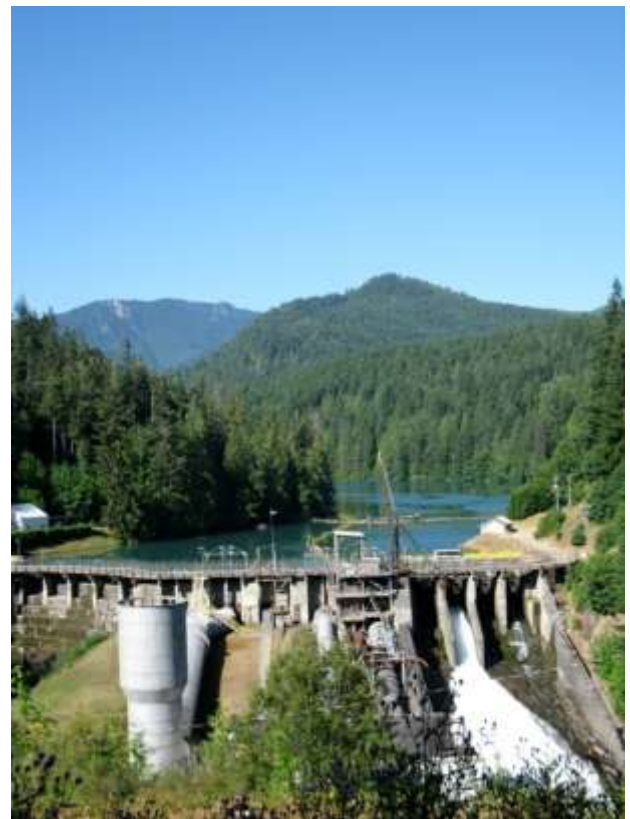
Aaron Clausen and Rebecca Brown

Close to a century after construction, following decades of debate and planning, preparations for dam removal in the Elwha River ecosystem have finally begun. In September 2010, workers cleared forest and dug a pilot channel through the delta that had formed within Lake Mills Reservoir. This part of the project's cost of \$744,000 pales in comparison to the nearly \$27 million set aside for the entire dam removal project, and the \$185 million authorized for the whole removal and restoration process. The official dam removal will kick off on the September 17, 2011, with weekend celebrations expected to draw thousands of participants following an Elwha Restoration Science Symposium September 15th and 16th.

For those unfamiliar, the Elwha River is located in Northwest Washington in Olympic National Park. It flows North from the Olympic Mountains passing over two dams: Glines Canyon, which forms Lake Mills, and Elwha, which forms Lake Aldwell, before it empties into the Strait of Juan de Fuca near Port Angeles. This river was historically a very productive salmonid stream that featured all 5 species of Pacific salmon. The dams were constructed in the early 20<sup>th</sup> century as a source of hydroelectric power and effectively blocked fish passage.

As the need for the river's hydroelectricity diminished and public ecological awareness increased, the idea of

removing the dams began to circulate. Congress, with the Elwha River Ecosystem and Fisheries Restoration Act of 1992, authorized Dam removal. Funding for the removal was blocked by Congressman Slade Gorton, remedied by his defeat in the 2000 election. That same year the Department of the Interior purchased the dams.



The Elwha Dam (A. Clausen).

Before dam removal could begin, facilities were installed to protect the municipal

and industrial water supplies of nearby Port Angeles from increased sediment loads (approximately 18 million cubic yards of sediment is estimated to be contained in the two reservoirs). In April 2010, the second of these facilities was completed, ten months ahead of schedule. Currently, dam removal is expected to begin around September 2011, but a formal removal schedule will not be approved until later this year.

To prepare for dam removal, The Bureau of Reclamation began a sediment management project last summer on the Elwha River delta – the delta formed at the mouth of the Elwha River in the Lake Mills Reservoir. The goal of the sediment management project was to promote efficient erosion of the sediment trapped within the reservoir when the dam is removed, and to prevent unstable high sediment banks from forming in the drained reservoir. First forest vegetation on the delta was leveled to allow erosion. A new river channel was excavated through the middle of the delta, and the old channel was blocked. Late last fall, the reservoir was lowered to test the effectiveness of the new channel. A high flow event in December 2010 further tested the channel and left woody debris accumulated in the reservoir; to alleviate this the reservoir water level was raised to allow the debris to pass over Glines Canyon Dam.

The physical removal of the dams will begin around September 2011, and may take up to 3 years to complete. During the drawdown of the lakes, there will be periods of inactivity (fish windows) to accommodate the migrations of both native and hatchery fishes. The unique placement of each dam and the natural complexity of the river make dam removal a complex process. First, Lake Mills reservoir will be drawn down approximately 15 feet in summer 2011. Flows will be diverted from Lake Mills (above Glines Canyon Dam) so as to provide flood protection while work on Elwha Dam is conducted. Water will then be diverted from Lake Aldwell (above Elwha Dam), and

temporary dams will be installed to divert remaining flows so the removal can occur under dry conditions. The powerhouse and other structures will then be removed and the temporary channel filled in, which should reroute the river to its natural path. After work has commenced on Elwha Dam, the upper portion of Glines Canyon Dam will be removed, which will cause water to spill over the crest of the concrete structure. After this point the dam will be notched on alternating sides to create temporary spillovers and allow the removal of each layer of concrete. Once upstream sediments have eroded and are resting against the remainder of the dam the structure will be blasted and the river channel restored.

A seven-year restoration plan has been developed by Joshua Chenoweth with the National Park Service for revegetation of the drained Lake Mills Reservoir following dam removal. The goals of the restoration plan are to control invasive species, stabilize ecosystem processes, and reforest the drained reservoir sediments. Restoration efforts will be focused on the uplands and terraces while riparian habitats will be left to natural processes. Throughout the revegetation, invasive species will be monitored and controlled. Rather than revegetate the entire drained reservoir, revegetation will take place using dense islands of woody vegetation as points where propagules can be dispersed to the surrounding habitat. To prepare for this effort, the National Park Service



Glines Canyon Dam (A. Clausen).

has collected over 600 pounds of seed from the Elwha Watershed, and is planting over 400,000 woody seedlings from a range of native species. Restoration plans include long-term monitoring of the revegetated delta and an adaptive management strategy to cope with the dynamics of the changing Elwha ecosystem.

The dam removal is also an excellent vehicle for research studies concerning the effects of dams on riparian ecosystems. A collaborative research team of researchers from Eastern Washington University (including the authors) and the USGS (including Pat Shafroth) have been undertaking a long-term study of the effects of dams and their removal on the Elwha River riparian zone. They collected baseline vegetation surveys in 2005, 2006, and 2010 from riparian zones in reaches above, below, and between the two dams. Preliminary analyses show a reduction in plant species diversity downstream from the dams. They plan to resurvey the same plots in the years following dam removal to develop a long-term picture of riparian vegetation dynamics and recovery. Another study by Cara Hulce of Eastern Washington University assessed the vegetation of the Lake Mills Delta, a habitat that will be indelibly altered by dam removal. Researchers from Western Washington University including Jim Helfield and Jamie Michel have assessed



The free-flowing Elwha River above Lake Mills in Geyser Valley (A. Clausen).

the potential of different native species to recolonize abandoned reservoir sediments.

So has begun the dam removal and ecological restoration along the Elwha River, one of the largest projects of its kind in history. The hope is that it will return the system to its historical state, with the wildlife, vegetation, and fish returning to pre-dam levels. Of course nobody can say for sure what will happen until it does, but surely it will benefit us as a learning experience. This project provides not only opportunities for a better understanding of ecological concepts and dynamics, but a chance to implement management and restoration strategies as well. Surely those involved in this huge venture will be better for it.

### Supplementary Information

Much of this information, as well as more detailed description of the restoration project, dam removal, and videos depicting the removal process for each dam can be found at the following National Park Service website:

<http://www.nps.gov/olym/naturescience/elwha-ecosystem-restoration.htm>

Additional information about the history of the Elwha River and the schedule of the dam removal can be found at the following websites:

<http://www.usbr.gov/pmts/sediment/projects/ElwhaRiver/ElwhaGlinesCanyon.htm>

<http://www.americanwhitewater.org>

The National Park Service has also set up a Facebook page that is updated frequently with articles and the stage of the removal project; search 'Elwha River Restoration' from the Facebook homepage.

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