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APBI 423 – Ecological Restoration
Term Paper
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Rewilding the Elwha: *A Success Story in Ecological Restoration*

Project Background

The Elwha River Basin covers 833 square kilometers within the Olympic Mountains of Northwestern Washington, USA. The head waters of the Elwha River run 72 km downstream through beautiful old-growth forests in Olympic National Park and flow into the Strait of Juan de Fuca in the Pacific Ocean. For over seven years, the Elwha River has run wild and free; its uninterrupted flow connecting a vast assemblage of pristine landscapes and ecosystems. However, this was not always the case.

The Elwha River, restored to its natural state. John Gussman.[2]

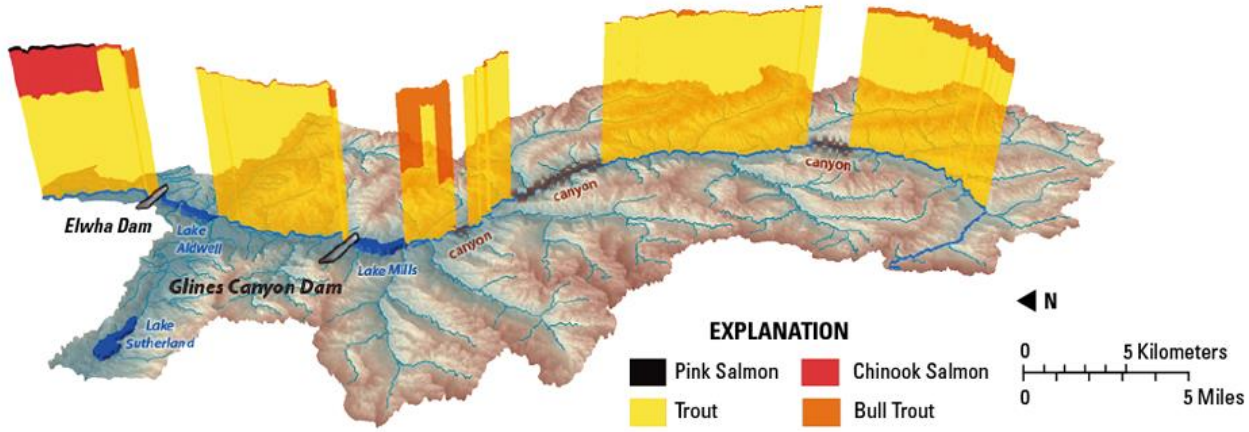
For over a century, the Elwha River was blocked by two dams; the 32 meter tall Elwha Dam and the 64-meter Glines Canyon Dam. These hydropower dams were built in the early 1900's in response to rising demand for electrical power generation in the pacific northwest region[1]. Despite serving the regions power needs and fueling the local economy, these dams blocked salmon form migrating upstream, and blocked sediment / woody debris from moving downstream causing significant disruptions in the ecological cultural connections between the Elwha Klallam Tribe and the Elwha Valley.[2]

Glines Canyon Dam prior to removal[1]

As a result of the dams being built, the surrounding environment underwent significant changes. Sediment transported by the Elwha River was blocked from moving downstream, which eventually led to severe erosion of the riverbed and

beaches.[3] These fine and coarse sediments are naturally moved downstream where they are deposited in lower reaches of the river and the near-shore estuary, creating micro-form habitat for aquatic species. Erosion of estuarian (near-shore) habitat reduced micro-invertebrate populations like shellfish, who relied on the sediment-rich environment as well as aquatic plants, bottom-feeding fish, aquatic mammals and even birds.[4] These ecosystem-level changes in river transport and morphology had huge consequences for Salmon migrations (spawning runs), where native chinook, chum, pink and coho populations saw significant decreases due to upstream dam blockages.[3] Most importantly, this created a significant disruption in the ecological cultural connections between the Elwha Klallam Tribe and the Elwha Valley.

Consequently, the Elwha River Ecosystem and Fisheries Restoration Act was enacted in 1992 in response to a shift in public and political support for dam removal, which was heavily influenced by these new regulatory changes.[5] Come 2000, ownership of both dams was then transferred to the Department of the Interior after it was determined that the removal of both dams was necessary to restore ecosystem function back to the Elwha River Basin; a decommissioning plan was then implemented (Gregory et al. 2002), marking the beginning of a new era for the Elwha River Basin.



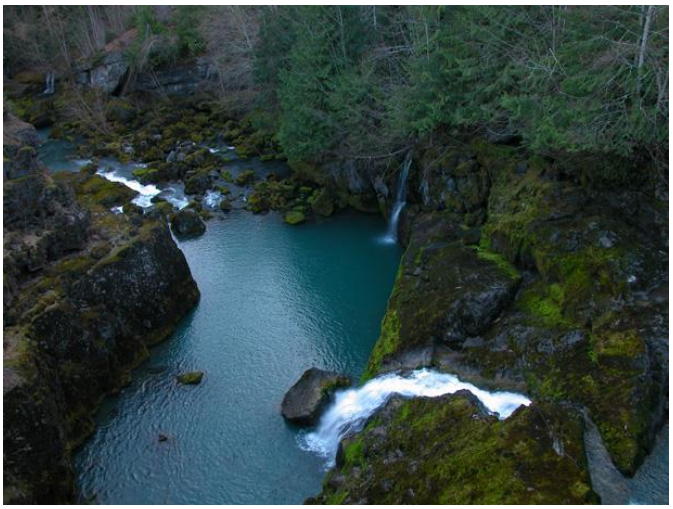
Proportion of adult salmon in the Elwha River Basin after dam construction, 2007.[1]

Restoring the Elwha River: what happened?

Led by the U.S. Geological Survey, the Elwha River Restoration project was a big deal. It was the largest dam removal project not only in US history, but the rest of the world.[5] The goals set out for this restoration effort were both exhaustive and complicated, as project objectives involved restoring the river populations of salmon and trout, restoring the river habitat to ensure connectivity between the coast and headwaters; managing invasive and exotic species within the basin, restoring natural ecosystem processes and re-establishing native forest.[2] Due to the novelty of a dam removal at this scale, achieving these goals was widely uncertain. The response of both aquatic and terrestrial organisms to the release of more than 10 million metric tons of sediment into the river was largely unknown and significant disturbances to the Elwha ecosystem were to be expected.[6]

So in 2011 when the gradual removal of both dams was underway, the immediate impact was substantial. 100 years of sediment build-up was released and transported downstream, coating the riverbed downstream and causing massive accumulations in the river delta. As a result, the river delta

landform expanded 400 meters offshore[1] – a geomorphic change that was visible from space! Furthermore, estuarian fish and macroinvertebrate abundances were instantly reduced and freshwater species dominated the newly formed near-shore ecosystem.[7] Over time, however, the renewed sediment source created sandy beaches and near-shore habitat that is now allowing shellfish, crab, shrimp and foraging fish to return.[2]



The river running freely below the Elwha Dam, post removal. Olympic National Park. 2005.

It was an incredible moment in history when the Lower Elwha Klallam tribe ceremonially welcomed back chinook, coho, pink and chum salmon to over 100km of the newly re-connected Elwha River,[8] allowing them to return once again to their native spawning grounds, continuing a tradition man millennium in the making. Despite a full recovery in population numbers likely taking many decades to see, all adult salmonoid species have now returned to the Elwha in increasing numbers.[2] Moreover, the upper reaches of the Elwha that were filled water suddenly became exposed again. Scientists and volunteers began to re-establish these riparian areas by planting more than 400,000 native plants in order to stabilize the riverbanks and begin successional forest recovery.[9] These revegetation efforts – along with the return of salmon - have helped elk, deer and black-bear return to forage in their native habitat.[10]

So far, the restoration project has been a success. Due to the release of sediment and return of the salmon, the natural hydrology of the river has been renewed. The reference physical and morphological conditions have been re-established, plant and wildlife diversity has increased, and ecosystem function has been brought back to the river and surrounding riparian areas. In addition, this project has helped repair ecological cultural connections between the Elwha Klallam Tribe and the Elwha River Valley.[2] However, the full magnitude of outcomes stemming from this project has yet to be discovered; as the ongoing effects of the dam removal are still happening to this day, and will continue for decades to come.

Where do we go from here?

The outcomes of dam removal on the Elwha have shown that river ecosystems can be incredibly resilient to disturbances massive scales. By letting natural processes take over, rivers re-create their regular morphology and re-establish a variety of habitat for both aquatic and terrestrial species. This project stresses the importance of river-connectivity; how a river's ability to flow unobstructed from its headwaters to the ocean is more than just an aesthetic pleasure, it has much broader implications for surrounding ecosystems, on scales much larger than we would have ever expected. Looking forward, restoration of the Elwha River supports the relatively new notion of dam removal as a valuable and effective river restoration technique. With the continued monitoring of the river, researchers have compiled a wealth of valuable information and data that has set the stage for future dam removal projects, inspiring a new discourse surrounding how manage rivers and water resources in the years to come.

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