# Large Woody Debris (LWD) projects in Northern California: Design, Implementation, Monitoring and Results
## Executive Summary

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In the summer of 2020, I obtained an internship position at Blencowe Watershed Management (BWM), a company which performs LWD restoration in Northern California. This report describes the design, implementation, monitoring and results of 6 LWD projects conducted in Northern California, based on my experience as a field technician intern for BWM in 2020.

In Northern California, coho and steelhead populations have declined significantly due to the loss of habitat in the last 80 years (Taylor 1978; NMFS 2012). Their habitat has been degraded and reduced by unsustainable timber harvesting practices, which expanded dramatically after WWII. Today, timber companies are governed by regulations such as the California Forest Practice rules, designed to ensure sustainability, and in general watersheds and streams are in better condition. Since the 1980's there has been a proliferation of LWD projects in Northern California to restore habitat that was lost from legacy timber harvest practices.

Because the success of stream restoration depends heavily on overall watershed management, this report also describes the status of sustainable forestry in Northern California, which eliminates the early logging practices that degraded streams, enabling streams to recover on their own, providing a framework for restoration.

In general, stream properties that are ideal for large wood projects have bankfull widths up to 40 ft. (3-12 m), and stream slopes up to ~5% (Sheahan & Herkamp 2010). These streams are also commonly used by anadromous fish for spawning and rearing.

In 2020, BWM conducted LWD restoration projects in six stream reaches throughout Northern California (Figure 1, Table 1.) We also performed baseline versions of longitudinal surveys and habitat surveys on two stream reaches.

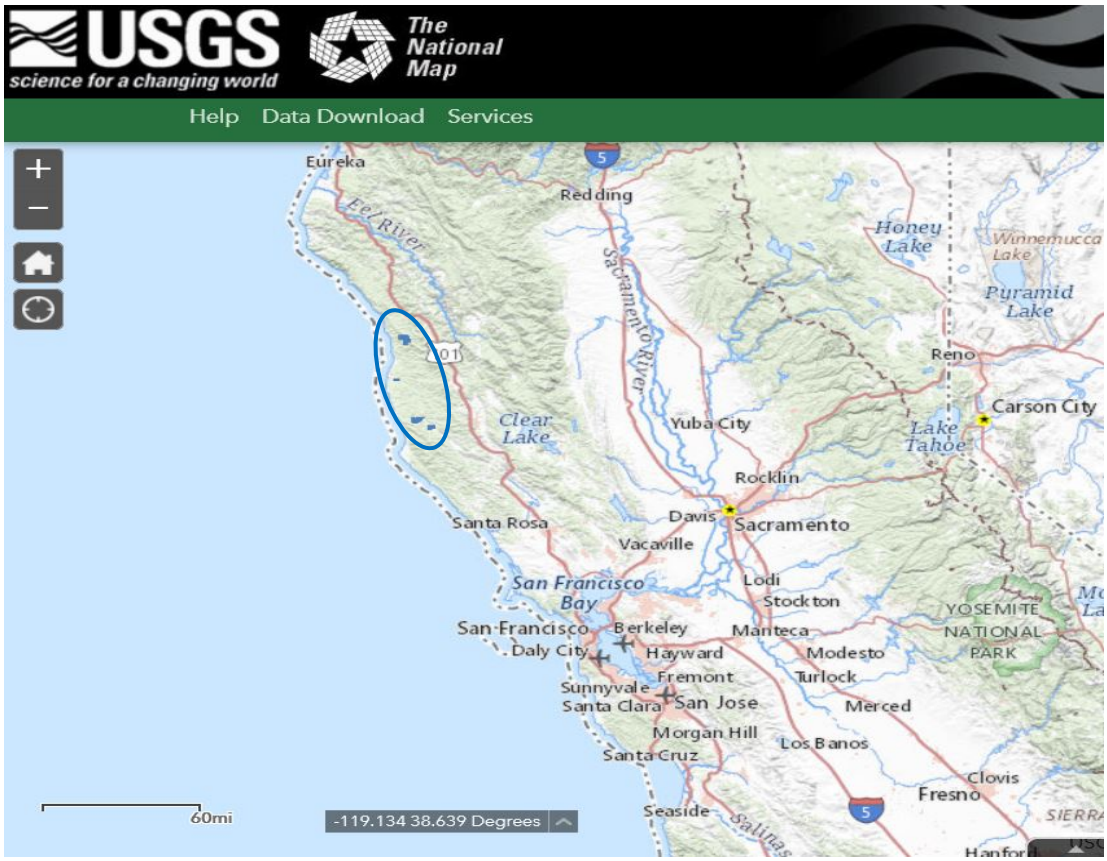


**Figure 1. Location of LWD projects conducted by Blencowe Watershed Management in 2020.**

| Project | Distance of stream treated (miles) | Bankfull Width (ft) | # of LWD pieces placed | # of Pools created/ enhanced | NOAA key piece rating (*) |
|---|---|---|---|---|---|
| Dutch Charlie Creek | 1.2 | 10-22 | 95 | 25 | Very good (3.5 pieces/100m) |
| Redwood Creek | 2 | 16-25 | 99 | 25 | Very good (3.5 pieces/100m) |
| North Fork Navarro | 0.28 | 36-48 | 14 | 10 | Good. (3.3 pieces/100m) |
| Mill Creek lower reach | 0.89 | 36-40 | 19 | 14 | GOOD (1.32 pieces/100m) |
| Mill Creek upper reach | 0.26 | 23-28 | 21 | | FAIR (5.02 pieces/100m) |
| Hayshed Creek | 0.9 | 9-18 | 60 | 18 | GOOD (7.32 pieces/100m) |
| totals | 5.53 | | 308 | 92 | |

**Table 1. Summary of LWD projects conducted by Blencowe Watershed Management in 2020.**

Large wood projects are generally perceived to be successful at improving physical habitat in coastal stream in Northern California, although more work is needed to be on par with large wood density in old growth forests. However, overall coho salmon and steelhead populations have neither rebounded, nor plummeted. There is mounting evidence that impacts from climate change are offsetting gains made in habitat improvement.

There is a small but significant stream restoration industry in Northern California, with the bulk of the funding going towards roads and sediment reduction projects such as decommissioning of obsolete logging roads. In recent years there has been an increase in funding for large wood projects, which has remained relatively consistent since 2012.

In Northern California, the pipeline of restoration projects is limited by two issues; the permitting process, and the availability of qualified personnel and companies to conduct these

projects. In 1981, Congress passed the fisheries restoration grant program (FRGP) to streamline the permitting process. This grant program has been used extensively and continues today. However, the pipeline is still constrained by the permitting process, and state and local agencies in California are considering possible improvements.

To address the lack of qualified restoration personnel, Trout Unlimited (TU) and the Salmon Restoration Federation (SRF) conducted a field training school in 2018. This event sold out months in advance, and 50 people attended.

There is a fair amount of research indicating that the restoration industry is a good source of jobs, especially local jobs. Considering that these calculations have a wide variation due to different regions, projects, and methods, the restoration industry compares well with other industries. (Figure 2.) in terms of creating jobs.

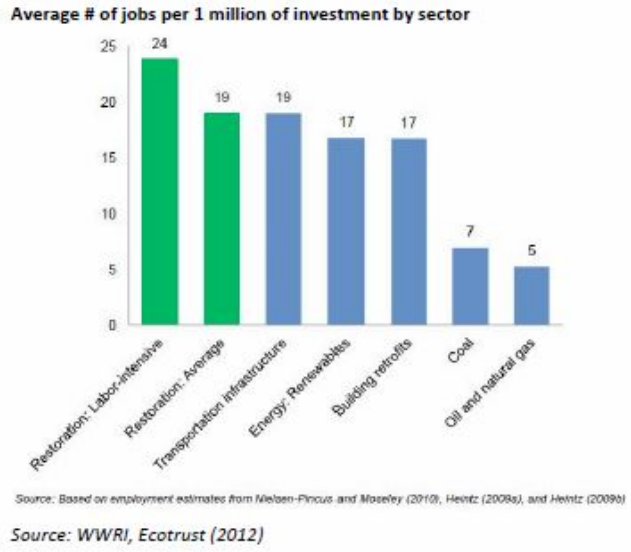


**Figure 2. Average # of jobs created per $M of investment by sector.**

Overall, my internship with Blencowe Watershed Management provided me with valuable experience and an opportunity to learn about the field of stream restoration, especially as it

pertains to salmon habitat. Working as a field technician provided me with hands on experience in implementing LWD projects to restore salmon habitat. Learning about LWD and its role in habitat restoration allowed me to synthesize concepts I learned from classes at OSU, in ecological restoration, freshwater ecology, ecosystem services, and environmental sciences.

In turn, I provided value to BWM by working as a field technician, and by documenting several aspects of LWD including design, implementation, monitoring, results, and work environment. In addition, I described and documented the role of sustainable forestry as a key practice to slow degradation in streams and watersheds, enabling the recovery process to begin, and providing a framework for successful restoration.

Finally, my internship experience gave me an opportunity to engage with a rather extensive stream restoration community here in Northern California. I became familiar with the entities responsible for designing, permitting, implementing, and monitoring stream restoration projects. The contacts I made at these organizations should help me establish a career in the stream restoration field, in a variety of different positions.

**References.**

NMFS (National Marine Fisheries Service) 2012. Final Recovery Plan for Central California Coast coho salmon Evolutionarily Significant Unit. National Marine Fisheries Service, Southwest Region, Santa Rosa, California.

Taylor, S. N. 1978. The status of salmon populations in California coastal rivers. California Department of Fish and Game. Anadromous Fisheries Branch. April.

Sheahan, J., Herkamp, K. 2010. Guide to Placement of Wood, Boulders and Gravel for Habitat Restoration. Oregon Dept. of Fish and Wildlife.