

**REDWOOD CREEK:
Prompted recovery of straightened channel with engineered log jams**

MARIN COUNTY, CALIFORNIA



What was done and why?

Redwood Creek originates in steep headwaters of Mt. Tamalpais and empties into the Pacific Ocean at Muir Beach. The basin is unusual in consisting of 95 percent parkland, including Muir Woods National Monument, a grove of coastal redwood (*Sequoia sempervirens*) flanking the upper portions of the creek, which receives over 3 million visitors annually by virtue of its location close to the San Francisco urban area. Redwood Creek is important spawning and rearing environment for two anadromous salmonid species of conservation interest: steelhead trout (*Oncorhynchus mykiss*) and endangered coho salmon (*O. kisutch*). Redwood Creek is considered one of the most southerly stable populations of coho. These evolutionary units of these fish are listed under the federal Endangered Species Act as threatened (steelhead) and endangered (coho). As a result, the creek has a very “high profile”, and there is unusually detailed basin-scale background technical information, pre-project baseline, and post-project monitoring data available from a variety of disciplines.

Historically, the Banducci family owned the site and converted much of the floodplain to

agricultural fields, leveled an 11-ha field for flower production, and constructed levees along the right banks in 1948-1949 to prevent overbank flooding. These historical actions created an artificially-straight, constrained stream with relatively little habitat heterogeneity, nicknamed the “bowling alley” reach. The NPS acquired this property in 1980, with an agreement allowing the Banduccis to continue farming until 1995.

In fall of 2003, the NPS completed the first phase of the Banducci Site restoration project, which entailed constructing artificial log jams using downed Eucalyptus trees and breaching the constraining levees to reconnect the channel and floodplain. The primary purpose of the instream project was to increase channel complexity, and specifically to create rearing pools for juvenile salmonids. NPS also removed invasive, non-native vegetation in the riparian corridor, and replaced it with native vegetation to enhance nesting habitat for resident and migrant riparian songbirds.

Who was involved?

Many partnerships occurred to successfully implement this project, including the National Park Service, Golden Gate Parks Conservancy, Stillwater Sciences, Philip Williams and Associates, and the California Department of Fish and Game (CDFG) Fisheries Restoration Grant Program.

Where can I see the project?

The Redwood Creek drainage basin (22.7 km²) is located in Marin County, California approximately 20 km north of San Francisco. The Banducci restoration project site, named for its former owners, is located on a 69-hectare parcel adjacent to Redwood Creek in the Muir Woods National Monument, about 1 km upstream of the mouth of Redwood Creek (122°34'W 37°52'N, at elevation 15 m).

Why was this a model project?

Redwood Creek had an unusually good set of background technical reports, pre-project and as-built surveys, and monitoring of biological resources including invertebrates, fish, and songbirds, some of which were part of routine monitoring unrelated to the project, but which provided data from the project site and from nearby sites for context.

Post-project topographic surveying shows significant changes in the stream channel post-project. From 2003-2005, the general trend was aggradation of 1.5 to 2.0 feet at large point bar at the upstream sharp bend, while downstream of the bend the bed degraded 1.5 to 2.5 feet, primarily immediately downstream of the placed log structures. Following the high flows of 2006, this pattern reversed, with portions of the upstream point bar degrading by 1.5 feet, and many of the deeper pools downstream of the placed log structures aggrading by 1.5 to 3.0 feet, returning to nearly the pre-project grade. Sequential surveys of the longitudinal profile show a distinct increase in bed heterogeneity – the initial survey shows a relatively flat, featureless bed, while

subsequent surveys show much deeper pools.

A lack of upstream habitat makes the Banducci site a crucial rearing habitat for juvenile salmon. Over the long-term it is likely that this restoration may successfully achieve this goal. Some evidence for this is that the instream structures are performing as expected, with sediment periodically filling and scouring pools downstream of the weirs.

For more information on these projects, please contact:

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