

Road and Trail Improvements Reduce Sediment Pollution in Salmonid Streams

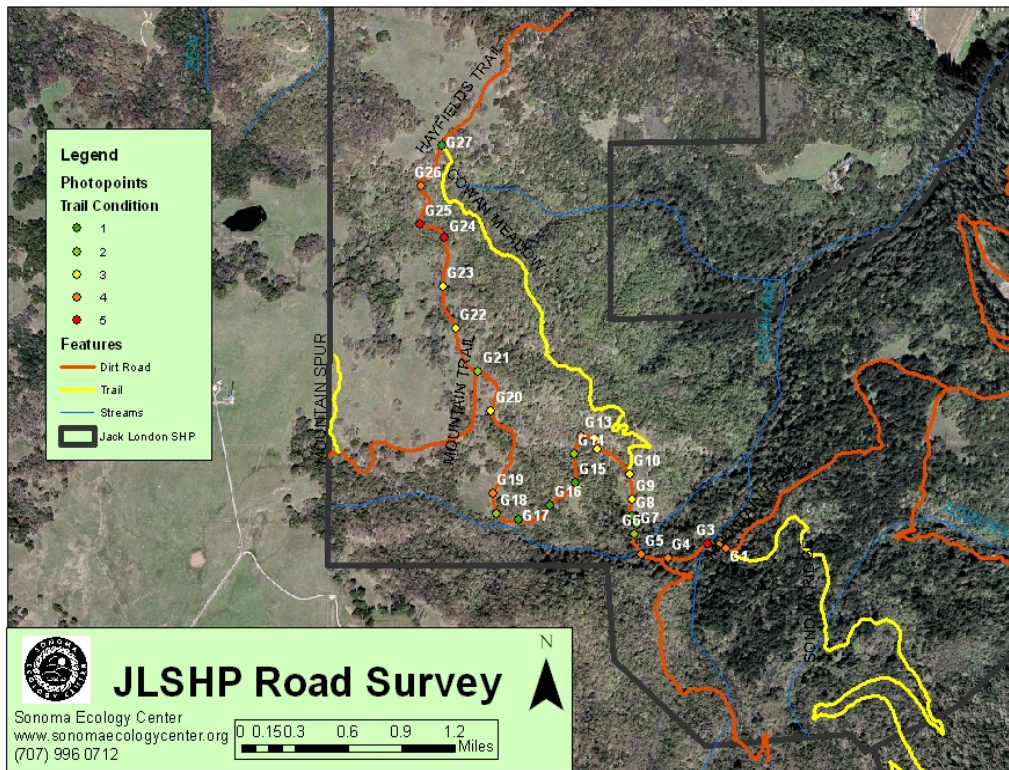
The Sonoma Creek Watershed, in California's Coast Range north of San Francisco Bay, covers an area of approximately 166 square miles (430 km²). The watershed provides habitat for several species of concern including steelhead trout, Chinook salmon and California freshwater shrimp. Excessive sedimentation and siltation have been associated with adverse impacts to fish spawning, habitat, and migration. This project directly implemented TMDL actions by reducing sediment from roads and creek crossings into several tributaries to Sonoma Creek within the Jack London State Historic Park (JLSHP).

Un-surfaced dirt roads on shallow soils have been a large, chronic source of sediment pollution at JLSHP in Sonoma County, California. The roads, which were highly degraded and compacted, were constructed for previous mining, farming, and fire access. Many of these roads crossed streams with culverts surrounded by unconsolidated fill. These roads and their stream crossings created a seasonally chronic source of sediment pollution into tributaries of Sonoma Creek and had a negative impact on beneficial uses including cold freshwater habitat, fish migration, fish spawning, preservation of rare and endangered species, and wildlife habitat.



Figure 1. Trail Reconstruction – Some Erosion Problems Due to Heavy Rainfall in First Year.

Since 1996 Sonoma Creek and its tributaries have been on the 303(d) list of impaired waterbodies for sediments, nutrients and pathogens. Sediment impacts include siltation of fish spawning areas, filling in of pools, and eroding and unstable stream banks. These problems have been documented by various studies by the Sonoma Ecology Center and others (www.sonomaecologycenter.org) and in the San Francisco Bay Regional Water Quality Control Board's preliminary TMDL report (http://www.waterboards.ca.gov/sanfranciscobay/TMDL/Sonoma_Crk_Sediment/preliminaryreport.pdf). The Water Board has adopted a TMDL for pathogens for Sonoma Creek Watershed and expects to adopt sediment and nutrient TMDLs in 2008.



The purpose of this project was to stabilize hydrologic disturbance caused by poorly constructed and maintained roads in JLSHP, which were previously built for mining, farming, and backcountry access. The project also sought to restore the hydrology while continuing to provide for emergency access where needed.

The project included assessment of sedimentation volumes and implementation of a series of Best Management Practices (BMPs) developed by California State Parks Department restoration experts to address roads and culverts. Road beds were de-compacted, culverts removed, and drainages restored with rock armoring. Roadbed drainages were re-contoured, and debris from previous land use activities was removed. The land along the road corridor was restored to a more natural configuration. Materials such as topsoil, forest duff, and organic matter were set aside prior to reconstruction and then re-spread back on to the restored surfaces.

The stated project goals were to 1) reduce sediment inputs, 2) improve salmonid habitat, 3) restore natural hydrologic function, and 4) maintain emergency vehicle access. The project also included public outreach including interpretive bulletins, newspaper articles, and a permanent interpretive panel alongside a re-engineered road that serves as a public trail.

The project was a collaboration between California State Parks and the non-profit Sonoma Ecology Center. Work was done between October 2004 and December 2006. The project implemented water quality improvements that were identified in the Sonoma Creek Watershed Enhancement Plan (Southern Sonoma Resource Conservation District, 1997) and Sonoma Valley Watershed Station Workplan (Sonoma Ecology Center, 2000).

Next steps include on-going maintenance of the repaired roadbed and establishment of native vegetation while removing non-native exotic plants. The State Park will cover these costs using Deferred Maintenance Program funds. Additionally, the Sonoma Ecology Center will continue turbidity and suspended sediment monitoring in Asbury, Graham, and Mill Creeks to assess whether performance measures related to water quality are being met over long term.

The results of the project included grading 3 miles of new roadbeds on improved alignments to reduce erosion, re-contouring the Treadmill Trail backcountry access road, removing ½ mile of degraded roadbed, and monitoring turbidity and suspended sediment from fish-bearing streams in the watershed. Roads were also monitored for stability and for invasion of exotic plants for one year following completion of construction.



Fig. 2. Interpretive Sign at Trailhead on Road Rehabilitation Project at Jack London State Historic Park.

In Asbury, Graham, and Mill Creek tributary watersheds, pre-project coarse sediment delivery related to roads was estimated as 4.87, 9.67, and 3.30 tons/year, respectively. Road-related fine sediment delivery was estimated to be equal to coarse sediments, for a total of 9.74, 19.34, and 6.60 tons/yr. With two of seven road-stream crossings improved on Asbury Creek, and four of 12 crossings improved on Graham Creek, the implemented road improvements potentially reduces loading by 2.78 and 3.22 tons/year, or 6 tons per year. This estimate does not include the reduction of channel-damaging surface runoff brought about by road re-contouring, an amount expected to be much higher.

Project performance measures were:

1. Reduction in peak and average turbidity and suspended sediment in stream flows
2. Replacement of undersized culverts with swale crossings
3. Eight-foot roadbeds and reduced grades
4. Retention of water-supply features.

All but the first of these performance measures have been met. It was difficult to achieve the first performance measure during the project timeframe because of intense precipitation in the first year after implementation. Though appropriate BMPs were part of the project design, i.e., grading work was conducted in the dry season and erosion control measures such as placing mulch were implemented, there was no way to completely ameliorate this excessive runoff. Continued monitoring will track the first performance measure and is expected to show long-term improvement in peak and average turbidity and suspended sediment in stream flows.

The total cost for this project was \$611,273; an EPA 319(h) grant provided \$250,000 and the rest was provided as matching funds:

California State Parks
Maintenance Funds (\$172,000)
California Department of Fish
and Game SB271 (\$20,000)
Pacific States Marine Fisheries
Commission (\$19,350);
Consolidated Grant 2005, Task
2.5 (\$109,103)
Proposition 13 (\$157,820)

Partners included the California
State Parks, Sonoma Ecology
Center (SEC), and California
Department of Fish and Game



Figure 3. Re-contoured Roadbed. Erosion Control Materials Placed and Grass Cover Growing.

CONTACT INFORMATION:

Marla Hastings
Senior Environmental Scientist
California State Parks
Diablo Vista District
845 Casa Grande Road
Petaluma, CA 94954
(707) 769-5652 # 214
mhast@parks.ca.gov

Becca Lawton
Geologist, Research Program Manager
Sonoma Ecology Center
20 East Spain Street
Sonoma, CA 95476
707-996-0712, x116
becca@sonomaecologycenter.org