

## Napa River Restoration Projects

Shaun Horne, Napa County, shaun.horne@countyofnapa.org  
Jeremy Sarrow, Napa County, jermy.sarrow@countyofnapa.org

The Napa River flows through one of the most scenic landscapes in the Bay Area, and supports one of the largest remaining salmon runs, but it faces many challenges. In the mid-20th century the river corridor was squeezed from a broad ribbon to a narrow thread, as land managers cut off secondary channels and confined the river behind levees. At the same time urbanization and land drainage funneled more water into a narrower floodway. The result was channel incision with bank collapse, erosion of channel bedforms (riffles, bars, pools) important to salmonids, and a reduced riparian corridor due to the lack of a functional floodplain. A broad coalition of organizations has been collaborating on 14 miles of river restoration within the Rutherford Reach and Oakville to Oak Knoll (OVOK) Reach. Restoration elements aim to restore physical and biological processes and include floodplain benches, large woody debris structures, biotechnical stabilization, non-native invasive management, native revegetation and buried boulder grade control designed to enhance existing hydraulic, geomorphic and depositional processes associated with riffle/pool maintenance and development, refugia and establishment of native riparian vegetation. Enhancement of the physical processes throughout these reaches will help sustain riffles over time and potentially improve spawning substrate and habitat conditions for multiple life-stages of salmonids. Construction in the Rutherford Reach was completed in 2015 and construction in the OVOK Reach will begin in July of 2015 and is anticipated to continue until 2019. A long term channel monitoring and maintenance program has been established by the Napa County Flood Control and Water Conservation District financed with dedicated funding from river front landowners. Costs and benefits of the project are being borne equally by landowners, the local Napa community, and state and federal grant programs.

**Keywords:** River Restoration, Habitat Enhancement, Bioengineering, TMDL, Riparian Ecology

**Poster Topic:** The Napa River: Working Together to Build a Resilient Watershed and a Living River

## Fish Barrier Removal Projects in the Napa River Watershed

Jeremy Sarrow, Napa County Flood Control and Water Conservation District,  
jeremy.sarrow@countyofnapa.org

Building on the success of the Zinfandel Lane Bridge Fish Habitat Improvement Project, a project that removed a historic fish barrier that impeded access to over 50% of the available spawning and rearing habitat for fall run Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead trout (*Oncorhynchus mykiss*) in the Napa River watershed, the County of Napa is again embarking on several additional fish barrier remediation projects in 2015 and 2016 that will both restore access to upstream salmonid habitat and also repair failing infrastructure.

Two road crossings on the mainstem of the Napa River, the Oakville Cross Road Bridge and Greenwood Avenue culvert, are considered partial or full barriers to upstream and downstream fish migration during low flow scenarios and both structures were compromised as a result of the August 24, 2014 South Napa Earthquake. Both crossings will be replaced in 2015 and design includes suitable hydraulic conditions for passage of adult and juvenile salmonids, maintaining channel stability and creating onsite habitat structures for endangered California freshwater shrimp (CFS) (*Syncaris pacifica*). Additionally, Napa County will be removing another fish migration barrier on Milliken Creek, a significant tributary on the Napa River. The Milliken Creek project will include both the removal of a dam and restoration of the adjacent riparian habitat in addition to construction of a flood bypass/weir to ensure a flood detention area does not overflow into neighboring homes.

All projects include pre- and post-construction channel geometry surveys and fisheries monitoring in the areas upstream and downstream of the construction areas in order to document hydraulic conditions in the channel and salmonid use. These projects are funded by grants from the California State Coastal Conservancy, the U.S. Environmental Protection Agency, Napa County Public Works and the citizens of Napa County through Measure A Watershed Improvement Funds.

**Keywords:** Fish Passage Barrier, River Restoration, Watershed Management

**Poster Topic:** The Napa River: Working Together to Build a Resilient Watershed and a Living River

## Beavers: Nature's Engineers at Work in the Napa River Watershed

Leigh Sharp, Napa County Resource Conservation District, leigh@naparcd.org

Shaun Horne, Napa County Flood Control and Water Conservation District,  
shaun.horne@countyofnapa.org

Leif Bryant, Napa County Flood Control and Water Conservation District, leif.bryant@countyofnapa.org

A series of major land use changes beginning with Euro-American settlement has had significant influence on the Napa River ecosystem that is present today. Increased inputs of water relative to the inputs of coarse sediment has contributed to incision of the mainstem and its tributaries and has resulted in abandoned floodplains, a simplified river morphology, and a decline in complex habitat and water quality. It has long been recognized that opportunities exist in the watershed to improve the overall ecological health of the river system, and in 2012, the San Francisco Estuary Institute recommended that beaver populations be restored to build low dams that trap fine sediment, restore riparian communities, reverse incision, and increase overall river ecosystem complexity. Beavers were known to exist in the Napa River in 2012, but in recent years there has been a noticeable increase in beaver activity along the Napa River and within tributaries throughout Napa County. The Napa County Flood Control District has been mapping and monitoring beaver activity in several tributaries and along the Napa River. In the City of Napa there are about 14-20 dams, 3-5 lodges or bank dens, and at least 15-20 beavers that have been identified. Throughout the County the number of dams, lodges or bank dens, and individuals is likely much larger but seems to fluctuate from year to year. Beaver dams and lodges in the tributaries seem to persist from year to year, and during large rain events most of the dams within these tributaries break up and are quickly re-built once stream flow recedes. Current observations indicate that beaver dams are promoting complex habitat for small mammals and contributing to the establishment of new vegetation. Long-term monitoring will help identify how large the beaver population is and how they are influencing watershed processes and functions.

**Keywords:** Beaver, Napa River, Wildlife Habitat, Wildlife,

**Poster Topic:** The Napa River: Working Together to Build a Resilient Watershed and a Living River

## Youth at Work in the Watershed: LandSmart Youth Stewards and Youth Ecology Corps

Frances Knapczyk, Napa County Resource Conservation District, frances@naparcd.org  
Eric McKee, Napa County Resource Conservation District, eric@naparcd.org  
Shaun Horne, Napa County Flood Control and Water Conservation District,  
shaun.horne@countyofnapa.org

Watershed conservation is a community activity; there's a role to play for people of every age group. Two recently established programs, LandSmart Youth Stewards and the Napa County Youth Ecology Corps, are striving to include Napa County's youth in the community of watershed stewards.

Youth Stewards is a project-based, service learning program that connects 5<sup>th</sup> -12<sup>th</sup> graders to environmental processes of their home watershed. Concepts such as human impacts on watershed function, climate change, and engineering come alive when students are given Napa-centric examples.

Class visits introduce students to watershed topics, then students apply the lessons during up to five field days at local open spaces, farms, or school campuses. Students conduct restoration work and environmental investigation during field trips. Planting native vegetation, building erosion control structures, and surveying creeks are just some of the ways students engage with their site. Students explore careers in conservation; professionals work alongside students during field days, discussing academic choices and career pathways. In the 2014-15 school year, classes from seven schools planted over 400 native riparian plants. An American Canyon student summed up the experience: "I love the hands-on real-world work, we are doing and learning."

Youth Ecology Corps is a natural resource workforce that provides training and environmental education to at-risk young adults (18-24). A broad coalition supports the Corps by providing restoration projects at which the Corps work, as well as exposing Corps members to a breadth of careers that interface with conservation. Corps crews work on invasive plant management and litter abatement on the Napa River Flood Protection Project, St. Helena Flood Protection Project, Napa River Restoration Projects and on the County's Stream Maintenance Program. Crew members gain valuable training in natural resource management, plant identification, trail maintenance, invasive management. Graduates may enroll in one year of continued employment and training in the CCC.

**Keywords:** environmental education, youth at-risk, stewardship, workforce training, restoration, students service

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## Napa River Sediment TMDL Monitoring Program: Pilot Implementation

Glen Leverich, Stillwater Sciences, glen@stillwatersci.com

A.J. Keith, Stillwater Sciences, aj@stillwatersci.com

Peter Baker, Stillwater Sciences, peter@stillwatersci.com

Jonathan Koehler, Napa County Resource Conservation District, jonathan@naparcd.org

Scott Dusterhoff, San Francisco Estuary Institute, scottd@sfei.org

Bruce Orr, Stillwater Sciences, bruce@stillwatersci.com

The 2009 Napa River Sediment TMDL and Habitat Enhancement Plan outlines an approach for addressing the primary factors determined to be affecting steelhead and salmon populations and establishes a plan to improve overall stream habitat conditions throughout the watershed. It establishes numeric targets for inter-gravel streambed permeability and channel bed-scour values associated with successful salmonid spawning and survival-to-emergence, to be measured throughout the Napa River watershed during a long-term monitoring effort. The monitoring approach and methods are described in a Monitoring Plan, approved by the Water Board in 2012. Here we describe the methods and results of an initial pilot monitoring effort, which was implemented during the 2012–2013 winter high flow season to: (1) test the sampling design outlined in the Monitoring Plan, (2) ascertain whether numeric targets are being met with a high level of statistical confidence, and (3) provide information and recommendations to adjust the design if necessary using an adaptive management approach. Analysis of the pilot gravel permeability data indicated that the sample size of 18 samples per reach was sufficient to statistically distinguish the reach-aggregated values from the TMDL target, particularly when assessing non-compliance. Permeability was unaffected by discharge or sample timing. The ability to assess statistical significance of inter-reach bed scour and bed texture was limited due to poor recovery of scour chains and the low number of pebble-count sites, respectively. A modified field method and increased sample size were recommended to improve scour-chain recovery. Power analysis indicated that 21 pebble-count sample sites per reach would be necessary to confirm a relative difference of 10% in the geometric means with 95% confidence and 80% power. Overall, the TMDL-recommended monitoring frequency of 2–5 years for approximately 10–20 years was supported by the outcomes of the pilot study.

**Keywords:** TMDL, fine sediment, monitoring, permeability, spawning gravel

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## Napa County Dry-Weather Storm Drain Outfall Assessment

Paul Blank, Napa County Resource Conservation District, paul@naparcd.org  
Jonathan Koehler, Napa County Resource Conservation District, jonathan@naparcd.org  
Jamison Crosby, Napa Countywide Stormwater Pollution Prevention Program,  
jamison.crosby@countyofnapa.org

Municipal storm drain outfalls are identified as non-point discharge sources that may contribute to declines in water quality throughout the State. As such, municipalities across the State are required to monitor and control illicit discharges from storm drains. In 2014, the Napa County Resource Conservation District conducted a county-wide dry-weather assessment of municipal storm drain outfalls on behalf of the Napa Countywide Stormwater Pollution Prevention Program (NCSPPP). The purpose of the assessment was to identify and curtail illicit discharges in each Napa County jurisdiction by assessing every outfall, sampling and analyzing dry-season flow when encountered, and investigating the source of the flow if action level concentrations were exceeded. In total, 304 outfalls were assessed. 87% of outfalls were in normal structural condition, 8% showed signs of structural damage, and 5% could not be assessed for maintenance condition due to heavy overgrowth of vegetation. Related to discharges, approximately 11% (34) of the outfalls were found to be discharging water and only 0.6% (2) of those were found to represent potential pollution concerns. Corrective action was taken at one site and the source of discharge at the other site was determined to be shallow riverside groundwater including brackish tidal water of the adjacent river. The results of the assessment will be used by NCSPPP to identify priority outfalls and establish a dry-weather flow monitoring program.

**Keywords:** water quality, outfall, stormwater

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