Planning for Resiliency: Water Conservation and Flow Monitoring in Redwood Creek, South Fork Eel River

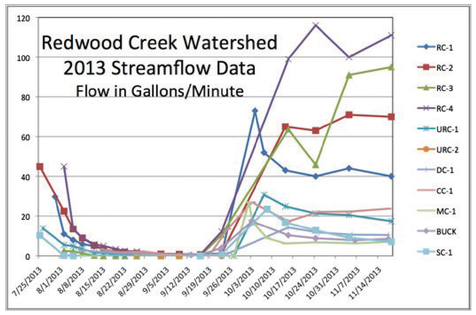
Background

The South Fork of the Eel River is a crucial link for the survival and recovery of coho salmon in California. Coho are listed as a threatened species under the federal and California Endangered Species Acts, and the South Fork Eel River population is key to recovering the North Coast and Southern Oregon Evolutionary Significant Unit (ESU). Historically, the Eel River had supported the third largest salmon runs in the state, and the South Fork of the Eel provided the ideal habitat conditions that made it home to the largest coho salmon runs in the entire 3,684 square mile watershed (Yoshiyama & Moyle 2012). Today, the sub-watersheds of the basin suffer from the legacy impacts of industrial logging, extensive road networks, rural subdivisions, and the cumulative impacts of water diversions. Creeks that once supported thriving salmon populations are now intermittent or completely dry by the end of summer. These impacts are compounded by the effects of a changing climate. In 2013, Humboldt County experienced the driest spring season in the historic record, leading to even more perilously low flow conditions for juvenile coho and steelhead. While climatologists predict that changes in global climate will continue to manifest in unexpected ways in the Pacific Northwest, longer dry seasons (i.e. months without rainfall) are an impact already being felt in Northern California, which can result in reduced water quality and quantity for increased periods of time.

Restoring the South Fork Eel River is key to the recovery of coho salmon. Flows in the SF Eel are as low as they were in the historic 1977 drought. photo: www.facebook.com/countylinewild

The Redwood Creek Water Conservation Project

Early in 2013, Sanctuary Forest and Salmonid Restoration Federation (SRF) initiated a study to determine the feasibility of conducting a "technology transfer" of Sanctuary Forest's Mattole headwaters voluntary water storage and forbearance program to Redwood Creek on the South Fork Eel River. Redwood Creek is a 26 square mile watershed that had historically supported strong runs of coho salmon, Chinook, and steelhead. The Redwood Creek Water Conservation Project is a collaborative, multi-stakeholder response to California's ongoing and extreme drought, and was designed to empower local residents to become responsible water users and to encourage participation in a coordinated approach becoming more resilient individually and as a community. In the first phases of the feasibility study for the project, public outreach was conducted and low flow studies were initiated. Quantitative and qualitative data were collected to inform the type of water conservation program that would be appropriate and acceptable to residents and be most effective in increasing streamflows in the watershed. The study is still ongoing, but the findings thus far have indicated that many residents are eager to voluntarily change their water use, and that education and outreach are needed to inform residents of the various methods and opportunities for reducing their water footprints.



The graph above shows the flows in the various Redwood Creek monitoring sites. Between early August and the middle of September most of the streams in the Redwood Creek watershed became intermittent. Most pools were either much lower or completely dry.

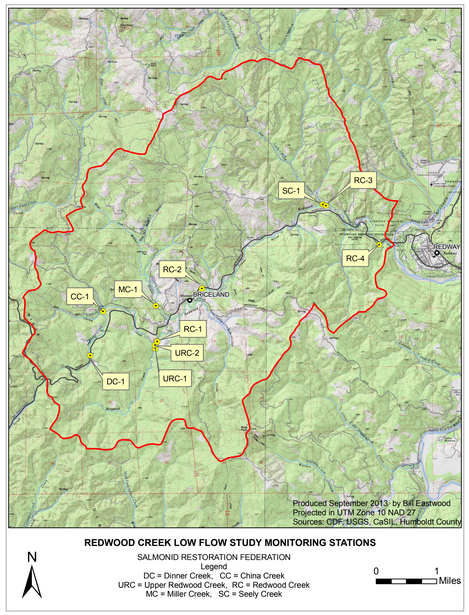
It was fascinating to monitor the response of the dry to almost dry streams after one inch of rain on September 20–21 and three inches of rain September 28–29. It seems clear that the ground water recharge situation in various parts of the watershed is highly variable.

The larger September 28–29 storm reestablished connectivity in all the streams in the watershed. The increase in pool volume was incredible. Unfortunately there were also some reaches that had dried up completely where there were no surviving fish to enjoy the newly filled pools. Interestingly, the flows after this storm maintained their flows very well, even though it didn't rain again for more than six weeks. Some of the streams actually increased flow during this period. Besides decreasing water usage by plants and people, some of the increased flow or slowed decrease in flow comes from slow moving ground water from the storms finally reaching streams. by Bill Eastwood

Technology Transfer Guide Developed for Watershed Stakeholders

Sanctuary Forest's voluntary water conservation model and the subsequent feasibility study for the Redwood Creek Water Conservation Project have been translated into a step-by-step guide for watershed stakeholders, in the hopes that what we have learned can be taken and applied in other locations on the North Coast.

Resilience in a Time of Drought: A Transferable Model for Collective Action in North Coast Watersheds is a practical guide for community members, restoration practitioners, non-profits, and other stakeholders on how to transfer successful water conservation practices and technologies from one setting to another while accounting for the unique social and ecological variables that exist in every watershed. The steps outlined in the guide are meant to be applied in watersheds where a rural population is dependent on a local watercourse for their agricultural and household needs, and where changing human use has the potential to increase streamflows. The guide is available for download on the SRF website at *http://www.calsalmon.org*.



Redwood Creek Flow Studies Initiated in 2013

Gathering baseline flow data and increasing instream flows are key recovery actions for endangered coho salmon, and are a necessary step in understanding if and how changing human use will make a difference. The Redwood Creek flow study began in July, where some of the 11 monitoring sites were running at 44 gallons per minute. Six weeks later, all of the monitoring sites were flowing at less than one gallon per minute, where pumping at a conservative rate of one gallon per minute can instantly dewater a creek that provides fish habitat. At all of sites, trained monitors observed stranded coho salmon and juvenile steelhead that were isolated in pools. These pools visibly decreased in volume each week, translating to higher temperatures in shallow waters that are lethal for coho salmon. The initial rains in September greatly increased flows and helped with connectivity, yet many juvenile salmonids did not survive the 2013 low flow season. Protecting quality rearing habitat is essential for the continued viability of this population.

Next Steps for Redwood Creek

SRF emphasizes a place-based approach when developing a collaborative streamflow improvement strategy for North Coast watersheds. Such a strategy: a) puts a high value on local and inter-generational knowledge-sharing and participation; b) emphasizes the intrinsic value of non-human creatures indigenous to the watershed (particularly of native salmon); and c) is motivated by a desire to improve the landscape for the benefit and enjoyment of future generations. Under the right circumstances, place-based collaborative restoration can provide an effective framework for encouraging local citizens to become active participants and caretakers of the places that they call home.

Geologist Bill Eastwood, Redwood Creek stream monitor, and Sara Schremmer, SRF, at a monitoring site where the summer flow trickles through a culvert designed for massive storm events. photo: Dana Stolzman

A water conservation program in Redwood Creek will likely look fundamentally different from the program that was established in the Mattole due to current availability of grant funding, differences in basic geology and hydrology of the watershed, and varying human water use practices. SRF is exploring several options that would benefit landowners and help improve flows, including a low-interest loan fund for purchasing water storage, voluntary forbearance in the summer months to ensure adequate flows in the tributaries, and working with Humboldt County Supervisors to remove economic barriers to participation. Incentivizing water storage and community engagement are essential to the success of this Redwood Creek water conservation effort.

Miller Creek, a tributary of Redwood Creek, had juvenile salmonids earlier in the 2013 season and then became disconnected with juvenile survival unknown. Most of the Redwood Creek tributaries were running at less than one gallon per minute by early August of last year. Flows are expected to be more lethal this year. photo: Bill Eastwood

Summer 2014 Water Conservation Efforts

1. Continue low Flow monitoring in Redwood Creek, South Fork Eel River
2. Educate landowners and residents about water rights and the Emergency Tank Registration Program
3. Develop water conservation projects
4. Create and site tributary signs to show the weekly flow levels
5. Conduct media outreach via radio, newspapers, and social media
6. 6) Provide support to landowners to improve water conservation techniques and offer assistance in filing riparian and appropriative rights

Salmonid Restoration Federation
www.calsalmon.org
water@calsalmon.org
707/923-7501