

Stream Level: Steelhead Populations as Indicators of High Functioning Stream Habitats

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The Napa River has been designated as an anchor watershed for steelhead (*Oncorhynchus mykiss*) in the San Francisco Bay Area. Excepting the Sacramento/San Joaquin River system, the Napa River has more than twice the number of stream miles accessible to steelhead than any other stream draining directly to the San Francisco Estuary. Recently completed and ongoing habitat restoration efforts aim to improve conditions for steelhead and other native fishes within the watershed. In order to track ecological responses to these restoration efforts, and to collect current information on steelhead population trends and life history details, the Napa County Resource Conservation District (RCD) and our partners have been conducting outmigrant monitoring with a rotary screw trap in the Napa River for the past five years (2009-2013). During this period we have observed relatively consistent steelhead smolt catch rates, with a five-year average of 2.1 smolts captured per day of operation. Steelhead smolt size, commonly used as an indicator of physiological condition, has been relatively large with an average fork length of 189mm (std. dev. ± 24 mm), despite significant variation in precipitation patterns between sampling years. Steelhead outmigration from the Napa River appears to peak consistently in early April with increased activity during storm flows. Steelhead spawning occurs from January through May and appears to peak in early March in most years. To explore movement patterns and residence times of steelhead in the Napa River watershed, RCD initiated a PIT tagging program in 2013. A stationary PIT tag antenna was installed in the lower Napa River to detect smolts tagged from upstream tributaries as well as returning adults in future years. We PIT tagged 59 steelhead smolts in 2013, and aim to tag 80-90% of future captures. RCD plans to continue this monitoring indefinitely, and annual reports are available at www.naparcd.org.

Keywords: Monitoring, Assessment, Aquatic, Fish, Indicator, PIT, Smolt, Steelhead

Session Title: Scaling up to Sustainable Watershed Management

Speaker Biography: Jonathan Koehler has been with the Napa County RCD since 2001 where his work has focused on issues combining aquatic ecology and geomorphic processes within the Napa River watershed. He currently oversees the RCD's fisheries monitoring program, which includes outmigrant trapping, spawner surveys, and snorkeling. A Bay Area native, Jonathan has a Master's degree in Biology from Cal State University East Bay.

Reach Level: The Case for Reach-Scale Restoration and Habitat Enhancement

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Surveys of San Francisco Estuary tributaries over more than 50 years have provided extensive information about the distribution of the region's cold water habitat. These areas capable of supporting native fish assemblages are recognized widely as valuable resources deserving protection and improvement through water quality regulation, limitations on nearby land use and funding support for restoration projects in riverine/riparian corridors. The Endangered Species Act listing of steelhead trout has further increased incentives to understand and appropriately manage the Bay Area's stream networks.

Recent and proposed outmigrant trapping studies in important streams around the Bay are allowing researchers to gauge key steelhead population characteristics (*i.e.*, abundance, productivity, spatial structure and diversity), thereby informing the questions: *Are our streams healthy? In which stream reaches are actions most needed? and What actions will have the greatest effect?* A program can be envisioned that builds on these efforts to: 1) look at previously unexamined streams and 2) generate a regional conservation and rehabilitation plan for aquatic habitat. Such a plan offers the opportunity to apply limited resources efficiently, focus the attention of the restoration community and the interested public, and advance toward attaining water quality and steelhead recovery goals. Addressing intractable issues such as dry season streamflow impairment and channel and bank modifications at the reach scale also would be less controversial than a blanket approach. Finally, tracking these basic traits provides a reliable indicator of watershed health status and trends.

Keywords: Steelhead, Stream Health, Reach Scale, Aquatic Habitat

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Speaker Biography: Gordon Becker is Senior Scientist at CEMAR, where he researches steelhead resources and analyzes restoration opportunities. Gordon prepared steelhead distribution studies for streams tributary to the San Francisco Estuary, the Eel River watershed, and the California coast south of the Golden Gate. He also developed prioritization reports for each of these regions. Recent projects include smolt trapping in Sonoma and Pescadero creeks, and fish passage barrier modifications in six Bay Area watersheds. Gordon studied fisheries science at Cal State East Bay, and holds a master's degree in water resources management from the University of Wisconsin-Madison and a bachelor's from Williams College in Geology and Environmental Studies. Whenever possible, Gordon rafts western rivers.

Reach Level: Watershed Assessment Methods—The Challenges of Assessing Watershed Health

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Watershed health care can be improved by advances in environmental science and technology that support coordinated environmental planning, regulation and management across government agencies at the landscape scale. The concept of ecosystem services is fundamental to the emerging watershed health care system. The central question is about the levels of services that watersheds should provide. Tools are being developed to rectify the target levels of different services by predicting their inter-relationships. These tools will help decide difficult tradeoffs in services within and among watersheds, and help develop resilient landscape designs, best management practices, and inter-agency governance. Watershed-based management of ecosystem services can be incentivized by bundling permits and stacking mitigation credits at the watershed scale. This will require tracking the effects of health care actions, including a common base map of habitat types and the built environment. The California Aquatic Resource Inventory (CARI), statewide vegetation mapping (VegCAMP), digital elevation data, Wildlife Habitat Relationships (WHR), and National Land Cover Dataset (NLCD) are elements of the needed base map. Standardized ways to map health care actions, such as Wetland Tracker and Online 401 tool, are also needed. Some standardized methods for assessing levels of service relative to targets are available through the Surface Water Ambient Monitoring Program (SWAMP) and other statewide monitoring efforts. Tools that forecast likely future conditions, such as Our Coast Our Future and various hydrological models, are needed to assess alternative manage actions. Tools like EcoAtlas and its Landscape Profile Tool can compile environmental data from various sources at user-defined scales of time and space without costly centralized data management. These advances in science and technology should support better coordination across environmental policies and programs to realize more effective watershed health care.

Keywords: Watershed Management, Ecological Health, Watershed Assessment, Climate Change, Watershed Stewardship

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Speaker Biography: Josh Collins is the Chief Scientist at the San Francisco Estuary Institute and Aquatic Science Center, where he coordinates scientific and technological work across programs. Dr. Collins is a landscape ecologist with special expertise in stream and wetland ecosystems. He received his Doctorate in Entomological Sciences at UC Berkeley and did post-doctoral studies in Geography and Ecology at the UC Berkeley and UC Davis. As an ecologist in the public utilities industry, Dr. Collins assessed the impacts of power plants on marine, estuarine, and riverine ecosystems. As a consulting ecologist in private practice, he designed restoration projects and developed methods to assess their performance. At SFEI-ASC, Dr. Collins has initiated continuing programs in wetland science, watershed science, historical ecology, and GIS. He has led efforts to set long range ecological goals in multiple regions and has developed environmental monitoring and assessment methods for California and the nation.

Watershed Level: Integrating Watershed Assessments in Multi-Objective Projects—San Francisquito Creek

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Because it forms the dividing line between cities and counties on the San Francisco Peninsula, no single agency has significantly altered San Francisquito Creek and it remains one of the only major natural channels in the area. The San Francisquito Creek Joint Powers Authority (SFCJPA.org) is a regional agency created to address the Creek's frequent flooding, preserve its ecological function, and promote recreational opportunities along it.

The SFCJPA is using its understanding of how the hydrology and habitat of the Creek relate to San Francisco Bay in order to make decisions that will shape them both for decades. In making these decisions, we must ask ourselves if we should design a fluvial-tidal interface that restores historic conditions, one that maintains -- for the short term -- existing conditions, or one that can adapt to an environment influenced by climate change that we can model but not reliably predict. In its first capital project to go to construction, the SFCJPA is answering this question by attempting to accomplish all three.

The multi-objective project from San Francisco Bay to Highway 101 is designed to protect against concurrent Creek and tidal 100-year floods with over two feet of Sea Level Rise. This long-term approach to reducing flood risk depends on recreating an outlet for the Creek into Bay marshlands during a high flow and tide. Because this may affect endangered species currently at the site, we are creating new habitat nearby. Perhaps most importantly, this project and plans for an adjacent Bay levee may eventually allow us to fully restore the historic connection between the freshwater Creek and saltwater marsh which would provide the sediment input necessary to ensure the long-term viability of the marshland habitat. The science and policy considerations that inform this project should inform efforts elsewhere around the Bay.

Keywords: Watershed, Integrate Science Policy, Multi-Objective Projects, San Francisquito Creek, Adaptation

Session Title: Scaling up to Sustainable Watershed Management

Speaker Biography: Len Materman is the Executive Director of the San Francisquito Creek Joint Powers Authority, responsible for programs, operations and finances. The SFCJPA plans and implements projects to enhance flood protection, disaster response, ecosystems, and recreational opportunities within a 50-square mile area on the San Francisco Peninsula. Prior to joining the SFCJPA, Len worked at Stanford University; as a consultant to nonprofits, foundations, and the U.S. State Department; and as executive producer of a documentary film broadcast nationally on PBS on Earth Day. During the Clinton Administration, he served as advisor to FEMA Director James Lee Witt and as FEMA's representative on two White House Task Forces. Prior to his work in Washington, Len served as the director of government affairs for UC Berkeley, and he received degrees in political science and biological sciences from UC Davis.