

The Russian River Coho Water Resources Partnership

Dedicated to improving water reliability for fish and people | January 2022



WATER
INSTITUTE
OCCIDENTAL ARTS &
ECOLOGY CENTER



Pioneering positive change through collaboration

Salmon and streamflow in the Russian River watershed

Salmon are a keystone species, inextricably linked to the health of our coastal ecosystems, yet over the past two centuries their populations have experienced devastating declines.

[Central California Coast coho salmon](#) and [steelhead](#) are at a fraction of their historic abundance. Rigorous species recovery efforts, including a conservation hatchery program for Russian River coho salmon, have been underway for decades. This prevented coho from extirpation, but our endangered salmon and threatened steelhead still face a formidable bottleneck—insufficient streamflow.

Flow impairment is a result of the cumulative effects of watershed-scale land use impacts and the intensive withdrawal of surface and ground water by the myriad of water users who inhabit the landscapes surrounding the streams where Russian River salmonids rear. Climate change is compounding the problem, leading to more frequent and severe droughts and an extended dry season. In recent years, low summer, spring, and even winter streamflows have had significant detrimental impacts on rearing salmonid fry, outmigrating smolts, and adults returning to spawn.

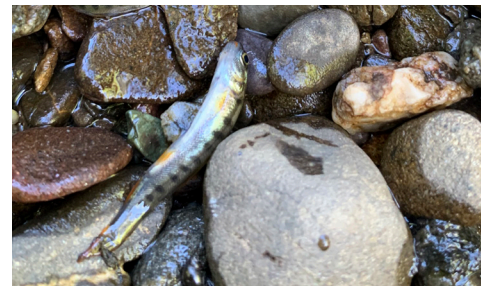
Significant streamflow enhancement efforts must be implemented in order to recover self-sustaining populations of Russian River salmonids. The challenges associated with restoring flow in the face of increasing climate volatility, combined with the sociopolitical complexities surrounding human water use, necessitate a multidisciplinary team dedicated to this endeavor.



Mill Creek July 1, 2015



Mill Creek September 8, 2015



Stranded salmonids

Russian River Coho Water Resources Partnership


In response to this need, a motivated group of watershed restoration practitioners, water rights specialists, and scientists formed the [Russian River Coho Water Resources Partnership](#) (Partnership) in 2009, with funding support from the [National Fish and Wildlife Foundation](#) and [Sonoma Water](#). Our goal is to increase flow in salmon-bearing streams, while improving long-term water security for local communities.

The Partnership unites a wide range of expertise and is comprised of the following organizations:

- » [Trout Unlimited](#)
- » [Gold Ridge Resource Conservation District](#)
- » [Sonoma Resource Conservation District](#)
- » [California Sea Grant](#)
- » [Occidental Arts and Ecology Center's WATER Institute](#)

Working collaboratively within dynamic and complex systems for over a decade has allowed us to develop the enduring relationships, innovative approaches, and adaptive strategies needed to effectively reduce anthropogenic impacts to streamflow and increase water reliability for our community members.



A person wearing a red and white plaid shirt, tan waders, and black rubber boots stands in a shallow, rocky stream. The stream is surrounded by a dense forest with tall trees and lush green foliage. Sunlight filters through the canopy, creating dappled light on the water and rocks. The water is clear, showing the rocky bottom and some fallen leaves. The person is looking down at the stream, possibly studying the water flow or the habitat.

“Conservation projects implemented by NFWF’s Russian River Coho Water Resources Partnership create win-win scenarios because they generate benefits not just for fish and wildlife, but also for local communities and economies.”

Jeff Trandahl, Executive Director and CEO
National Fish and Wildlife Foundation

Partnership hydrologists have been studying summer streamflow in Russian River streams for over a decade.

Building watershed resilience through science and action



“Partnership support has provided me with a firm foundation on which to build my work in the focus watersheds. The talented people in this group are very knowledgeable about local watersheds and have shared their observations, monitoring outcomes and recommendations, patiently answered my questions, and acted as a vital link to landowners. Partnership members serving on our advisory team contribute much-needed skills in the area of water transactions and hydrology, and provide maps and data to help inform habitat and flow restoration projects.”

Mary Olswang
North Coast Salmon Project Coordinator
CA Department of Fish & Wildlife

Flow and fish monitoring

The Partnership operates the largest network of streamflow gages within the Russian River watershed, with over 30 measurement sites—some dating back more than a decade.

These hydrologic data fill a critical gap and are relied upon by many scientists and resource managers to understand streamflow status and trends, identify areas of relative flow impairment and refugia, guide the prioritization of flow enhancement work and other recovery actions, inform patterns in salmon movement and behavior, support specialized research and modeling efforts, and document the effects of flow improvement efforts. We also monitor groundwater conditions to characterize site-specific hydrologic dynamics and inform flow restoration efforts.

As part of multiple, ongoing salmonid recovery efforts, Partnership organizations have also been documenting salmonid distribution, abundance, survival, and habitat conditions in Russian River streams for nearly two decades. We use biological and environmental datasets to identify key limiting factors to local salmon populations in order to inform species recovery actions, as well as to evaluate status, trends, and restoration project effectiveness.

Our long-term datasets provide valuable information about how streamflow and salmonids are responding to changing climatic conditions and extreme weather-related events like wildfire and drought. They also help us to predict and prepare for future drought.

Top: A Partnership biologist releases juvenile coho salmon into a stream study reach. Bottom: Researchers sampling fish for a Partnership study of survival, growth and movement.





Streamflow and habitat enhancement

The Partnership is primarily focused on remediating the impacts of direct and indirect water diversions on surface flow, and addressing upland drainage issues. Streamflow is increased through the cumulative benefits of multiple projects concentrated in high-priority watersheds.

We work directly with landowners to implement water conservation measures, develop alternative water sources, complete water storage projects, shift the timing of diversion from the dry season to the rainy season, facilitate flow augmentations, and implement upland projects to reduce runoff and increase groundwater recharge. Our team navigates the water rights and permitting processes for all relevant projects.

Cumulatively, the dozens of storage and forbearance projects implemented by the Partnership are estimated to save nearly 7,000,000 gallons of water in five high-priority salmon streams each summer. In addition, Partnership-supported flow releases collectively contribute over one cubic foot per second (cfs) to summer streamflow. These are substantial contributions to streams that have average summer baseflows of only around 0.15 cfs, with some sections commonly dropping to zero flow during dry years. Monitoring data provide empirical evidence that many Partnership projects have directly improved instream flow and habitat connectivity, increasing the probability of survival for rearing salmon and steelhead.

The Coho Partnership has one of the most robust streamflow programs in the state. Our team members also implement a wide array of instream fish [habitat enhancement](#) projects, such as large wood structure installation, [fish passage barrier remediation](#), and [on-channel dam removal](#). See the [projects page](#) of our website for highlights.

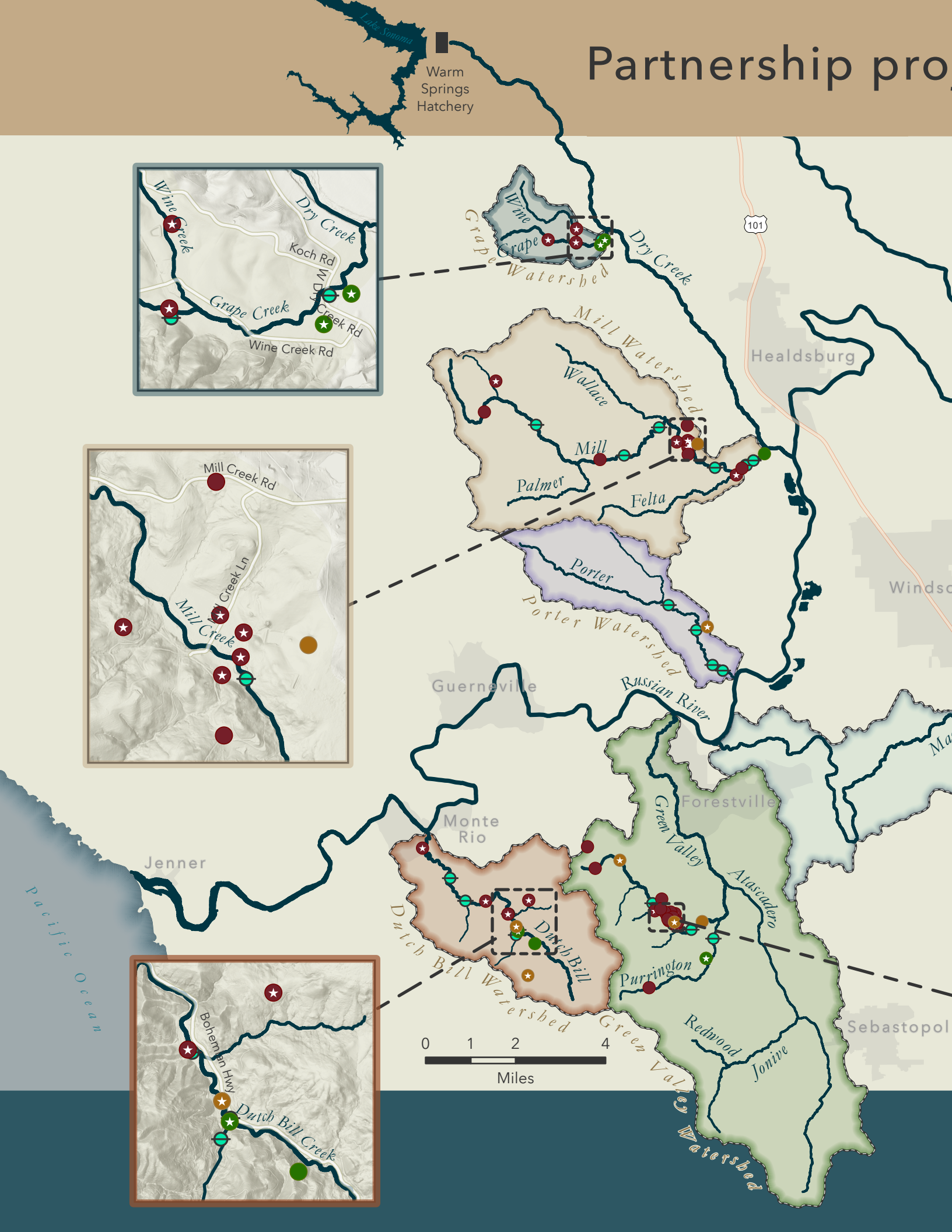
Dutch Bill Creek Water Conservation & Storage Project

The [Dutch Bill Creek Water Conservation & Storage Project](#) shifted the timing of water diversion from summer to winter and provided 175,000 gallons of water storage for a camp and conference center. By pairing this with water conservation measures, we were able to reduce the camp's water demand by over 80%, reduce the rate of diversion by 99%, and return millions of gallons of water to the stream each summer.

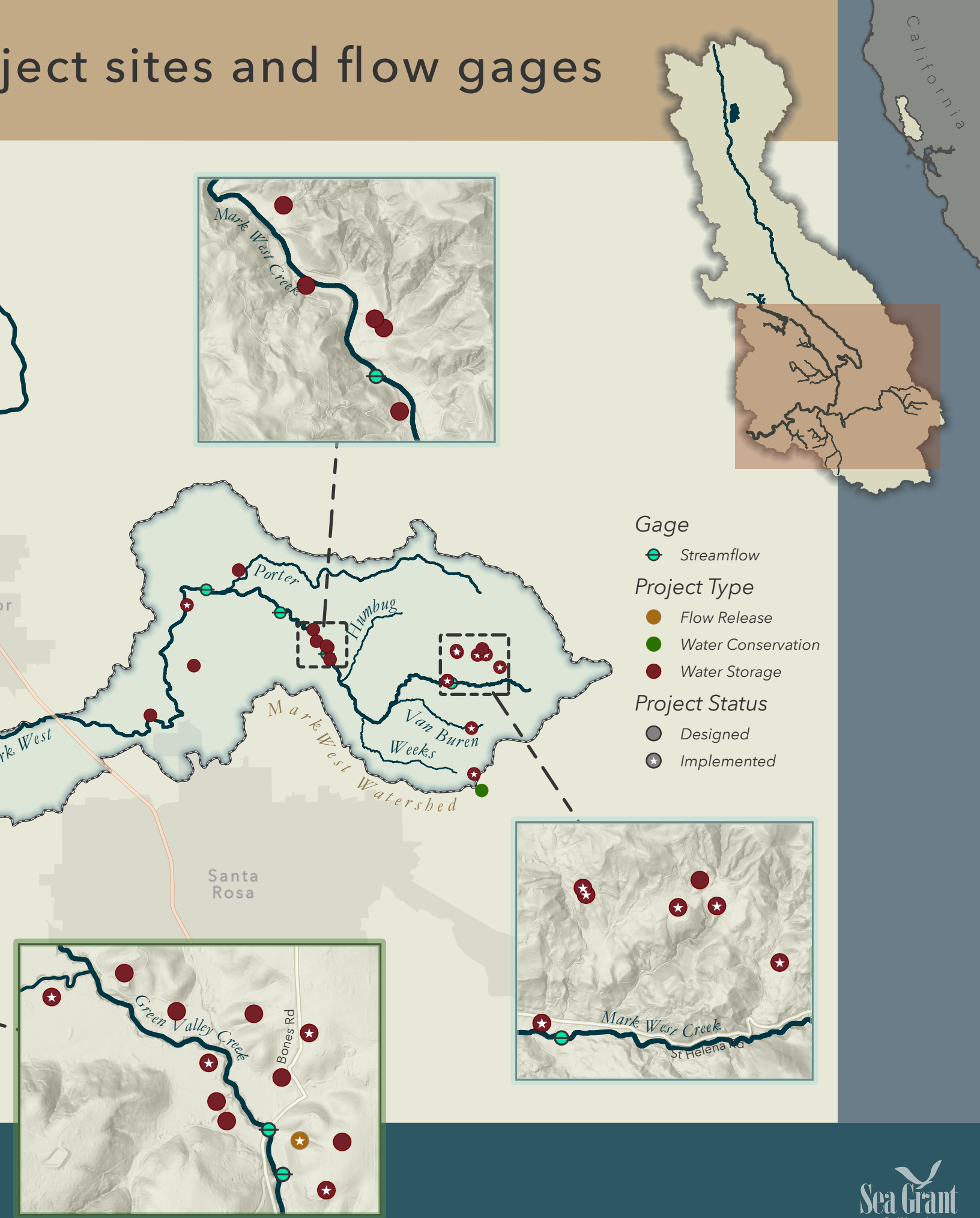
Top: A 30,000-gallon water storage system complete with solar power and educational signage at Westside Elementary School near Felta Creek. Bottom: One of the water tanks constructed as part of the Dutch Bill Creek Water Conservation and Storage Project.



Partnership pro



Project sites and flow gages



“The rigorous science and cutting-edge research methods used by the Partnership have been extremely effective in filling critical knowledge gaps and informing solutions to species recovery. Their collaborative, science-based approach to addressing the needs of the fish and of the community serves a model for others working to restore salmon and steelhead populations in California and beyond.”

Ted Grantham, PhD
Assistant Cooperative Extension
Specialist, Department of Environmental Science,
Policy, and Management at UC Berkeley



Scientific studies and publications

Research conducted and supported by the Partnership has broadened our understanding of the impacts of flow impairment on rearing and outmigrating salmonids, the effects of flow augmentations, the minimum flow needs of juvenile salmon, and key factors influencing their behavior, growth, and survival. Much of this work has been encapsulated in [peer-reviewed journal articles](#) and disseminated broadly, thus contributing to our collective scientific knowledge of salmon, hydrology, and streamflow restoration throughout coastal California and beyond.

Demonstrating the importance of small amounts of flow for fish

In a world where every drop of water is precious, the Partnership set out to determine how much flow is needed for fish to survive the dry season by conducting a long-term study to correlate streamflow and other environmental variables with salmon survival.

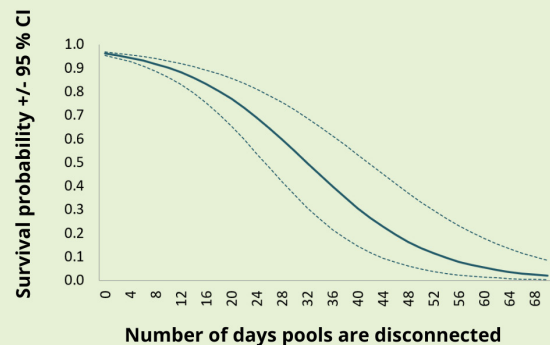
Results highlighted the importance of pool connectivity, and provided evidence that reducing the number of days that pools are disconnected by surface flow in a given summer is a critical step in increasing the probability of fish survival. We also learned that returning just tenths of a cubic foot per second of flow to study streams could have a significant positive impact on juvenile salmon survival.

[Study outcomes](#) helped to create a shift in the mindset of many scientists and funders in recognizing the value of small-scale flow restoration projects for tipping the scales in favor of persistence of salmon in intermittent streams.



Gabe Rossi, U.C. Berkeley

Survival and pool connectivity



Model development

Partnership data have been incorporated into models that relate fish survival to environmental metrics, predict the spatial and temporal extent of stream drying under variable climatic conditions, evaluate the cumulative impacts of water rights, predict outcomes of various flow enhancement project scenarios, and guide restoration project planning and prioritization. The result is a suite of tools that are helping resource managers to plan recovery actions and respond to changing environmental conditions.

Tools and technologies

The Partnership is dedicated to developing and refining tools and technologies to better serve the needs of the flow restoration community; from generating scientific information and guidance documents that answer important questions, to devising cutting-edge project implementation, monitoring, and data-sharing technologies.

Interactive tools

We have created web-based applications to share customizable views of real-time biological and environmental data with dozens of partners working on similar goals across coastal California. One way these tools have been used is to inform fish relocations and other emergency drought actions by agency partners.

Field technologies

We have built specialized field data collection instruments, including PIT-tag fish tracking devices and loggers that identify the onset of stream intermittency in critical locations.

Project innovations

We have replaced irrigation-based vineyard frost protection systems with fans, incorporated solar technology into rainwater catchment systems, custom-designed rainwater tanks to increase catchment capacity, worked with local authorities to address tax disincentives for rainwater catchment, and piloted numerous additional measures to improve project efficiency and resiliency.

Streamflow plans and guidance documents



Our Streamflow Improvement Plans outline flow status, limitations and opportunities, and specific strategies for flow enhancement in four subwatersheds critical to salmon and steelhead recovery within the Russian River basin (Dutch Bill, Green Valley, Mill, and Grape creeks).

Partnership organizations have also authored or contributed to [several useful reference documents](#) that inform a broad array of subjects pertaining to streamflow enhancement work throughout coastal California and beyond, from rainwater harvesting to water rights.

[View the Partnership's Streamflow Improvement plans here.](#)

Top: Cover of the Upper Green Valley Creek Streamflow Improvement Plan.
Below: Vineyard frost protection fan in the Grape Creek watershed.



“The Partnership has redefined how truly useful watershed plans can be to anyone looking to improve aquatic habitat. The SIPs not only document the current conditions and needs of our degraded streams but incorporate evaluations of summer streamflow and the effect on rearing juvenile salmon. These resources could not be more timely for those of us trying to save highly-endangered CCC coho salmon from extinction in watersheds suffering from unprecedented drought impacts.”

Joe Pecharich
Marine Habitat Resource Specialist
NOAA Restoration Center

Investing in community



"I feel so lucky to have worked with the Partnership. There was respect and enthusiasm for my point of view and I learned so much about the stream ecosystem on my property. It has been a rewarding collaboration for me, especially when I tell a friend or neighbor about my experience, knowing they can turn to this important community of diverse skills and helpful science folks when they need it."

Sally Weed
Farmer and Grape Creek landowner



The Partnership collaborates with private landowners throughout the Russian River watershed, and with numerous agency, academic, and NGO partners throughout coastal California. Our diversity of expertise and non-regulatory status allow us to fill a unique role in achieving benefits for the community, imperiled salmonids, and our precious freshwater resources.

Public outreach and education

Through our efforts to conduct research, develop projects, and educate the public, we have communicated with over 10,000 community members via direct outreach and dozens of public meetings.

We have provided extensive community support by responding to pressing needs resulting from wildfire, drought, and other unforeseen events in our region.

We value the enduring relationships we have built and recognize that they are critical to the success of our work. We are committed to generating solutions that benefit both the community and the environment.

Professional support and collaboration

We are dedicated to moving science into action and to sustaining the robust collaborations necessary to preserve and restore our freshwater resources. Partnership organizations provide extensive support for agencies and other professional partners by:

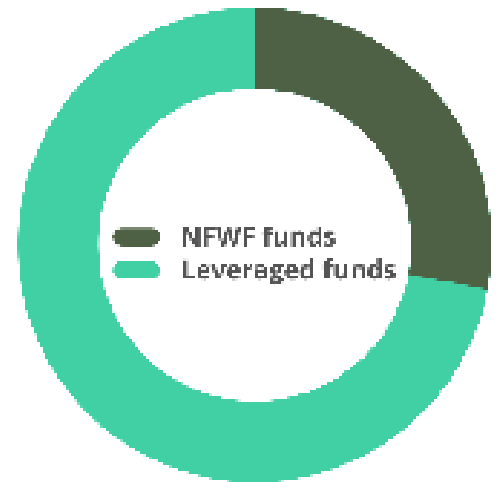
- » Providing technical input on efforts to develop conservation and management plans, assess water resources, guide restoration project prioritization, and improve the permitting process.
- » Disseminating real-time data to inform in-season flow releases, guide the relocation of fish from drying pools, and plan additional adaptive actions.
- » Aiding local agencies with wildfire and drought response.
- » Sharing resources and providing support for other organizations working to achieve similar goals throughout coastal California.

Top: Landowners, like Sally Weed, are essential to the success of programs like the Partnership.
Bottom: Leading a technical tour for The Nature Conservancy and Mendocino RCD.



Scanning juvenile coho salmon for PIT tags and recording unique tag numbers allows biologists to determine growth rates and movement patterns of individual fish.
Photo credit: Joshua Asel

Leveraging resources



The Partnership has relied on grant funding for all of our work. From 2009 through 2022, the National Fish and Wildlife Foundation provided primary financial support for the Partnership, with matching funds from Sonoma Water and additional sources. By working collaboratively, compounding efforts, and maximizing resourcefulness and efficiency, we were able to leverage these funds to nearly quadruple the impact in the watershed.



“Partnership flow enhancement projects have proven to be an effective tool for enhancing drought resilience in some of our most critical coho salmon rearing streams. The Partnership has devised an innovative approach to enhancing streamflow for people and fish, building a long-term, successful collaboration that can serve as a blueprint for future efforts in California.”

David Hines
Senior Environmental Scientist
CA Department of Fish & Wildlife

Off-channel water storage pond constructed in the Grape Creek watershed.

Moving into the future

Programmatic funding has allowed the Partnership to develop an integrative and adaptive approach to improving streamflow and water reliability in the Russian River watershed. Many years of hard work have led to notable gains in scientific knowledge, effective collaborations, and flow enhancement projects, but much remains to be done to restore sufficient streamflow in our watershed and through the region.

Enhancing the resiliency of our stream ecosystems so that the wild and human communities that rely on them have the best possible chance of weathering climate change is more critical than ever before. If California is going to successfully preserve our keystone salmon and our freshwater resources, we need to accelerate the work being done and build on it by engaging in more concerted efforts to restore hydrologic and ecosystem functions at a landscape scale.

The Partnership's dedication to sound science, developing innovative solutions to complex problems, building relationships, and increasing awareness within the community and beyond have positioned us well for continued, future success with this work.





Acknowledgements

The Russian River watershed lies in the ancestral and unceded land of the Pomo, Wappo and Coast Miwok peoples. We acknowledge the deep and enduring connection to this land by these original inhabitants and their descendants, and draw inspiration from their thoughtful stewardship of this space.

We are grateful to the National Fish and Wildlife Foundation and Sonoma Water, who recognized the need for this work, believed in our potential, and provided the financial and structural foundation on which the Partnership was built.

We extend our heartfelt thanks to the private landowners, community members, small businesses, and local organizations who make this effort possible through their enduring support and stewardship.

We would also like to express our gratitude to the many partners below, who contributed funding, participated as members of our Technical Advisory Committee, or otherwise supported our work. We value these partnerships tremendously and acknowledge that our success thus far has been built on these collaborations.



NFWF



Sonoma Water

- » **California Department of Conservation**
- » **California Department of Fish and Wildlife**
- » **California Department of Water Resources**
- » **California Environmental Water Network**
- » **California State Coastal Conservancy**
- » **California Water Boards**
- » **California Wildlife Conservation Board**
- » **CalTrout**
- » **Coast Range Watershed Institute**
- » **ESRI**

- » **Friends of the Mark West Watershed**
- » **Jackson Family Wines**
- » **NOAA Fisheries**
- » **Natural Resource Conservation Service**
- » **O'Connor Environmental, Inc**
- » **Salmonid Restoration Federation**
- » **The Nature Conservancy**
- » **University of California, Berkeley**
- » **US Army Corps of Engineers**
- » **US Fish and Wildlife Service**

We are aware that salmon recovery and ecosystem restoration will only be achieved through the engagement and commitment of all stakeholders, and are grateful to be part of such an amazing and dedicated community.

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