



Photo: Lauren Hammack

Bodega Valley Rainwater Catchment & Alternative Water Supply Program

AG INNOVATIONS NETWORK | DECEMBER 2013

Project Summary

The Mediterranean climate of central and northern California, with its rainy winters and dry summers, creates water supply challenges for both humans and wildlife. The agricultural and rural residential Bodega Valley, in coastal Sonoma County, is a case in point. It is a water scarce area, both for groundwater and surface water. All water extractions likely affect the flow of Salmon Creek, which runs through Bodega Valley, either directly or indirectly through cumulative impacts. This is documented in the June 2010 [Salmon Creek Water Conservation Plan](#). Fish need water to survive, and often there is not sufficient water in Salmon Creek during the summer to keep the young salmon alive or thriving. Therefore, a goal of the Conservation Plan is to increase streamflow during the summer low flow period to help support the survival of the endangered coho salmon in the watershed. One solution, proposed by a 2006 study on impacts to salmon survival in the Salmon Creek Estuary, was to help restore summer streamflow by developing alternative water sources and storage for agriculture and community needs. The community of Bodega and neighboring ranches provided an ideal opportunity to concentrate community planning and project implementation efforts to demonstrate the potential of roofwater harvesting systems to meet water supply needs. The Bodega Valley Rainwater Catchment & Alternative Water Supply Program is an example of a multi-pronged, community-based program to provide enhanced water security for residents and help restore streamflows.

Location

Bodega, Bodega Valley, Salmon Creek Watershed, Sonoma County, California

Partners

- Salmon Creek Watershed Council
- Prunuske Chatham, Inc
- Occidental Arts and Ecology Center
- Bodega Land Trust
- University of California Cooperative Extension
- Gold Ridge Resource Conservation District
- Private landowners

Funding

- State Coastal Conservancy
- American Recovery and Reinvestment Act funds through the National Oceanic and Atmospheric Administration (NOAA) Restoration Center
- Private and community funds
- North Coast Integrated Regional Water Management Plan
- California Department of Fish and Game (now the California Department of Fish and Wildlife)

Project Background

Bodega is located in the Salmon Creek Watershed. Brock Dolman, of Occidental Arts and Ecology Center (OAEC), refers to the watershed and its residents as a “basin of relations,” meaning that all components within the watershed are interconnected.

In the 1990s, residents began educating themselves about creek health and water sustainability. A group of concerned citizens congregated

to form the citizen-based **Salmon Creek Watershed Council**. Noting the disappearance of the salmon populations in the creek, the Watershed Council, in partnership with Prunuske Chatham, Inc. (PCI), OAEC, and Gold Ridge Resource Conservation District (GRRCD), sought to investigate the reasons for this occurrence.

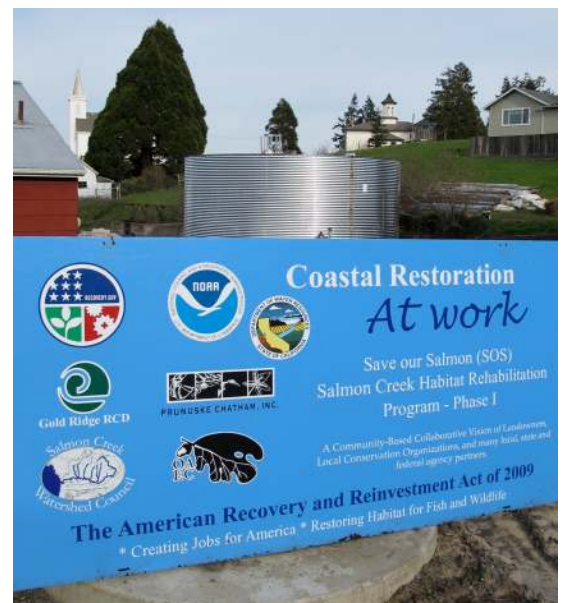
In 2004, the State Coastal Conservancy funded OAEC and the Watershed Council to do a **study** on the Salmon Creek Estuary with enhancement recommendations. PCI was hired as a consultant, bringing geomorphologist Lauren Hammack to the project. As a result of Salmon Creek Estuary study and others conducted in the watershed, key relationships began to form between Lauren Hammack, Brock Dolman, GRRCD, Watershed Council members, landowners, and watershed residents.

One key observation stemming from the estuary study was the effect of low stream flows, especially during the dry season, on fish habitat conditions. This prompted the study contributors to look upstream for water diversions and opportunities to reduce water users' summer streamflow diversions. It turned out that the town of Bodega and its neighboring agricultural producers are a concentration of these summer streamflow users. The study recommended an increase in off-stream storage capacity, a reduced reliance on instream diversions during summer months, and encouraged conservation. It also recommended education and outreach programs as an effective way to inform citizens about managing their water use. It was found that "...opportunities for synergy and cooperation among the many active groups in the watershed abound." Active groups ripe for cooperation included the Salmon Creek Watershed Council, the Occidental Arts and Ecology Center, and the Bodega Land Trust.

Community Factors

Water has always been an issue in the Salmon Creek watershed. It is a water scarce area with very limited groundwater sources. The limited supplies and high water rates have encouraged citizens to be aware and protective of their supply. Concurrently, the importance of Salmon Creek for the endangered coho salmon and for steelhead trout was growing within the regulatory agencies' awareness. The simultaneous effect of economic, regulatory and environmental pressures spurred the community and the Watershed to action. The village of Bodega became a focus area for a water conservation program.

The town of Bodega is served by the Bodega Water Company, whose primary water source is a shallow gallery well that was deemed by the State Water Resources Control Board to be pulling from the underflow of Salmon Creek. A neighboring dairy and a cattle operation are also supplied by similar shallow gallery wells. Other residents draw water directly from Salmon Creek to irrigate gardens or water livestock and horses. It is estimated that these wells and



TOP TO BOTTOM: Gilardi Ranch, Bodega Valley; project signage; community outreach. Photos courtesy of John Green, Gold Ridge Resource Conservation District and Brock Dolman, Occidental Arts and Ecology Center.

diversions remove up to 14,000 gallons of water per day from the stream. During summer drought conditions this volume of water can make the difference between the young salmon surviving or dying. Based on this, both the California Department of Fish and Wildlife and NOAA Fisheries have been interested in helping the community make efforts to improve streamflow through the development of alternative water supplies.

Community Outreach

The Watershed Council and collaborating organizations began hosting public meetings in the early 2000s to share information with residents about the state of the watershed, its salmon populations, and what could be done to protect and improve both. In late 2009 and the spring of 2010, OAEC's Water Institute conducted two workshops and associated tours on alternative water supply and conservation practices. The first workshop focused on rainwater catchment systems and included a tour of a nearby catchment system on a residential property. The second workshop focused on water conservation strategies, including stormwater management and roofwater harvesting. These meetings, tours, and workshops raised local awareness about the issues facing the watershed and the salmon, the severity of the water scarcity issue, and possible solutions to the problem.

A slide presentation demonstrating the benefits of roofwater harvesting was held at the Bodega Fire Hall. This outreach event coincided with the fire department's fundraising effort for a new building. Inspired, the Bodega Volunteer Fire Department added a roofwater harvesting tank to their fundraising drive. Local ranchers also attended the presentations, and several soon gained interest in installing rainwater catchment systems on their land.

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Water Stewardship Practices

Stormwater retention: roofwater harvesting, off-channel ponds, and storage tanks.

Alternative water supply approaches that collect and store the abundant rainy-season water for use in the dry season include roofwater harvesting systems, off-channel ponds, and storage tanks. Rainwater catchment is used world-wide for water supply. Rainwater catchment systems catch and store water for later use before it reaches stream networks or sinks into the ground. In the US, rainwater catchment provides water for outdoor, non-potable purposes (such as water for livestock, landscaping, small-scale crops and gardens), replacing water extracted from creeks and aquifers. In California, roofwater harvesting systems and some off-channel ponds that capture rainwater do not require water rights. Storage systems that take water out of the streams during the rainy season and store it for use during the dry season do require water rights.

Applications

Several alternative water supply projects have been implemented in Bodega or are in the process of design and construction. They include:

1. Gilardi Ranch

The Gilardi Ranch is a replacement dairy cow ranch that runs 140 heifers. A roofwater harvesting system was designed to collect and store enough water to meet summer livestock watering needs (6 months) and provide landscape irrigation. The project replaces a shallow gallery well adjacent to Salmon Creek.

The project consisted of three main components:

- Rainwater collection and conveyance system
- 235,000-gallon underground water storage tank
- Expanded water distribution system for livestock watering

Rainwater is collected on the roofs of three ranch buildings, with a combined surface area of 15,075 square feet. Roof runoff flows into gutters and a series of downspouts, and into underground pipes that feed into

the underground tank. The pioneering 235,000-gallon underground storage system, constructed out of potable-grade plastic pipe designed and fabricated by Contech Construction Products, was installed in fall 2010.

Project Challenges

- Addressing groundwater conditions and drainage in the design.
- Backfilling between pipe rows during installation without affecting their shape and position.
- The initial plastic welding work did not seal the tank, which resulted in tank leaks and a loss of the collected water.

All of these challenges were overcome and the system is performing well. There has been sufficient water in the tank to supply the ranch with non-potable water, and water from Salmon Creek is no longer being used in ranch operations.

2. Bodega Volunteer Fire Department

The Bodega Volunteer Fire Department had no independent water source for fire fighting or training, and had to rely on the limited Bodega Water Company system as a water source. During the summer months, the fire department relied on using treated water for emergency uses. In the event of a large fire, they could completely drain the community water system. A 35,000-gallon roofwater harvesting system and storage tank were installed at the new firehouse for fire fighting, training, and community emergency uses. This independent water supply reduces demand from the community water supply system and the creek, and provides an additional measure of water security for the town.

3. Private Projects

Seven roofwater harvesting systems were installed at residential properties in Bodega in 2010. The size of these projects range from 9,000 gallons to 35,000 gallons. Another five systems are currently under design and are expected to be constructed in 2014. The total water storage and savings from these residential systems is approximately 210,000 gallons. These systems replace non-potable water demands that were supplied by either Bodega Water Company or in-stream pumps.

4. Hughes Dairy

The Hughes Dairy is an active organic dairy across the creek from the Gilardi Ranch. A roofwater harvesting system is designed that collects 1.4 million gallons of water from the loafing and hay storage barns and stores the water in a pond. This pond will have a floating cover that reduces evaporation losses and helps maintain water quality. Stored water will be used for dairy operations that use non-potable water, and replace summer extractions from a shallow gallery well and Salmon Creek.



TOP TO BOTTOM: Gilardi Ranch catchment installation; Bodega Volunteer Fire Department storage tank; private residence roofwater harvesting system. Photos courtesy of Lauren Hammack, Prunuske Chatham, Inc. and John Green, Gold Ridge Resource Conservation District.

5. Bodega Water Company

The Bodega Water Company is in the process of designing a large water storage tank that will provide the community's water supply needs during the late summer and early fall dry period. The tank is expected to hold 1.5 to 2 million gallons and will be filled in the winter from their shallow gallery well.

Permitting Requirements

Water storage construction projects require adhering to city, county, and state permitting requirements. The Sonoma County Permit & Resource Management Department required projects to acquire building permits and comply with requirements for above-ground tanks of more than 5,000 gallons, including the associated grading of the tanks. Additionally, because Bodega is within a designated historic district, any new project must be compatible with special requirements to preserve the historic integrity of the town of Bodega. Water rights permits may be needed for projects that store water from a stream or shallow well. Roofwater harvesting systems are not subject to water rights restrictions in California, however each state has different laws governing the collection and use of water.

Lessons Learned

The success of the Bodega Valley Rainwater Catchment and Alternative Water Supply program is a testament to the power of innovative solutions, community building, and the value of effective demonstrations. Lessons learned from the program include:

- Innovative solutions require an understanding of the habitat, climate, and history that contributed to the initial problems.
- Progressive thinking initiates action, and can move ideas and issues into mainstream consciousness, but a critical mass is necessary to bring efforts to fruition.
- Early efforts and community building are key to obtaining widespread support. In this case,

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education, outreach and guided tours were instrumental in gaining the community's engagement.

- In a community as culturally, politically, and generationally diverse as Bodega, the message needs to be framed properly in order to attract and build the trust of multiple stakeholders.
- Even among diverse stakeholders, people will convene and work together to address issues that have widespread effects, and ultimately come to a positive solution.
- Problems are usually multifaceted. Engaging at multiple scales and in different ways is often a successful approach. For example, demonstrating an array of rainwater catchment systems exhibited the scalability of the concept and the diversity of applications, which contributed to the collective buy-in. Presenting the approach as customizable, rather than one-size-fits-all, resulted in greater willingness to participate.
- Centralization and decentralization are interconnected. The development of residential (decentralized) projects motivated the creation of a centralized community system.

Ultimately, it is hoped that the success of the Bodega Valley Rainwater Catchment and Alternative Water Supply program, and the importance of demonstrating success early on, serve as an example for other communities. Having piloted community rainwater catchment systems effectively, this project can be presented as a model to assist other communities with future efforts.

This case study was written by Erica Gross of Ag Innovations Network and Lauren Hammack of Prunuske Chatham, Inc. with input from Brock Dolman of Occidental Arts and Ecology Center and John Green of Gold Ridge Resource Conservation District. It was produced for the California Agricultural Water Stewardship Initiative by Ag Innovations Network, a nonprofit organization dedicated to helping stakeholders solve problems in the food system through effective collaboration. For more information visit agwaterstewards.org and aginnovations.org.