Collaborative Water Management

A Guide to Enhancing Streamflow and Water Supply Reliability in California's Rural Watersheds and Communities

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Digital copies of this document can be obtained from The Nature Conservancy and Salmonid Restoration Federation at https://www.nature.org/california and https://www.calsalmon.org/resources/Collaborative-water-management.

This guidebook was developed during the global pandemic of COVID-19. At a time when our lives and the way we communicate are altered, it is important to remember that while the pursuit of improving water resources management is ongoing, the methods and strategies that we utilize will need to adapt to ever changing conditions. This pandemic and how it disproportionately affects disadvantaged communities is an important reminder of how many communities do not have equal access to clean water, information, and the ability to engage in restoration efforts. We need to be cognizant of these social and environmental factors in our collective planning, community engagement, and implementation efforts to create healthier watersheds.

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p.18: Chris Alford
p.19: Whitethorn Valley Farm
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p.49: Anna Rogers
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p.51: Monty Schmitt
p.53b: Anna Rogers
p.54: Sanctuary Forest Inc.
p.56: Bob Fink
p.57a: Brock Dolman
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Table of Contents

List of Acronyms

BMP	Best Management Practices
Cannabis Policy	Cannabis Cultivation Policy – Principles and Guidelines for Cannabis Cultivation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CEMAR	Center for Ecosytem Management and Restoration
CWM	collaborative water management
cfs	cubic feet per second
EIR	Environmental Impact Report
FGC	Fish and Game Code
LSAA	Lake and Streambed Alteration Agreement
MND	Mitigated Negative Declaration
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
North Coast Policy	Policy for Maintaining Instream Flows in Northern California Coast Streams
RCD	Resource Conservation District
SDUR	Small Domestic Use Registration
SFI	Sanctuary Forest Inc.
SGMA	Sustainable Groundwater Management Act
SHA	Safe Harbor Agreement
SHaRP	Salmon Habitat Restoration Priorities, NOAA Fisheries
SIUR	Small Irrigation Use Registration
SIP	Streamflow Improvement Plan
SRF	Salmonid Restoration Federation
State Water Board	State Water Resources Control Board
TMDL	Total Maximum Daily Load
TU	Trout Unlimited
USFWS	United States Fish and Wildlife Service
WCB	Wildlife Conservation Board

This document is intended as a general guide that includes strategies for managing water rights and water resources to enhance instream flows and water supply reliability in rural watersheds in California. While it discusses water rights and water-related legal issues, this guidebook is not intended as a definitive or authoritative legal guide. Water rights and water law in California are complex and often depend on the specific circumstances involved. Accordingly, the statements and conclusions presented within this document are not intended as legal advice on any issue or question. The advice of a water law attorney should be obtained when making decisions or taking actions with respect to legal issues related to the existence and use of water or water rights.

Chapter 1

Introduction

The need and basis for collaborative water management

California's rivers and streams provide critical habitat for fish and wildlife, as well as water supplies that sustain rural farms and communities. However, meeting the water needs of nature and people has become increasingly difficult. Due to California's Mediterranean climate, most rainfall and snow occur in the winter followed by long dry seasons. This natural cycle of wet and dry seasons impacts the hydrology of our rivers and means that available surface water supplies are at their lowest in the dry season when human water use demand is at its highest. This mismatch in timing of water availability and use is compounded by impacts to streamflow caused by legacy land use issues and increasing water supply demands. As a result, many of California's rivers and streams experience critically low flows or even dry up during late summer months. Increased frequency of droughts and rising temperatures due to climate change further exacerbate the situation. These impaired streamflow conditions threaten the health of our streams and survival of salmon as well as other fish and wildlife. Impaired streamflows also reduce water supply reliability for farms and communities that depend on streams to meet their water needs.

California's rural watersheds need flow enhancement strategies and techniques that foster collaboration among water diverters, support habitat needs for fish and wildlife, and improve water security for communities. This is particularly true in watersheds that do not have large dams or centrally distributed water supplies to regulate streamflows and water diversions. These decentralized watersheds, common to coastal California, are home to vibrant communities and agricultural economies as well as vitally important freshwater ecosystems. Traditional approaches to water management often fail to meet the needs of people and nature in these areas because dozens, if not hundreds, of individual dispersed stream ***diversions*** are mostly managed and regulated independently of one another. A collaborative approach to water management is needed to address the dispersed nature of water diversions in rural areas, and sustainably manage water supplies to meet the needs of people and the environment.

Collaborative water management (CWM) offers an alternative approach for water management in rural communities where: 1) important aquatic habitat would be preserved or enhanced by managing water differently during a specific time period, 2) coordinated participation among water users could measurably improve flows and water supply reliability, and 3) water users are willing to participate in a collaborative effort.

***Collaborative water management** is a watershed- and community-based approach to support and incentivize water users to implement water management practices and improvements in a collaborative manner. The approach leverages existing water management policies, funding opportunities, and tools to increase water supply security for people and improve critical streamflows for water-dependent species and ecosystems. CWM is especially applicable in regions where a significant number of individual or decentralized surface water diversions alter streamflows and negatively impact protected fish populations and other important water resources.*

Goal of this Guidebook

The goal of this guidebook is to provide both water users and local resource management organizations, such as ***Resource Conservation Districts (RCDs)***, with a cohesive framework and practical tools to collaboratively address streamflow, water supply, and other local water resource challenges. The CWM framework presented in this guidebook offers a programmatic approach to increase resilient water supplies for rural communities and to support the recovery of freshwater species and the ecosystems they rely on.

Intended audiences

The primary audiences for this guidebook are conservation entities that work with a variety of stakeholders to address collective community and natural resources issues at the watershed and sub-watershed scale, as well as rural water users who are interested in locally driven approaches to water resources management. We use the term ***conservation entities*** to describe local resource management organizations or agencies, including but not limited to RCDs, watershed groups, and nonprofit conservation organizations. RCDs and similar organizations are well-positioned to facilitate a CWM approach, due to their expertise in the region in which they work and their experience assisting individual landowners with natural resource issues by modifying on-site management practices and improving infrastructure.

Scope and format of this document

The CWM framework is based on streamflow improvement plans, strategies, and lessons learned from experienced organizations working in communities throughout northern coastal California to restore streamflows. This guide provides essential information and practical guidance for conservation entities and water users who wish to improve local streamflow and water supply reliability using a community-based approach as a cohesive framework for rural water supply stewardship. The CWM framework tools and recommended actions outlined in the following chapters are not intended as specific prescriptions, but rather as potential approaches that conservation entities and rural water users can consider within their own communities to resolve water supply challenges and support efficient and effective environmental management of streamflows.

Chapter 2 describes water management tools that support or are enhanced by CWM efforts. Chapter 3 covers policy and permitting pathways associated with the implementation of these water management tools. Next, we provide community outreach strategies and tools in Chapter 4, followed by descriptions of approaches for formalizing the approach in Chapter 5. Steps for developing a CWM framework are outlined in Chapter 6. Chapter 7 provides guidance for expanding and exporting an initial CWM effort. Case studies of CWM approaches in four watersheds are presented in Chapter 8. A glossary of terms and an appendix listing additional resources are provided at the end of this guidebook.

Collaborative water management offers a practical approach to address the water supply needs of individual water users, communities, and fish and wildlife within a watershed or sub-watershed in ways that collectively produce greater net benefits than isolated or individual site-by-site efforts

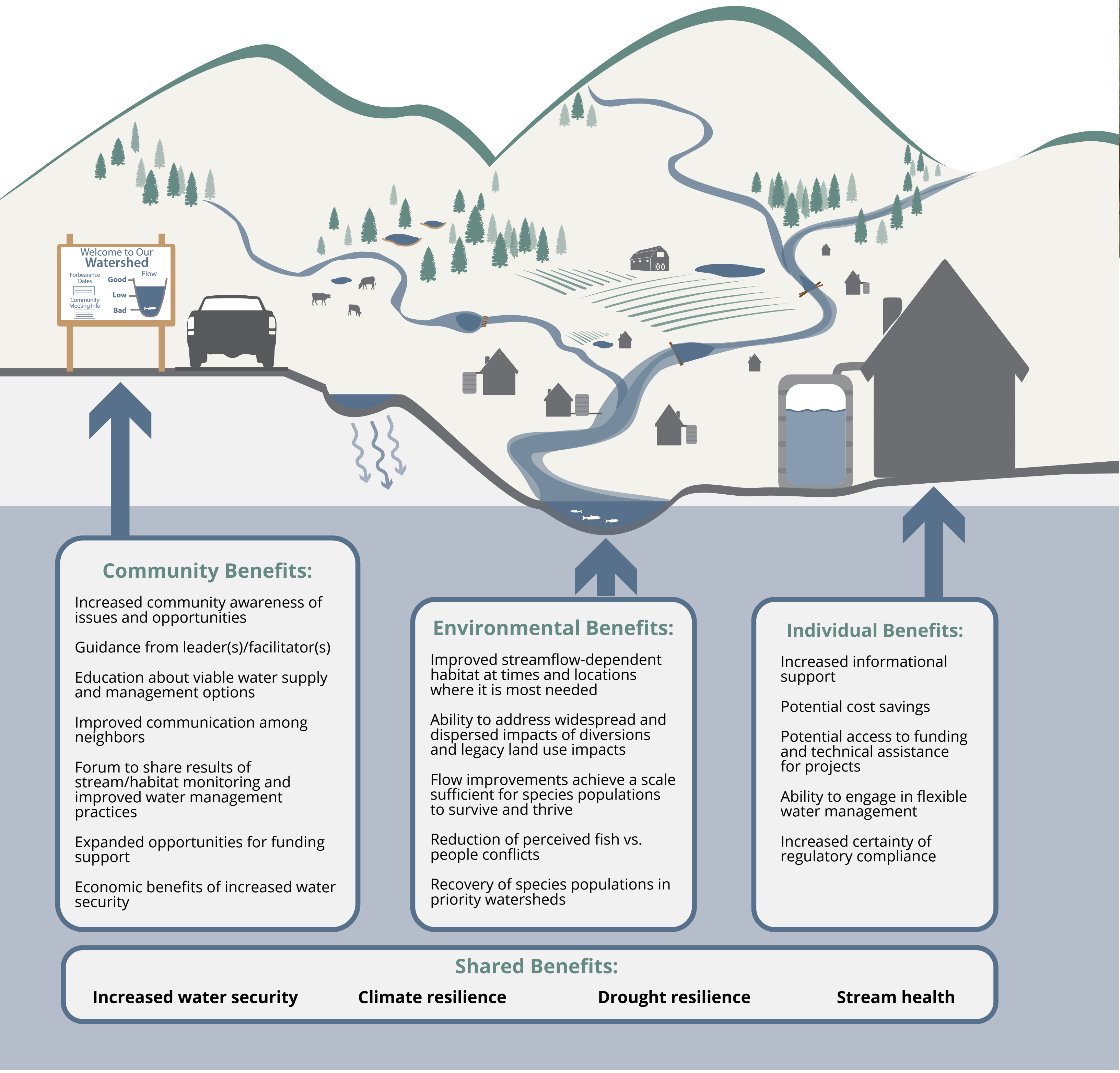

Figure 1: Benefits of a collaborative water management approach

Chapter 2

Water Management Tools

The CWM approach utilizes a variety of existing project and management action tools to promote and expedite streamflow enhancement efforts to benefit streamflow conditions and improve water security for landowners.

The tools range from simple water management modifications, such as coordinating the timing of water diversions, to more complex efforts, such as water storage and ***forbearance*** (when a water user voluntarily refrains from diverting water during key time periods or conditions). Even some of the most basic tools, such as coordinating water diversion timing with a neighbor, can provide a dramatic benefit to instream flows, aquatic habitat, and the species that rely on them, while maintaining or improving water supply security for human use. These tools are not mutually exclusive, and in many circumstances the resulting benefits are multiplied when multiple approaches are implemented simultaneously or sequentially.

Water Management Tools:

- Reduce water demand
- Coordinate the timing and rate of water diversions
- Implement off-stream storage and forbearance
- Capture and store rainwater
- Storm-proof rural road networks
- Increase upslope groundwater recharge
- Install or encourage large wood accumulations instream

Additional resources that provide information about these water management tools are listed in Appendix A.

Reduce water demand

Reduce one's water needs through water conservation and efficiency. This should be the starting point for any effort to increase water supply reliability and instream flows.

Reducing water use and increasing efficiency can result in long-term water conservation savings and keep more water instream for nature. This fundamental first step in any streamflow enhancement effort provides multiple benefits including maintaining desirable water uses and increasing resilience of water supplies against future droughts. Reducing water demand can lengthen the amount of time that a stream segment flows during drier months or extend the amount of time that a spring-fed pond holds water, thereby providing critical habitat for species to complete their life cycles. Furthermore, implementing water conservation measures as the first strategy can significantly increase the effectiveness of other management actions and lower the cost of other approaches by reducing the quantity of water that users require from the stream.

The most effective water conservation strategies for rural residents tend to be reductions in water use for landscaping. For example, residents can employ more efficient irrigation or replace a lawn that requires frequent watering with drought-tolerant plants. Replacing inefficient appliances such as toilets, shower heads, and washers with more efficient models is another common and relatively simple strategy for reducing domestic water use.

On working agricultural lands, water conservation most often involves improving irrigation efficiency or changing from a water-intensive crop to a crop that requires less water. Another approach is to eliminate the need for water entirely by using an alternative technique. For example, if water was historically diverted to provide heat or frost protection for an agricultural crop, consider using a shade cloth for heat protection and fans for frost protection.

The process of obtaining a permit for a water conservation project can vary greatly, depending on the project. For example, changing an irrigation nozzle does not require a permit, but installing a water conveyance pipe to replace an unlined irrigation canal will likely require a local grading permit and may need to comply with the California Environmental Quality Act (CEQA), as well as other state and federal permitting requirements, depending on the project size, location, and funding source. If the water conserved is associated with an appropriative water right, the water right holder should report the conserved water on their annual water use report to the State Water Resources Control Board (State Water Board) under Water Code Section 1011, or submit a change petition to add fish and wildlife preservation and enhancement instream as an allowed purpose and place of use under Water Code Section 1707. Either approach will prevent the conserved water from being potentially forfeited due to non-use. Submitting a change petition under Water Code Section 1707 will also legally protect the conserved water left instream from being diverted by junior water rights holders. Water Code Section 1707 is described in Chapter 3.

Even if the CWM approach is focused on tools such as winter rainwater capture or diversion to off-stream storage and forbearance, taking the time to first reduce water needs to the extent that is feasible will benefit the effort. Reducing the overall footprint of a water storage pond or tank system can reduce construction costs. It can also have an ongoing economic benefit in areas where land that is suitable for agriculture is scarce by minimizing the portion of productive land that needs to be taken out of production in order to provide water storage.

Coordinate the timing and rate of diversions

Eliminate the dramatic drops in streamflow and/or stream dewatering that occurs when multiple diversions withdraw water from a stream at the same time.

Having all water users coordinate on the timing and rate that they divert water from a stream is an efficient and low-cost way to significantly reduce the cumulative impacts of water withdrawals. For example, a group of water users may elect to alternate pumping so that only one water user within a given ***stream reach*** is pumping per day or within a specific time period. This relatively simple action can dramatically reduce the chance that the stream segment is significantly reduced or even ***dewatered*** due to multiple diversions withdrawing water at the same time. Users do not need to get permits to coordinate the timing of existing water diversions, and their coordination can provide immediate and significant benefits to streamflow conditions. They can coordinate diversions without necessarily reducing the overall amount of water diverted.

The benefits of coordination to both water supply security and instream flows can be enhanced by pairing this approach with other strategies, such as water conservation, increased water storage, or offsetting surface water diversions by capturing rainwater.

The CWM approach is well suited to developing and implementing a water diversion timing schedule among participating water users, particularly when a neutral party such as an RCD or other conservation entity can help facilitate the effort. When developing a coordinated diversion schedule, it is important to understand sources of water supplies and water usage needs (e.g., domestic, landscaping) within the sub-watershed, as well as the physical water supply infrastructure limitations of each participant. A water use survey is a useful tool for collecting this information. The entity facilitating the effort should model different scenarios to understand how changes in diversion timing can best reduce (if not eliminate) the cumulative impacts of diversions during the time periods when streamflow enhancements are most critical for key species. Each scenario should be evaluated under existing conditions, in order to maximize the immediate benefits of diversion timing for the initial participants. Future modifications to the initial schedule should also be evaluated to identify additional benefits that can be achieved over time as more water users opt to participate and additional strategies, such as increased storage, are implemented. The Mattole River Flow Improvement Effort case study described in Chapter 8 is an example of a CWM effort that includes coordinated water diversion and forbearance timing.

Implement off-stream storage and forbearance

Use water stored during the wet season to reduce reliance on diversion during the dry season and improve instream flow conditions.

A common strategy in many rural watersheds is the practice of storing water in the winter, when it is more abundant, using off-stream storage such as ponds or tanks. The water can then be used to meet water needs in the summer. Off-stream storage is an important tool for improving streamflows and reduces reliance on the stream during its most vulnerable time. This strategy is especially effective and beneficial when a storage project is designed to enable forbearance of stream diversion during certain conditions or times of the year. These may include specific streamflow or temperature thresholds or the time of year when a species needs the water instream to complete its life cycle. For example, if the primary goal of a project is to support adult salmon migration, the forbearance period should occur when fish are moving upstream, to facilitate fish passage.
A more common goal is to maintain the range of

water temperatures that enable juvenile salmonids to survive in stream pools throughout the summer, in which case the forbearance period may be triggered by a specific water temperature or minimum flow threshold.

Data collection and evaluation can guide a coordinated storage and forbearance approach among water users. Understanding water use needs and protective flow thresholds will help determine what level of storage participating landowners require in order to forbear from water diversions for the designated time period. Figure 2 provides calculations developed by Sanctuary Forest Inc. (SFI) in the Mattole River watershed, using average water use data provided by the State Water Board to estimate residential water use needs.

The two main options for water storage are tanks and ponds. Tanks can better maintain the drinkability and quality of the water, while ponds are more suitable for storing large amounts of water for irrigation. Storing water in ponds is also significantly less expensive, and ponds may also provide benefits in terms of fire safety, recreation, and wildlife habitat. Ponds may be able to increase groundwater recharge if water from the pond percolates underground.

A few water right and permitting factors should be considered when developing a storage project and forbearing on the use of a water right. Whether or not it's necessary to obtain local, state, and federal permits prior to installing the tank or constructing the pond will depend on the size, use, and placement of the tank or pond. Even smaller water storage tanks intended for residential use may require a grading or building permit from the local city or county planning department. Local permitting requirements (i.e., grading and building) vary from place to place, so it is important to look up local municipal code requirements.

With respect to water rights, any storage of surface water for longer than 30 days requires an ***appropriative water right***. If a water user currently uses a ***riparian water right***, the user would need a new appropriative water right to divert and store water during winter months for use later in the year. If a water user currently relies on an appropriative right, the user should ensure that the diversion season and other terms of the right enable diversion during the winter; some appropriative water rights limit diversion to the dry months.

Another consideration is the management and protection of water left instream from forbearing on diversions. One strategy is to submit a water right change petition under Water Code Section 1707 (as described in Chapter 3) to formally dedicate the water left instream to fish and wildlife preservation and enhancement. This will protect water left instream from diversion by other water users and protect the underlying water right from forfeiture due to lack of use. However, if the forbearance of a water diversion occurs sporadically or for very short periods during the diversion season, it may not be necessary to acquire or modify the associated water right. Every situation is different, so it is always prudent to obtain guidance from a water rights attorney when considering any changes to a water right.

Regardless of the length of time of the forbearance, forbearance agreements are a useful way to clearly outline the goals and objectives of the effort as well as the roles and responsibilities of participants. When an RCD or other conservation entity is facilitating a CWM approach, that entity could develop a template forbearance agreement. Forbearance agreements are described in more detail in Chapter 5.

To estimate the amount of water storage needed to forbear on summer diversions in the Mattole River watershed, Sanctuary Forest Inc. (SFI) relied on average water use data from the State Water Resources Control Board (State Water Board).

- Household water use: 55 gallons per day (gpd) per person
- Garden water use: 18.5 gpd per 100 square feet of garden
- Fire protection water reserve: 2,500 gallons

Sample storage calculation for a 3-person household with a 1600 sq. ft. garden:

- Household water need (Aug 1 – Nov 15): **17,325 gallons***
  (105 days × 3 people × 55 gpd)
- Garden water need (Aug 1 – Oct 15): **22,496 gallons***
  (Based on 76 days × 1600 sq. ft. x 18.5 gpd per 100 sq. ft.; this assumes that households will stop irrigating their gardens after October 15, which is recommended)
- Fire protection: **2500 gallons**

Total household storage need: 42,321 gallons (for 3½ months)*
**Water conservation techniques may reduce actual use by 25-50% below these levels.*

See Water Stewardship Guide—Conserving and Storing Water to Benefit Streamflows and Fish in North Coast Creeks and Rivers (Sanctuary Forest Inc., 2017) for additional information.

Figure 2: Residential water storage need estimates developed by Sanctuary Forest Inc.

Capture and store rainwater

Reduce reliance on streamflow by capturing and storing rainwater.

Rainwater collection is a simple way to capture water for non-potable uses, including livestock watering, landscaping, fire protection, and small-scale gardening. Rainwater can be collected from rooftops, hillslopes, and other surfaces and stored in tanks, cisterns, or ponds. For example, a rainwater catchment system installed to collect water from a 1,000 sq. ft. roof captures approximately 600 gallons of water for every inch of rain. In the South Fork Eel watershed, where annual precipitation is approximately 85 inches per year, a single 1,000 sq. ft. roof can provide approximately 51,000 gallons of rainwater for collection. This amount of water is sufficient amount to fulfill over four months of outdoor water needs for an average household, based on a survey in the ***Flow Enhancement Feasibility Study in Redwood Creek on the South Fork Eel River***[1].

Rainwater catchment in California does not require a water right; however, local grading and/or building permits may be needed, depending on the size and type of storage installed to capture and hold collected rainwater. Even if a building permit is required by the local municipality, any rainwater catchment system constructed on or after January 1, 2019, is exempt from property tax assessments, according to Proposition 72. While the rainwater system is included in the value

[1] *https://www.calsalmon.org/sites/default/files/files/Redwood_Creek_Feasibility_Study.pdf*

of a property when it is sold, the property owners who install rainwater capture systems won't have their property reassessed at the time that a rainwater catchment system is installed. Therefore, landowners can install a rainwater capture system on their property in order to reduce their reliance on water diverted from streamflows without being subject to a property tax increase due to the improvements they make.

With financial support from a grant or funding initiative, an RCD or other conservation entity can develop a rainwater catchment program as part of a CWM approach. Such a program can provide residents, private businesses, and public agencies with technical and potentially financial support to capture and store rainwater to meet their landscaping needs, thus decreasing the use of potable water to meet those needs. The two-volume set of books ***Rainwater Harvesting for Drylands and Beyond*** [2] provides information about how to evaluate, design, and implement rainwater catchment systems at both residential and community scales. The Bodega Valley Rainwater Catchment and Alternative Water Supply Program case study, described in Chapter 8, describes the use of rainwater catchment as the primary strategy of a CWM effort.

Storm-proof rural road networks

Design and maintain road systems to slow runoff and reduce sedimentation in order to improve water quality and stream base flows.

Poorly constructed and abandoned rural road networks can significantly impact watershed hydrology and contribute sediment loads to streams that threaten water supply, water quality, and fisheries. These roads intercept rainfall and hillside runoff, significantly disrupting how water moves through a watershed by concentrating water and increasing its speed downslope and into streams. This reduces the ability of the landscape to intercept and absorb rainwater, resulting in higher flood flows during rainstorms and diminishing ***base flows*** fed by groundwater that sustain streamflow during dry periods. Designing road system upgrade projects and decommission projects to minimize the re-direction of surface water runoff and sediment transport, particularly along inner gorge and streamside riparian systems, will reduce the negative impacts that road systems have on streamflow conditions within the watershed. Projects that are designed to allow natural flow paths and runoff to re-establish within the watershed help minimize the influence of the road, or decommissioned road, on the local streamflow conditions.

Storm-proofing local road systems can also go beyond eliminating impacts to streamflows by designing road upgrades and decommission projects that intentionally facilitate the capture and ***infiltration*** of rainfall across hillslopes to recharge local groundwater resources, which govern summer base flows in most river systems. The book ***Water Harvesting from Low-Standard Rural Roads***[3] provides a variety of practical approaches for evaluating, designing, constructing, and monitoring a road system upgrade.

Rural road maintenance projects require ground disturbance, so it is important to employ best management practices (BMPs). ***The Handbook for Forest, Ranch and Rural Roads***[4], developed by the Mendocino County RCD and Pacific Watershed Associates, is considered the leading resource for erosion and sediment practices, protocols, and techniques.

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[2] https://www.harvestingrainwater.com/
[3] https://quiviracoalition.org/good-road/
[4] https://mcrcd.org/resources/publications

Increase upslope groundwater recharge

Slow drainage of surface runoff to improve infiltration and retention of water supplies in the soil and shallow aquifers.

Past and current land-use practices, such as logging and the development of rural road networks, have increased surface water runoff during storm events and reduced infiltration into soils and shallow ***aquifers***. The installation of groundwater recharge ponds, wetlands, and bioswales upslope of important stream reaches can capture water so that it slowly infiltrates into the ground and stays within the local drainage basin for a longer period of time. Adding these features to the landscape can raise adjacent groundwater levels and slowly release water to the nearby stream channel during low-flow periods. In some circumstances, wetland vegetation that grows in a constructed wetland can also increase the water-holding capacity of the soil within the immediate area by adding significant amounts of organic matter as vegetation decomposes. Each of these upslope water retention and groundwater recharge techniques involves active management of the local shallow aquifer system as an underground reservoir or groundwater "bank" that can supplement or replace diminished surface water supplies during dry periods. This strategy involves managing water over a much longer timeframe than other approaches for improving instream flows.

The planning and design of groundwater recharge ponds and constructed wetlands to maximize groundwater recharge and improve summer stream baseflows requires an understanding of the local soils, topography, and groundwater conditions. It is important to start the design process by doing a site assessment that includes review of available soil map data, groundwater monitoring, analysis of soil depth and soil type, and a topographic survey of the land. Assessing existing groundwater levels and the depth to bedrock at a potential project site is important in the planning process, as it determines the groundwater storage capacity. For example, if the ground surface is close to bedrock, there is a limited capacity for groundwater storage and groundwater levels may already be at or near maximum capacity at that specific location. The soil type at a project location is also important, because the amount of clay in the soil determines how quickly captured water infiltrates into the aquifer. Areas that contain a high percentage of clay in the soil will not infiltrate as much water as areas that contain a higher percentage of sand or organic matter. Understanding the topography of the land is important for determining the amount of surface water runoff that may be captured by a water retention feature.

Install or encourage large wood accumulations instream

Increase stream habitat for fish and retention of shallow groundwater by restoring large wood accumulations.

The accumulation of fallen trees or construction of beaver dams in an active stream channel can help increase water storage capacity by creating deep pools. These accumulations can also facilitate the retention of shallow groundwater in adjacent stream banks by retaining sediment and raising water levels. Historic logging practices, as well as outdated restoration practices, removed downed wood and beaver dams from many of California's streams, leaving behind less complex stream channels with fewer and shallower pools. Changing local practices to allow and encourage large wood piles and beaver dams instream, as well as installing engineered log jams, large woody debris, and beaver dam analogs that mimic these natural features, can help restore stream habitat and water storage capacity. These evolving and innovative practices can contribute needed water to dry-season base flows that benefit fish and water users.

Things to consider when planning and implementing large wood installation projects include the amount of wood already located in the stream channel, the channel gradient (steepness), channel features, the human presence in the surrounding landscape, the source of project logs, the level of engineering, and the fish species involved. If the channel is so steep or wide that stream reach cannot retain loose logs, either engineering will be required or that stream reach is not an optimal candidate for wood introduction. Engineered designs, and associated permitting, dramatically increase project costs. The land use of the surrounding area is also an important consideration for engineering. If the area has little economic value (e.g., if it is an unused wooded area), usually less engineering and fewer permits are required. However, if the project is adjacent to any area where stream meandering is undesirable (e.g., if it is near houses, roads, or agricultural land), then more engineering and permits are usually needed. Project costs are also greatly impacted by the source of the project logs. When logs are located nearby and donated by the landowner, costs are typically much lower than if they are bought and trucked to the site. Finally, the project characteristics must be suited to the particular species of interest living in the area. Coho Salmon prefer deep, dark, woody, cool, marsh-like habitat. Steelhead prefer steeper gradients and faster moving water, and Chinook Salmon like broad, open reaches with large wood accumulations, but fewer small-wood features. Due to both the permitting complexities involved in these types of projects and the benefits that can be achieved by implementing them across an entire stream reach, efforts to encourage large wood to accumulate or to install it in a stream are best used as part of a CWM approach.

Chapter 3

Policy Approaches and Permitting Pathways

Many of the tools to improve water supply security and enhance streamflows must be used in compliance with certain regulatory policies and permits.

Some policies provide or allude to a specific framework to achieve compliance through collaborative means. In other situations, a CWM approach can provide water users with effective and efficient ways to comply with regulatory obligations by pooling resources and utilizing collective strategies.

The following regulatory policies, discussed in order in the pages that follow, commonly apply to water management efforts that involve either modifications to infrastructure or water rights and can be collaboratively addressed as part of a CWM effort among watershed stakeholders:

- Lake and Streambed Alteration Agreements (Fish and Game Code Section 1600)
- Instream Flow Dedications (Water Code Section 1707)
- Safe Harbor Agreements
- Policy for Maintaining Instream Flows in Northern California Coastal Streams
- Cannabis Cultivation Policy
- Sustainable Groundwater Management Act

Lake and Streambed Alteration Agreements (LSA or Section 1600 Agreement)

This agreement is required by the California Department of Fish and Wildlife (CDFW) when a project activity has the potential to substantially adversely affect fish and wildlife resources.

CDFW has authority under Fish and Game Code Section 1600 et seq. to regulate any water withdrawal that may have an impact on fish or other aquatic life. This provision states that anyone who undertakes an activity that might “substantially divert or obstruct the natural flow of any river, stream, or lake” is required to notify CDFW of this activity. Such notifications are particularly important in streams where low flows are a limiting factor for salmonids and other listed species. If CDFW determines that a specific water diversion could have a “substantial” impact on the resource, then CDFW may require that each water right associated with the point of diversion have a valid Section 1600 Agreement. This requirement is particularly likely to apply if a stream or spring provides habitat for any listed species or is a tributary to such a stream.

LSA Agreements are typically issued on an individual, site-specific basis for a term of up to five years for each individual project or water right. An LSA Agreement is subject to renewal after the original agreement has expired for activities that involve ongoing impacts to the stream channel, bed, or bank, such as water diversions. LSA Agreements are increasingly being required separate from and in addition to water rights, which is creating challenges in rural communities where often people do not have a current LSA Agreement associated with their existing water diversions.

Nexus between LSA Agreements and CWM

It can be difficult to obtain a new LSA Agreement in order to bring an existing water diversion into compliance, or during the process of seeking a new water right. Many water rights holders are reluctant to hand over information about their activities to regulatory agency staff. A CWM approach can help individual water rights holders because a participating RCD or other conservation entity can help develop common terms and conditions across multiple LSA Agreements for similar types of projects within the same stream, and they can coordinate directly with CDFW staff on behalf of the water rights holders.

While individual LSA Agreements are only valid for five years, it is possible to obtain a Long-Term Maintenance LSA Agreement for routine maintenance, repair, operation, and limited replacement or relocation activities on existing stream diversions owned by multiple water rights holders within a watershed. Such an LSA Agreement is valid for a longer period of time before it must be renewed. It may be best to batch multiple water diversions under a single Long-Term Maintenance LSA Agreement within small watersheds or sub-watersheds where the landowners are located relatively close to one another and the local RCD or other conservation entity is willing and able to take on the lead role of monitoring and reporting.

Sanctuary Forest Inc. (SFI) and CDFW have been working on developing a batched approach for the Mattole Storage and Forbearance Program since 2012, utilizing a Long-Term Maintenance Agreement LSA Agreement in lieu of an individual LSA Agreement for each landowner. In the model under development, SFI is the primary entity entering into the agreement with CDFW, and each participating landowner signs on to the agreement to acknowledge their participation in the program and concurrence with the agreement terms. SFI is responsible for conducting annual monitoring of streamflows, ensuring landowner compliance, and submitting a status report to CDFW every four years.

The landowners are individually responsible for operation of their diversions and compliance with the Long-Term Maintenance LSA Agreement. The term of the agreement is 15 years, with the option to renew once for an additional five years. The group agreement includes landowners who have different types of water rights for commercial and domestic uses. New landowners can be added under a sub-notification. The process and fees for the sub-notifications are negotiated as part of the agreement.

Instream Flow Dedications (Water Code Section 1707)

These agreements provide water for fish and wildlife while protecting a water right from abandonment.

When a water right holder is able to conserve or otherwise forgo diverting water associated with their water right, they can submit a water right change petition under Water Code Section 1707 to formally change the beneficial use of all or a portion of their water right to allow for instream use. Typically, if an appropriative water right owner does not exercise their right to the water for a period of at least five years, the water is at risk of forfeiture due to non-use. This poses a disincentive for conservation or forbearance. By formally allocating water to benefit fish and wildlife uses instream, in accordance with Water Code Section 1707, the water left instream is considered “used” and the water right is protected from potential forfeiture.

Submitting a water right change petition to the State Water Board to dedicate water instream under Water Code Section 1707 is the only mechanism under California water law that provides a legal basis to prevent junior water rights holders from subsequently diverting water that was intentionally left instream for fish and wildlife. The petition process for using Section 1707 is explained in detail in ***A Practitioner's Guide to Instream Flow Transactions***[5] in California.

Nexus between Section 1707 dedications and CWM

Any CWM effort that includes projects that involve a significant reduction in water use and/or the development of water supply storage in order to be able to divert water during wet periods, in exchange for forbearance during the dry summer months or other key time periods to enhance instream flows, is likely to benefit from using Section 1707 instream flow dedications. Section 1707 dedications both protect the water left instream and preserve the underlying water right. Several grant funding programs, including those managed by the Wildlife Conservation Board and the National Fish and Wildlife Foundation, require assurances that water conserved or otherwise left instream will be protected. A Section 1707 instream flow dedication is the preferred method for doing so.

While instream dedications do not require a CWM approach, a CWM effort can enhance their effectiveness when multiple water rights holders within a single stream reach or tributary all participate. In addition, a CWM approach can make the water rights change petition submission and approval process easier for individual water rights holders because they can utilize the same streamflow data and compliance strategy, as well as receiving technical and financial support as program participants. While the State Water Board does not have any specific guidance for batching Section 1707 petitions, it has demonstrated a willingness to process multiple Section 1707 petitions that are part of a collaborative effort among multiple water rights holders within a single watershed.

[5] *http://www.calinstreamguide.org/*

Safe Harbor Agreements

These permitting pathways are for groups of water users who need to address federal endangered species protections.

A Safe Harbor Agreement (SHA) is a voluntary conservation agreement between one or more private landowners and a permitting agency (i.e., NOAA Fisheries and USFWS for federally listed species and CDFW for state listed species). It is used when the actions taken by participating landowners under the SHA will provide an overall benefit to the identified species. SHAs are often used to facilitate efforts to reintroduce endangered or threatened species to areas where they were previously extirpated or are in severe decline. Participating landowners receive formal assurances from the permitting agency that they will not be subject to additional land-use restrictions or regulatory burdens due to the presence of a federally and/or state listed species, beyond what they voluntarily commit to in the SHA, as long as the landowner's collective actions maintain or improve the overall habitat for the species. The water management tools commonly used as part of a CWM approach are examples of actions that a landowner can commit to implementing on their property for a SHA that provides take coverage for aquatic species, such as salmonids (see Chapter 2).

Nexus between SHAs and CWM

SHAs can be developed programmatically using a Template SHA, which is established for a specific region with the intent that multiple individuals or entities will enroll in the SHA program. With the Template SHA approach, an RCD, other conservation entity, and/or coalition of landowners act as a coordinating entity to facilitate and coordinate the development of a template agreement with the permitting agency (i.e., NOAA, USFWS, and/or CDFW, depending on the identified species and their listing status). The coordinating entity works with individual landowners to develop compatible site plans for their properties that include management actions which will result in a net conservation benefit to the identified species. Each landowner commits to maintaining their property at or above the existing baseline for the entire length of the agreement (from five to 50+ years).

Although it is not required in order to implement a CWM approach, an SHA can appeal to landowners who have business enterprises on their land, including family farms, ranches, or vineyards, if these ongoing operations have the potential to cause the incidental take of a listed species. RCDs and other entities in California have set up SHA programs to support habitat on working agricultural lands for species such as the valley elderberry longhorn beetle, the red-legged frog, and the giant garter snake. More recently, SHAs that include instream flow enhancement components to aid in the recovery of salmon were developed in the Russian River and Shasta River watersheds.

Dry Creek Valley Programmatic Safe Harbor Agreement

The Dry Creek Valley Programmatic SHA (Dry Creek SHA) was finalized in 2016 and was NOAA Fisheries' first Programmatic SHA. Sonoma County Water Agency (SCWA) is the program administrator for this SHA and landowners may enroll in the program if they voluntarily agree to participate in SCWA's Dry Creek Habitat Enhancement Program. The SHA is intended to encourage landowner cooperation by proving take coverage for California Coastal Chinook Salmon and Central California Coast coho Salmon for habitat enhancement activities and normal vineyard operations on enrolled properties. Landowner participation in this effort is expected to help SCWA accomplish its goals to provide enhanced summer rearing conditions for coho Salmon and steelhead by expanding floodplain refugia and large woody debris installations, while maintaining regular water supply releases through Dry Creek to maintain the water supply.

Policy for Maintaining Instream Flows in Northern California Coastal Streams

This policy applies to new water rights within the North Coast Policy Area and enables expedited permitting of individual and group projects that help protect streamflows.

The ***Policy for Maintaining Instream Flows in Northern California Coastal Streams*** [6] (North Coast Policy) was established in 2014 by the State Water Board in an effort to protect instream flows for anadromous salmon. The North Coast Policy specifies the allowable season of diversion, minimum bypass flow, and maximum level of cumulative diversion that apply to all new water rights within the Policy Area (see Figure 3). The North Coast Policy also expedites the processing of new winter water rights when they result in enhanced conditions for fish and wildlife.

Nexus between the North Coast Policy and CWM

The North Coast Policy directly applies to CWM programs when the watershed is located within the Policy Area and when new water rights are needed in order to divert and store water supplies during wetter months in order to forbear water diversions during dry months.

The Policy provides for expedited permitting of new water rights under Small Domestic Use Registrations (SDUR) and Small Irrigation Use Registrations (SIUR). These registrations have some limitations, as noted in the box to the right. While they are temporary and need to be renewed every five years, they can be processed relatively quickly, whereas new appropriative water rights can take a decade or more to establish.

Figure 3: North Coast Policy Area

Small Domestic Use Registrations

Small Domestic Use Registration (SDUR) allows for the direct diversion of up to 4,500 gallons per day and up to 10 acre-feet of storage for domestic use.

Small Irrigation Use Registrations

Small Irrigation Use Registration (SIUR) allows for up to 20 acre-feet per year of storage of surface water to irrigate crops. This type of registration is only available within the North Coast Policy Area and cannot be used for cannabis cultivation.

All water right registrations are valid for a 5-year period.

[6] https://www.waterboards.ca.gov/waterrights/water_issues/programs/instream_flows/

If a group of water users within a watershed in the Policy Area want to collaborate as part of a CWM effort, the North Coast Policy offers a Watershed Approach that can be utilized to secure a batch of new water permits at once. The water users can utilize one of two coordinated strategies identified in the Instream Flow Policy: 1) coordinated management of diversions through a project charter, or 2) coordinated application permitting.

For the first strategy, water right applicants and other stakeholders who opt to form a watershed group and submit a project charter can follow the guidelines specified in Chapter 4 of the North Coast Policy and summarized in the box to the right. They must submit initial information as part of the project charter as well as subsequent technical documents that are required for the State Water Board to review and process permit applications. Some key elements required for the Watershed Approach in the North Coast Policy include State Water Board staffing commitment, adequate funds, and a clear, compelling explanation of why this approach would benefit participating landowners.

The second strategy described in the North Coast Policy is the coordinated submission of permit applications. The North Coast Policy does not include a prescriptive approach for doing this, but the policy encourages applicants to coordinate and share technical information that can be utilized by multiple water rights applicants within a single watershed or sub-watershed area.

At present, the watershed-based approaches identified in the North Coast Policy have yet to be implemented in compliance with this policy, although efforts to do so are underway. Demonstrating success and proof of concept with a watershed approach will facilitate future coordinated efforts. The emergence of the CWM approach offers a practical framework that can guide the development of batched projects in a manner that facilitates future utilization of the North Coast Policy's watershed-based approaches.

North Coast Instream Flow Policy

Required Elements of a Watershed Charter:

- List of involved parties and their roles
- Shared goals of the group
- Tasks that must be completed in order to achieve the identified goals
- Description of water rights applications or petitions involved
- Timeline for the effort
- Financial commitments

Required Technical Documents:

- Site-specific studies to evaluate the instream flow needs of fish and fish habitat
- Evaluation of water availability
- Information necessary to draft CEQA documents
- Evaluation of the potential impacts of the proposed projects
- Diversion management plans

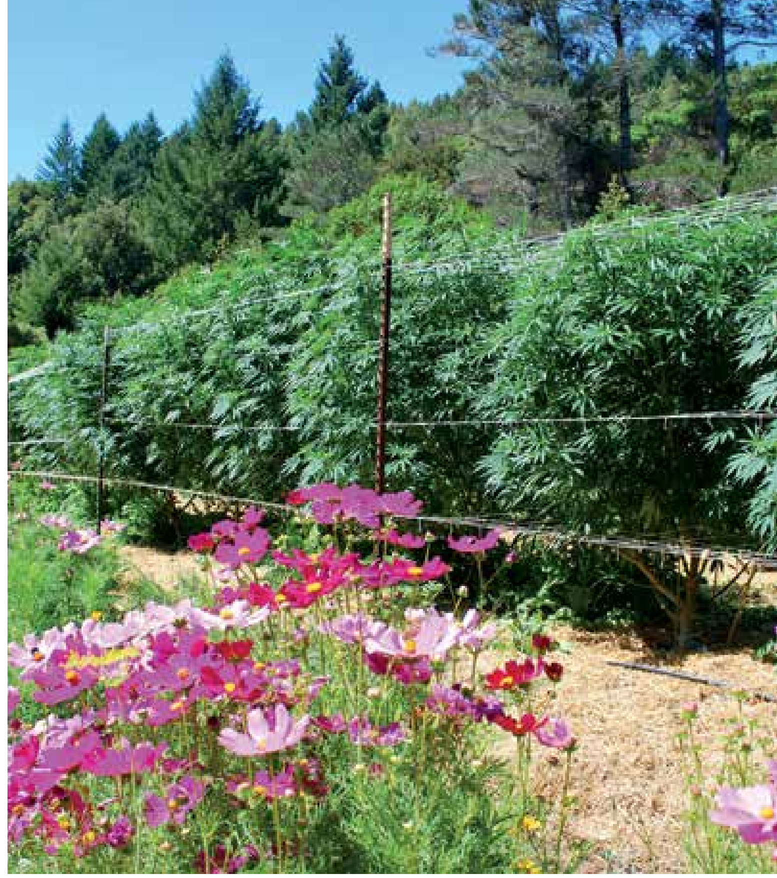
Cannabis Cultivation Policy

Coordinated applications for cannabis cultivation between watershed community members can enable water right permitting in basins that are already impacted by unnaturally low streamflows.

The ***Cannabis Cultivation Policy, Principles and Guidelines for Cannabis Cultivation***[7] (Cannabis Cultivation Policy) was adopted by the State Water Board in 2019 to establish statewide compliance requirements for the diversion and use of water and discharge of waste for activities related to cannabis cultivation, in order to protect water quality and instream flows. The Cannabis Policy requirements are primarily implemented through the Water Board's Cannabis Cultivation General Order and Cannabis SIUR permits, in addition to the California Department of Food and Agriculture's CalCannabis Cultivation Licensing Program. The policy is intentionally restrictive to discourage direct diversions in all but the safest of terms.

Nexus between the Cannabis Cultivation Policy and CWM

The Cannabis Cultivation Policy includes a provision that allows individual cultivators to develop local cooperative solutions instead of having to meet the policy requirements on their own. CDFW may request cannabis cultivators to develop a cooperative solution if it enters into an agreement with one or more cultivators and determines that the approach provides equal or greater aquatic species protection than the standard site-specific approach. A cooperative approach might be particularly useful in areas where there is a high concentration of cannabis cultivation operations. The Cannabis Cultivation Policy does not require any specific approach or materials to be included in a proposed local cooperative solution, but the solution could involve coordinated water diversion timing, shared water supplies, and/or installation and maintenance of a local stream gauge to provide an alternative instream flow compliance location. The State Water Board's Deputy Director can approve a local cooperative approach if the proposal meets the Cannabis Cultivation Policy's minimum instream flow requirements and any other conditions the Deputy Director determines to be appropriate. The Cannabis Cultivation Policy could advance broader benefits to instream flows if water users voluntarily apply the Policy's guidance on mandated water management plans and use best management practices for other types of water uses in a CWM effort.



Cannabis Small Irrigation Use Registrations

To facilitate water diversion to storage during the wet season, the State Water Board has developed a Small Irrigation Use Registration (SIUR) specific to cannabis cultivators. A SIUR for cannabis is a streamlined process to obtain a small (less than 6.6 acre-feet per year) appropriative water right specifically for the use of storing surface water to irrigate commercial cannabis crops.

[7] *https://www.waterboards.ca.gov/water_issues/*

Sustainable Groundwater Management Act (SGMA)

California's first framework for groundwater management focuses on the creation of groundwater sustainability plans that are developed locally.

The California Sustainable Groundwater Management Act (SGMA) was enacted in 2014 to establish a framework for sustainable management of local groundwater. This landmark legislation calls for the California Department of Water Resources (DWR) and the State Water Board, in coordination with regional groundwater management entities, local land-use authorities, and other stakeholders, to work toward developing guidance and tools to promote effective management of groundwater basins. It is intended to halt groundwater overdraft in areas across California that DWR has identified as high and medium priority.

Nexus between SGMA and CWM

SGMA recognizes that the most effective way to manage groundwater is at the local level. Sustainable groundwater management can only be achieved in the context of a balanced regional water budget in which groundwater use, surface water use, and land use decisions are inextricably linked. Although many watersheds in northern coastal California are not included in SGMA's high and medium priority basins, SGMA offers science-based guidance on establishing habitat and hydrologic thresholds and working with stakeholders that could be applied to a CWM approach in any watershed.

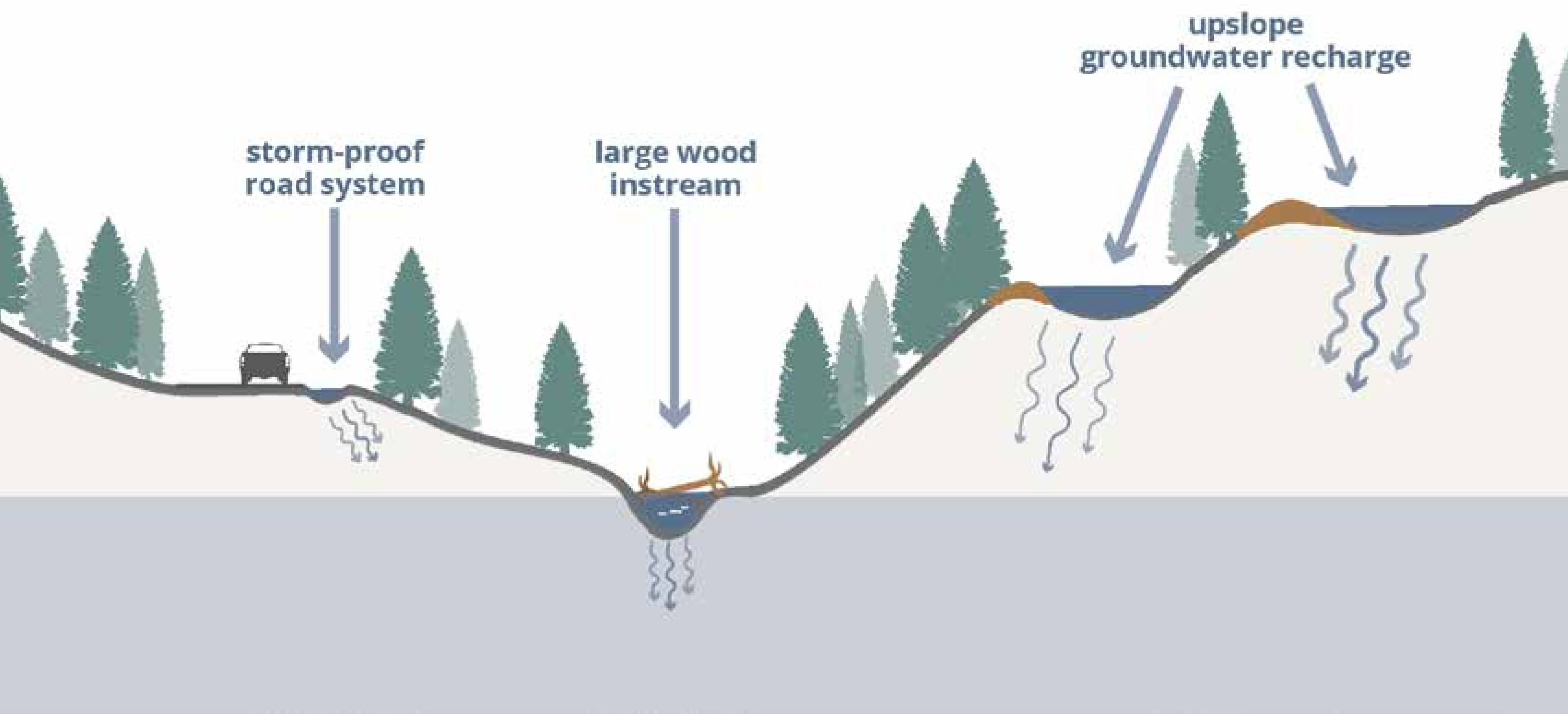


Figure 4: Tools used in a CWM approach that benefit groundwater supplies

Chapter 4

Community Outreach Strategies and Tools

Community outreach and communication are essential elements to engage landowners in collaborative partnerships.

An effective communication strategy helps to convey threats to watershed health, frame the issues, and explain the value of collaborative water management approaches to landowners, the community at large, and potential funders. Landowners often have fears or concerns about water management recommendations and water rights. Effective outreach can help address their concerns, foster constructive discourse, and help to identify and develop of a suite of water management projects that can benefit local water supply reliability and improve instream flows for fish and wildlife. A clear and responsive communication strategy is key to achieving the goals of any conservation effort that is founded on collaborative stakeholder participation, and it can help build lasting community support.

The following are recommended steps and considerations of an outreach strategy for RCDs or other conservation entities that are facilitating a CWM approach to engage local stakeholders:

1. Identify the goals and objectives of the communication strategy
2. Identify the target audience
3. Develop and implement concrete outreach strategies to inform the target audience

Step 1: Identify the goals and objectives of the communication strategy.

A first step in a CWM effort is to identify goals and objectives. Goals define what you want to accomplish as part of the overall CWM approach and objectives are the communication and outreach steps that you use to achieve those goals. A communication strategy and its associated goals and objectives should be responsive and adaptive to community feedback, concerns, and policy changes, as well as to new opportunities. The communication strategy of a CWM effort evolves as the program moves through three distinct phases: 1) initial assessment, 2) plan development, and 3) implementation.

Example communication strategy goal and objective for the initial phase of a collaborative water management effort.

Example Goal: Identify conservation goals and build community support for water management actions to enhance streamflows in the watershed.

Example Objective: Within six months, conduct a workshop to identify potential solutions and pathways to address water supply shortages and foster watershed stewardship practices.

Step 2: Identify the target audience.

It is important to identify the target audience and develop educational materials and outreach strategies that are transparent, inclusive, motivational, and informational. Identifying and messaging to a target audience should be guided by an understanding of shared concerns in the local community, watershed conditions, and ecological issues in the watershed. An initial step is to identify local leaders who can support outreach efforts and encourage local participation. These local leaders may include representatives of road or Fire Safe Council associations, conservation groups, resource agencies, elected officials, tribal council members, and so on. Garnering early support from these important members of the community can help with information sharing and help resolve issues that might arise.

Outreach efforts to individual community members are often conducted as one-on-one meetings at a landowner's property or on the phone, as many landowners may not attend public meetings. Group outreach might include meetings at people's homes, a local town hall meeting, a fundraiser, or another community event. Whatever the size or venue, outreach efforts need to be tailored to effectively share information, build collective support, and gather valuable feedback from stakeholders.

Step 3: Develop and implement concrete outreach strategies to inform the target audience.

Once the target audience has been identified, the conservation entity can develop a variety of outreach and educational materials and disseminate them, including factsheets, maps, fliers, educational posters, and PowerPoint presentations that can be shared at meetings and distributed via mail and/or email. When creating educational materials that involve complex legal and regulatory requirements, it is best to ask water rights specialists, legal experts, or relevant agency personnel to review descriptions of regulatory processes. Involving experts in the crafting of educational materials ensures that descriptions are legally vetted and helps engage the experts in the collaborative process. Similarly, creating educational materials or public meeting agendas with other stakeholders cultivates buy-in and can leverage resources like printing and facilitation costs. Working collaboratively with agency personnel helps them understand your good-faith effort to provide accessible information to a shared target audience and creates opportunities for constructive feedback. Regardless of the complexities of the effort, it is important to present information in ways that are accessible to the community. For example, use layman terms, and provide materials in multiple languages if you need to reach community members whose first language is not English. You may need to send information by mail or provide it at public locations, such as community centers, libraries, and other public spaces, to reach community members who have limited access to the internet or common local news sources.

Communications tools and strategies

Take advantage of existing community forums and networks

In many rural communities, existing forums play an important role in community engagement, including local road associations, volunteer fire departments, community services districts, homeowner's associations, service organizations (e.g., Rotary Club, Soroptimist International), and agricultural collectives. Interface with other educational efforts to increase the public profile of the project. Identify other efforts that dovetail with water management and can expand the constituent base, including Fire Safe Councils, Farm Bureau chapters, Regional Water Quality Control Board public meetings, cannabis compliance workshops, and so on.

Use online media

For most stakeholders, online media is an effective way of sharing information. If it is feasible, create a publicly accessible webpage to provide project resources, flow data, water conservation opportunities, and other pertinent resources. Developing an online presence for a CWM effort does not require a large financial or staffing investment. It could be as basic as a Facebook page or a page on the website for a related project.

Reach out with print and radio

Print and radio are important sources of information for many rural residents who have limited familiarity with or access to the internet. Initiate a public print and radio media campaign with clear performance measures (e.g., target number of radio interviews, news articles, community newsletters).

QUICK TIP: Outreach materials should direct interested parties to a website or other accessible platform that includes project information, real-time flows, and other resources so community members can peruse information on their own timeframe.

Educate stakeholders

Distributing well-designed materials is an effective way to educate and engage new stakeholders. Educational outreach can include:

- Water conservation and water rights brochures
- Educational posters about water conservation that can be posted in garden supply stores and other venues
- Public workshops and tours of existing projects that demonstrate the utility of one or more approaches that you want to promote as part of CWM
- Hands-on training workshops that demonstrate how to implement water management tools such as rainwater collection systems

Recommendations for fostering community engagement

Engaging the community and soliciting community input in a proactive way are cornerstones of the CWM approach. Voluntary water conservation strategies will have more traction if there is community buy-in. In addition, the effort will be more sustainable if it is driven by local leaders and stakeholders who stand to benefit from increased streamflows. Sharing data about ecology, flows, and the impacts of water use on shared water resources helps residents understand the benefits of working together to preserve instream flows for fisheries and ensure reliable water supplies among all water users into the future. Their heightened awareness and understanding of the issue(s) translates into an increased desire to preserve the ecological value of their stream.

Provide multiple opportunities for public engagement, including house parties, public meetings, free water conservation workshops, and/or field tours of demonstration sites to showcase exemplary projects that are likely to engage or inspire other landowners. It's helpful to have an RCD or Natural Resource Conservation Service representatives on field tours so landowners can learn about resources and funding opportunities for conservation projects and can talk to a local landowner who is a strong advocate for the approach. In addition, it is ideal to offer landowners a range of ways to engage in the effort, including citizen monitoring, organizing their neighbors, maintaining community flow signage, and hosting house parties or a public forum.

Maximize the effectiveness of private or public meetings by developing a clear agenda with desired outcomes, creating a dynamic agenda that allows interaction, and arranging for an experienced facilitator and a designated note-taker. Be sure to have a sign-in sheet so you can build a network of stakeholders. After the meeting, distribute the meeting notes with action and follow-up items and associated timelines for accountability purposes. It is important to keep community members informed about important milestones in a water management effort, including new funding opportunities, scientific findings, and changes in laws or regulations that may affect them.

In summary, a communication strategy and outreach plan should be tailored to the specific CWM effort. It should be proactive and take into account the constituency and existing community forums. Discussing project development with those who are most likely to be involved in the planning process from an early stage can build stakeholder buy-in and social capital that result in better overall community participation.

Chapter 5

Defining Shared Goals – Agreements and Charters

Benefits of Written Agreements

Written agreements among landowners and other parties can enable them to successfully collaborate to achieve water management goals. A CWM approach can use any of a variety of agreements, such as a watershed charter, forbearance agreement, or SHA. The overarching strategies identified within a CWM Plan, as well as the needs and interests of participating individuals, will determine which type(s) of agreement is practical or necessary for the specific situation. A voluntary agreement developed among landowners and conservation entities can be a way to formally identify roles and responsibilities and specify how resources will be shared among participants. In other situations, a formal agreement may be needed to secure a permit for a water management project.

There are a variety of advantages for using written agreements as part of a CWM approach:

1. Provide a common understanding. Written agreements document agreed-upon roles and strategies and provide a timeline to ensure that participants have a common understanding of the CWM approach and their individual responsibilities. This is particularly important for efforts that involve numerous participants, multiple objectives, and/or are intended to be implemented over a long time period. An example of a written agreement is a watershed charter that clearly describes the goals and objectives of the collective group and the roles and responsibilities of the various participants.

2. Document participants' commitments. Formal agreements can be used to document the participants' commitments to provide beneficial outcomes for both the environment and participating water users. When an action such as forbearance is identified in a written agreement, it is more likely that the water will be left instream at critical time periods. Creating a written agreement can also result in project support and regulatory assurances for participating water users. An SHA[8] is an example of a formal agreement that clearly identifies the commitments of the participating landowner, while providing the landowner with regulatory assurances that they will not be subject to any additional restrictions as a result of changes in the protections associated with the identified listed species during the agreement period.

[8] *See Chapter 3 for more information about Safe Harbor Agreements (SHAs)*

For projects that involve water storage and forbearance of diversions, an agreement between the landowner and the RCD or other conservation entity facilitating the project will specify the timing that the landowner commits to forbear diverting water from the stream as well as the level of technical and/or financial assistance that the landowner will receive to install a tank or pond on their property.

3. Ensure longevity of the CWM Plan. Formal agreements that include a commitment to participate for a specified period of time help to ensure that upfront investments provide a long-term benefit to instream flows and water supply security. This reassures participating parties that the time and resources they commit will have a long-lasting result. In fact, many permitting and grant programs require this type of commitment. Conservation easements and forbearance agreements that are recorded at the County Recorder's Office can provide assurance that a commitment will continue to be implemented over time, even if property ownership changes.

4. Provide necessary documentation to receive permits. Regulatory agencies regard many types of written agreements as durable commitments. They require specific documentation in the form of a written agreement, such as an SHA, in order to issue a permit. Even if it is not required, when a written agreement describes how the proposed efforts will reduce the impacts of water use on the environment and other water users, it makes it easier for an agency to issue a permit authorizing the proposed activities. Forbearance agreements and other formalized agreements to commit water instream for specific fish and wildlife benefits can support the State Water Board's decision to approve a Section 1707 water right dedication that protects water dedicated instream.

5. Increase eligibility for technical assistance and funding. Landowners and water users who are willing to engage in a formal written agreement often become eligible to receive technical support and permitting assistance as a participant in a CWM effort. Participants may also become eligible to receive financial support from grant programs, such as those administered by the Wildlife Conservation Board (WCB) and CDFW.

6. Entitle water rights holders to other benefits. Instream flow dedications and conservation easements may entitle landowners to a tax benefit or make them eligible for conservation funding to compensate them for the water they commit to leave instream.

Types of Agreements

It is critical to understand the appropriate type and scale of any agreement in order to support a successful CWM effort. As mentioned in Chapter 3, in some situations a permitting or regulatory approach requires a formal agreement and may dictate the scope and content of the agreement. In other circumstances, the format of an agreement may be shaped by a grant funding requirement. Even where no formal agreement is required, developing one can still be extremely useful for the reasons identified above.

The formal agreements explored in this section are organized based on the scale of the proposed effort and the corresponding content they include:

- **Watershed/tributary-scale (charters)**
- **Site-specific (SHA site plans, conservation easements, water management plans, and forbearance agreements)**

A CWM approach can benefit from, and in some situations may require, a combination of agreement types in order to address both the general goals and objectives to which all participants of the effort agree, as well as more specific commitments made by individual participants.

Watershed/Tributary-Scale Agreements (Charters)

A charter is an agreement that defines the project goals among program participants in a specified watershed area and the tasks that they agree on to accomplish these goals. A charter ensures that all participants have a clear understanding of one another's roles and what is required to achieve shared objectives. A charter can be developed voluntarily to solidify the working relationship and to articulate the goals and expectations of a group participating in a CWM approach. In some situations, a charter may be required in order to receive a permit. For example, a project charter must be submitted to the State Water Board by a group of water diverters who intend to organize themselves as a watershed charter group and want to utilize the North Coast Policy's Watershed Approach for processing new water rights petitions and/or modifying existing water rights, as described in Chapter 3.

A group of water users can adopt a charter as a means to agree upon and document shared stewardship practices, forbearance thresholds, and/or pumping schedules. A watershed or tributary charter can share best management guidance, formalize agreements about water usage, and clarify methods to achieve watershed goals. The development and implementation of a charter with other water rights holders can make it feasible to pool resources to pay for any required studies and water availability analyses that are needed to modify existing water rights and apply for new water rights associated with a storage and forbearance program. Sharing these costs can enable the group to pay for more detailed watershed analyses and help them develop a more informed perspective on the appropriate scale of a restoration project or diversion than could normally be achieved by a single applicant. Theoretically, the approval process that determines water availability for each individual project can be streamlined, since the proposed projects are in the same watershed and utilize much of the same background information.

Site-Specific Agreements

One of the key elements of a CWM approach is identifying on-the-ground projects and modifications in water management practices by participating landowners. A site-specific agreement provides the details of how water management practices and projects in a CWM plan or watershed charter are put into practice on a specific property. This type of agreement is a tool that codifies landowners' commitment to participate in a CWM approach. It may help them acquire project funding and/or permits, or it may be required as a result of funding or permits.

Information to include in a voluntary watershed or tributary charter:

- The name of the group
- The purpose(s) of the charter
- The overarching goals, scope of the effort, and general approach
- Charter members, their roles and responsibilities, and the membership process
- The process for holding meetings, notifications for meetings, and general communications
- The time period that the charter is valid

Safe Harbor Agreements

A Safe Harbor Agreement (SHA) is a voluntary agreement involving private or other non-federal property owners, intended to support the recovery of a threatened or endangered species. As described in Chapter 3, an SHA can be developed for a single property, or a Template SHA can be developed as the starting place for multiple SHAs as part of a more programmatic effort.

A Template SHA is conducive to a CWM approach in that the SHA is established for a specific region, where multiple individuals or entities are expected to enroll in the SHA program. With the Template SHA approach, an RCD, conservation entity and/or coalition of landowners, act as a coordinating entity that facilitates and coordinates the development of a template agreement with the permitting agency (i.e., NOAA, USFWS, and/or CDFW, depending on the identified species and their listing status). Individual landowners subsequently apply to the permitting agency for their own individual permit for activities that comply with the previously approved Template SHA. A survey of each property is conducted to determine the baseline condition. Each landowner commits to maintaining their property at or above the existing baseline for the time period of the agreement (from 5 to 50+ years). Individual landowners also work with the coordinating entity and/or the permitting agency to develop a site-specific plan that spells out best management practices and other actions to which the landowner commits. Activities can include fencing off riparian areas, planting native trees and shrubs in riparian zones, improving irrigation efficiencies, managing grazing, introducing gravel bars and woody cover to improve habitat, and removing barriers to fish passage. Once a site plan has been approved for a property, the permitting agency enrolls the property into the SHA program by issuing a certificate of inclusion.

Site-Specific Water Management Plan

A water management plan is an important, and often required, component of grant-funded water management and conservation projects. Even when it is not required,

Safe Harbor Agreements must contain the following information:

- The property and the specific species and associated habitats covered by the Agreement
- The responsible parties (who will implement activities on the property and who will monitor the maintenance of baseline conditions)
- The agreed upon baseline conditions for the property (whether the property must maintain an elevated baseline or whether it can return to the existing baseline once the term of the agreement ends)
- Management actions that will accomplish the expected net conservation benefits to the species and the committed timeframe for these actions
- The anticipated results of the management actions and any anticipated incidental take associated with the management actions
- A notification requirement to inform wildlife agencies and give them a reasonable opportunity to rescue individual covered species, (if it is appropriate and feasible) before any authorized incidental taking occurs
- How other requirements of section 10 of the Endangered Species Act and/or Fish and Game Code (depending on whether the SHA is federal, state, or both) will be satisfied

a site-specific water management plan can be a useful tool in a CWM approach to consistently document each participant's specific commitments to the overall approach. There is no specified format for a water management plan, although some grant funding entities have their own requirements. The box to the right provides examples of types of information to consider including in a water management plan.

Potential information to include in a site-specific water management plan:

- The parties involved and why they are entering the agreement
- The terms to which the water user is agreeing (e.g., timing of forbearance, pumping rates, conservation measures)
- Maintenance and repair responsibilities (if applicable)
- Monitoring commitments by landowner/ water user or permission for another entity to conduct monitoring
- Schedule of any key dates (e.g., forbearance periods, when to fill tanks, monitoring schedule)
- Recordkeeping and communications (e.g., contact information, methods for communication)

Conservation Easements

Conservation easements are voluntary, permanent, legally binding agreements that restrict the uses of, or activities on, a property for conservation purposes. Conservation easements are often established between land trusts (or agencies) and landowners who want to protect specific resource values of their land in perpetuity. They can include terms that restrict or condition the diversion and use of water associated with the property, so they serve as a permanent forbearance agreement. Typically, a conservation easement is associated with the use of an entire property and the suite of rights associated with it, although it can also be used as a tool for conditioning a single aspect of the property, such as an individual water right.

A conservation easement often provides significant financial benefits for landowners because they can receive an upfront payment for the rights to the property that they are relinquishing under the easement and they can lower their estate tax liability. A conservation easement is also a mechanism for a landowner to permanently safeguard the habitat values, water quality, open space, and traditional uses on their property.

Forbearance Agreements

A forbearance agreement is a formal agreement between a willing landowner or water user and a land trust, RCD, or other conservation entity that outlines the responsibilities of the landowner or water user to forbear from diverting water during a specified period of time. The timing specified in the agreement should be informed by protective flow thresholds and should adhere to regulatory requirements. Forbearance terms may be tied to dates (e.g., June 15-October 15), or certain flow thresholds (e.g., 2 cfs), and are often determined by when instream flow is most needed to meet the life-cycle needs of a particular species or to maintain ecosystem functions. For example, seasonal forbearance periods for programs in Northern California typically extend for three to five months during the driest period of the year, when instream flows are critically low for juvenile salmonids and other aquatic species.

The overall length of time that a forbearance agreement is valid can range from a single season (or less) to permanently (when it is recorded as a permanent deed restriction on its own or within a conservation easement). The time period of the agreement is often tied to factors such as the anticipated timespan of the overarching program, the lifespan of the infrastructure installed to facilitate the committed forbearance, or requirements imposed by permits or grant funding agreements. For example, grant funding programs administered by CDFW and WCB specify that water conservation projects that receive funding for streamflow enhancement projects include forbearance agreements with a term of at least 20 years.

A forbearance agreement is typically executed between just two parties: the landowner or water user and the administering entity. As part of a CWM approach, however, a template forbearance agreement provides common terms and conditions that apply to all participants, while actual agreements are individually prepared and signed for each participating individual or entity.

Information that should be contained in forbearance agreements:

- Recitals (background facts) explaining who the parties are and why they are entering the agreement
- A description of the forbearance terms to which the water user is agreeing, including the dates and/or minimum flows that trigger forbearance, plus the source waters to which it applies (including groundwater and tributaries, if applicable), and any provisions for exceptions in case of emergency
- What the water user is being promised in return for the forbearance (e.g., a storage system or other infrastructure)
- A description of the property to which the forbearance applies
- The term of the agreement and associated water management plan
- Provision for recording the agreement with the property deed so it is binding on future owners

Table 1: Key differences in streamflow protection agreements (excerpted from the SFI Legal Options Guide)

Characteristics	Forbearance Agreement	Conservation Easement	Water Code Section 1707 Streamflow Dedication[1]
Permanent?	No	Yes	No
Requires State Water Board approval?	No	No	Yes
Provides tax benefit?	No	Yes	No
Protects flows from downstream users?	No[2]	No	Yes
Protects existing water right from forfeiture?	No	No	Yes

1. While a streamflow dedication under Water Code Section 1707 is a water rights permitting procedure and not an agreement, it is included here as one of the primary approaches for providing water instream for environmental benefit. For more detail, see Chapter 3.

2. A forbearance agreement only protects flows from use by downstream users if the downstream users are a party to the forbearance agreement and have agreed not to divert water left instream.

Chapter 6

Collaborative Water Management Framework

The ability to establish a CWM program in a particular area depends on a range of factors, including environmental and regulatory imperatives, economic drivers, and willingness of landowners.

This framework is intended to support collaboration between conservation entities and landowners in order to expedite and advance streamflow restoration. When the conditions are favorable, these types of collaborative efforts can provide water security, regulatory compliance, and cost savings to participating water users.

Successful community-based approaches require landowner support and the ability to bring stakeholders together to identify water management actions and conservation strategies. Successful efforts also embrace local solutions that can meet water needs and have established protocols to measure the efficacy of implemented projects. Developing goals for restoring flows and implementing water projects is often an iterative process that requires scientific flow monitoring, agency guidance, and the integration of community feedback.

Key steps in implementing such an effort include the following:

- Set flow objectives and restoration goals.
- Support and incentivize collaboration among watershed stakeholders to develop plans and improve the ease and cost-effectiveness of implementing water management projects and actions.
- Improve water supply reliability by improving the way people manage water (changes in the timing, amount, source, and/or location of diversion).
- Install new or modify existing infrastructure (tanks, ponds, diversion pumps, water delivery systems, soil moisture meters, etc.) to enable flexible management of water resources.
- Obtain any necessary permits and approvals that authorize changes and ensure that they are carried out to produce benefits over time.

It is important to recognize that the specific approaches and details of any CWM planning effort will be unique to the particular issues and stakeholders involved in the focus watershed.

The following framework outlines phases and key steps that can help guide development of a CWM planning effort. Key steps within these phases include data collection and assessment, community engagement, goal setting, planning, seeking funding and support, and implementation. In some watersheds, a conservation entity may need to start by prioritizing tributary watersheds within a larger basin or planning area (Phase 1). In other circumstances an entity may already know where to develop a community-based planning effort and can skip the initial assessment process and start focused planning efforts (Phase 2). The steps within each phase are not necessarily sequential. They are often taken concurrently and vary based on the watershed and on whether planning efforts are already underway.

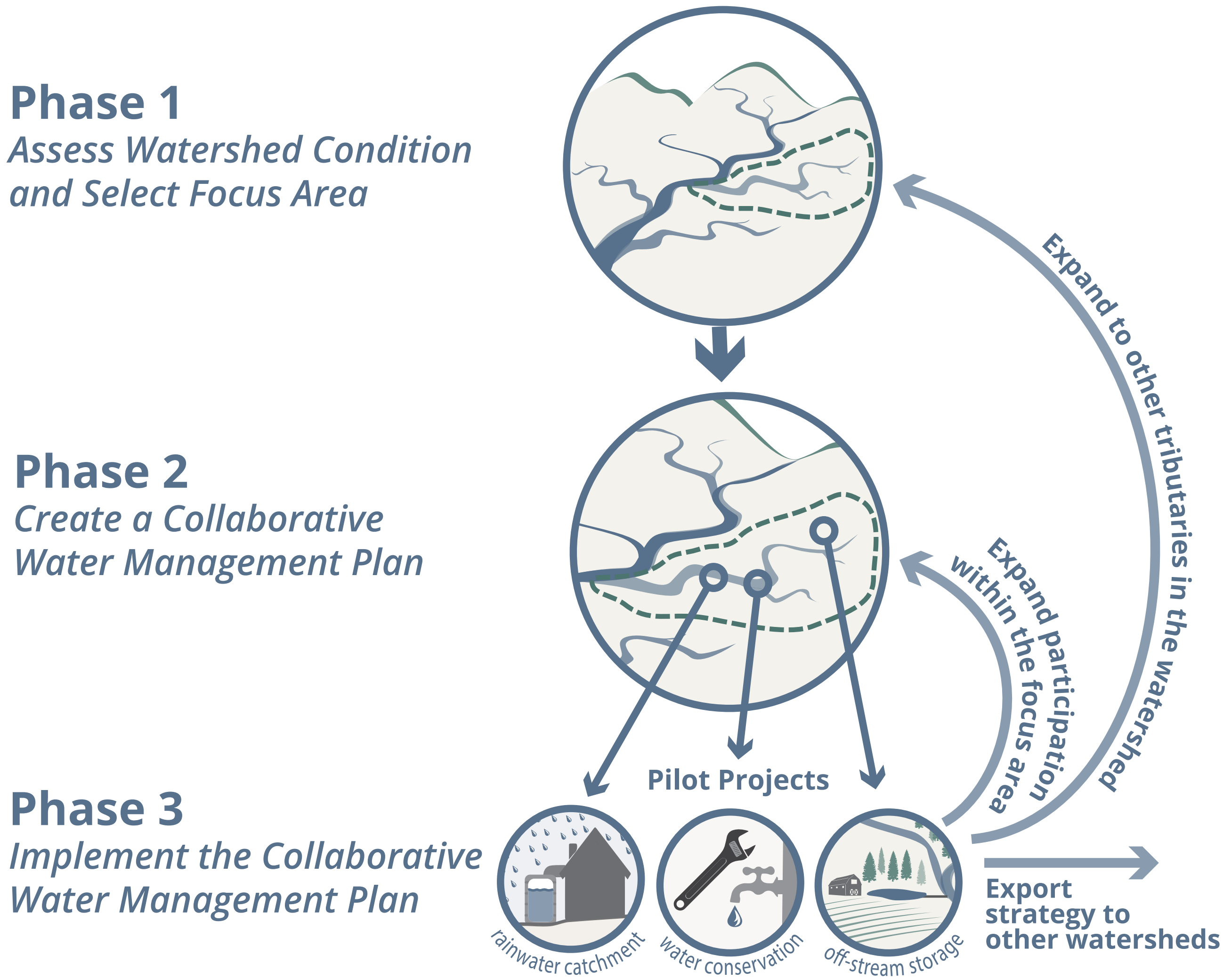


Figure 5: Phases of the CWM framework

Phases and Steps of a Collaborative Water Management Framework

PHASE 1: Assess watershed condition and prioritize effort

Step 1: Conduct initial assessment of watershed conditions and community interest

- Identify streamflow and management needs based on readily available information
- Assess general community interest
- Identify and seek initial funding to support project planning
- Determine whether a CWM effort can fit within or complement any existing programs

Step 2: Select priority focus area(s) within the watershed

- Identify a priority focus area (tributary or stream reach) for targeted streamflow enhancement
- Prepare to monitor stream conditions
- Work with landowners to establish monitoring access
- Analyze existing streamflow, habitat, and water use data
- Cultivate landowner support for implementing environmental water projects

PHASE 2: Create a collaborative water management plan

Step 3: Focus area outreach and assessment to support plan development

- Focus area outreach and community engagement
- Conduct water use assessment within focus area

Step 4: Develop collaborative water management plan

- Incorporate information and selected approaches into a CWM Plan
- Develop specific flow restoration goals
- Identify potential water management tools and strategies
- Establish a long-term flow monitoring plan

PHASE 3: Implement the collaborative water management plan

Step 5: Implement a CWM program

- Develop project proposals with willing participants
- Seek funding for water management project design and implementation
- Get “shovel-ready”
- Coordinate information exchange and ongoing communications
- Reassess and adapt
- Sustain the program

Phase 1: Assess watershed condition and prioritize effort

Rural communities often have a general awareness or concern that altered streamflows are impacting their fisheries, aquatic resources, and/or water supply reliability. In some watersheds where streamflow and water use data are readily available, the community may already be receptive to the idea of collectively addressing water management issues using a CWM framework. With limited resources to develop and implement projects, a key first step is figuring out where to focus efforts within a larger planning area. In watersheds where there is already a clear understanding of water use, needs, and existing support, it may be possible to quickly determine the sub-watershed area in which to focus initial efforts and what water management tools to use as part of a CWM approach without much additional assessment or prioritization. In most situations, however, additional data collection, evaluation, and community outreach are needed to better understand the existing conditions, needs, and level of community interest prior to determining that a CWM approach is appropriate and identifying an area of the watershed in which to focus initial efforts.

Step 1: Conduct initial assessment of conservation goals and community interest

***Goal:** Identify overarching conservation and water supply concerns and build community support for water management actions to enhance streamflows.*

Identify streamflow and management needs based on readily available information.

A cost-effective first step is to gather and analyze existing information to better understand the watershed conditions, land-use activities, water supply needs, and viability of various flow enhancement strategies to help inform CWM program priorities and strategies. For efforts that focus on enhancing streamflows for salmonids, the NOAA Fisheries recovery plans for listed salmonid species include high-priority recommendations to address the primary limiting factors of water quality, water quantity, and fish passage barriers. Each of these limiting factors is typically either primarily or partially impacted by streamflow impairments. Scientific reports from universities, conservation groups, or other resource management entities can also provide a wealth of free information. The State Water Board often has important water quality data, including sources of impairment and temperature data at the watershed scale. Review information from state and federal species conservation plans, watershed management plans, and Total Maximum Daily Load (TMDL) temperature action plans that are specific to the watershed to understand watershed and species conditions, as well as discovering any high-priority recommendations that resource agencies have already identified. Developing even a coarse understanding of community water use and needs can be helpful at this initial assessment phase. Phase 2 provides guidance on methods to conduct more detailed analyses of water use and supply needs that will help inform prioritization efforts.

Assess general community interest

A CWM approach should seek input from key community members regarding how local conditions impact environmental and human water use needs. This initial outreach helps assess the level of stakeholder interest and the receptiveness of the community at large to a CWM approach within the watershed. Initiating conversations with local partners, established groups, and community leaders about potential flow restoration and water management actions will help to identify shared goals, objectives, and opportunities for partnership. In addition, gaining early and meaningful support from these entities and individuals can help build broader community support for a CWM effort.

> ***QUICK TIP:*** *Identify leaders in the community who support flow enhancement efforts and may participate in initial pilot projects. These early adopters can be valuable partners when you are creating a CWM program.*

Determine whether a CWM effort can fit within or complement any existing programs

When you are initiating a CWM effort, determine whether there are any existing programs in the region that could support or be supported by a CWM approach. Understanding how your effort fits within, overlaps with, or complements an existing program can help leverage community support, technical support, and funding opportunities associated with an established program. Common programs that are implemented locally at a regional or watershed scale and that could complement a CWM approach include, but are not limited to:

- ***Integrated Regional Water Management (IRWM) Plans*** [9]
- ***Sustainable Groundwater Management Act (SGMA) Groundwater Sustainability Plans***[10], particularly in watersheds that contain Groundwater Dependent Ecosystems (GDEs)
- ***Salmon Habitat and Restoration Priorities (SHaRP)*** efforts spearheaded by NOAA Fisheries and CDFW[11]

Identify and seek initial funding to support project planning

Community outreach, project planning, and flow monitoring all require investments of time and funding. Initial start-up funds are sometimes available from the Natural Resources Conservation Service, local community foundations, or membership funds, or they may be a line item in an existing planning grant. Leveraging existing efforts or studies being conducted by agencies, academics, or restoration partners is a great way to maximize limited funding in the initial phases of project development. State agencies have limited planning funds and prioritize watersheds that are considered critical for streamflow enhancement. In California, most state and federal funding programs that support streamflow enhancement planning and implementation projects prioritize efforts that demonstrate a direct benefit for salmon populations. It is possible to obtain funding to support streamflow enhancement efforts for other listed species or other conservation purposes, but there are fewer funding sources available for efforts that do not benefit salmon populations.

Step 2: Select priority focus areas within the watershed

Goal: Assess and identify priority tributary watersheds to improve instream flows for fish and water supply reliability for landowners. Select one to serve as an initial pilot demonstration project.

Identify a priority focus area (tributary or stream reach) for targeted streamflow enhancement

Assessing tributaries to understand the need and potential to improve instream flows and water supply reliability for landowners is an important step when establishing a new program within a large planning area. The prioritization process is an opportunity to ensure that primary goals and objectives for creating a flow restoration program guide the selection of sub-watersheds for further consideration and for potential restoration projects. Identifying selection criteria can help prioritize watersheds and stream reaches where flow enhancement activities are most likely to be successful.

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[9] https://water.ca.gov/Programs/Integrated-Regional-Water-Management
[10] https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Groundwater-Sustainability-Plans
[11] https://www.calsalmon.org/sites/default/files/files/2017_Confab_Weeder_Recovery.pdf

The following conditions could describe an appropriate focus area within the larger watershed:

- There is high intrinsic habitat value that would be preserved or enhanced by changing water management during a specific time period.
- Coordinated participation among water users could measurably improve flow conditions.
- There is a demonstrated history of stewardship practices in the area.

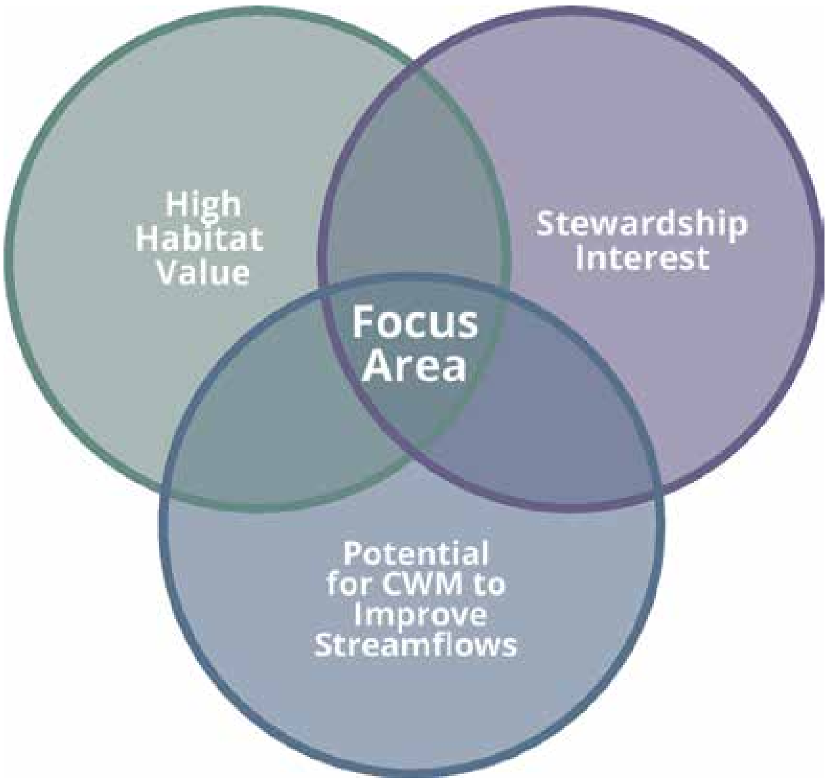

Figure 6: Primary conditions to evaluate when identifying a focus area for a CWM effort

Streamflow enhancement efforts in rural watersheds typically focus on summer rearing habitat for juvenile salmonids, when streamflows are often altered. Rearing habitat generally exists in the lower reaches of tributaries or the upper portion of the mainstem of smaller watersheds. In order to improve this habitat, it is essential to understand the locations of historic and current rearing habitat. This information will determine where in the watershed flow enhancement projects will provide the greatest benefit for the focal species. It is also critical to have a solid understanding of where and when water diversions and other water management activities are impacting available habitat. Finally, evaluate the extent that water users are willing to engage in stewardship efforts and collaborate with their neighbors and other stakeholders in the tributary or stream reach.

Prepare to monitor stream conditions

Once an initial assessment has indicated that a CWM approach would appropriately advance improvements within a watershed, then an RCD or other conservation entity should explore natural streamflow data (Natural Flows Database, www.rivers.codefornature.org) and identify existing streamflow and habitat data gaps and monitoring needs. Streamflow data can reveal current flow conditions and trends, and baseline data for both streamflow and habitat conditions can be used in future to evaluate the success of a completed streamflow enhancement project. It is also helpful to have data to reference when seeking funding, in order to justify the planning effort and explain the flow enhancement benefits that you expect from the proposed project.

> ***QUICK TIP:*** *Warm water can significantly limit or eliminate habitat suitability for aquatic species, such as juvenile salmon. In these situations, it is important to install water temperature sensors and assess how temperature and streamflow are correlated.*

In some watersheds, existing stream gauge records or a recent streamflow study can provide valuable baseline information about the hydrology within the watershed. However, many watersheds have few, if any, stream gauges. Establishing a gauging network throughout the watershed prior to selecting the focus areas for initial efforts will help provide data to inform tributary prioritization, especially in a large watershed where the long-term intent is to eventually develop and implement flow enhancement and water management projects in multiple tributaries. Alternatively, if a planning effort is being undertaken in a watershed where the priority tributary or other focus area has already been identified or where resources are limited, monitoring efforts may be limited primarily to the identified project area. The scale and complexity of a gauge network or other streamflow monitoring approach will vary depending on the scope of the effort and the resources available. When establishing new or additional gauges or monitoring sites under any scenario, resource managers and scientists should consider the locations of important known or expected environmental features (e.g., rearing habitat for salmon) and known or suspected water diversions.

> ***QUICK TIP:*** *Local landowners can be a valuable source of information regarding which streams seasonally go dry in some years or historically have had year-round flows.*

Existing data about habitat conditions for focal species also vary dramatically from one watershed to the next. You will likely not be able to find as much historic and current data on instream habitat conditions in smaller tributary watersheds as in larger rivers. CDFW has documented physical stream characteristics and habitat for salmonids in stream inventory reports. These reports are often a great resource, although some of them are quite old and contain outdated information. Anecdotal data provided by residents, local scientists, and resource managers can often help fill data gaps. Local residents often have intimate first-hand knowledge of changes that they have witnessed in the landscape. Seek their input and observations to identify stream reaches and specific locations where important features, such as deep pools, are located. Asking them for information both helps to engage them as valued partners in planning efforts and also provides valuable input that can

Some example questions to ask when you are evaluating flow and temperature data:

- What sub-watersheds have water temperatures in the range (or close to it) to support summer-rearing salmonids?
- What sub-watersheds have temperatures well above those thresholds?
- Where do stream reaches go dry and for how long do they go dry? Are they dry for a relatively short period of a few weeks or for most of the summer and fall?
- Which reaches have impaired flows, to what degree are they impaired, and what is the cause of impairment?

Work with landowners to establish monitoring access

Identifying receptive landowners early on can help to establish access to stream monitoring sites. In a decentralized watershed, monitoring sites are often located on private land, and pre-project data are essential to demonstrating the flow improvements associated with water management actions and future projects. Another way to engage landowners and other community members is to seek their assistance with setting up sites, maintaining road signage that shows current flows, and doing seasonal creek walks. Many community members take pride in understanding the fluctuating conditions of their local creek. Community members who understand the flow monitoring effort and feel invested in the process can be great representatives to their neighbors. Often, individuals who engage early in the process are in a better position to benefit from grant funding for technical assistance, water storage infrastructure, permitting, and eventually a funded restoration project.

Analyze streamflow, habitat, and water use data

Comparing streamflow conditions over multiple years, and ideally at multiple locations within the focus area, can help participants better understand how conditions vary (dry, average, or wet years), and how human water uses change depending on these conditions (e.g., you may see fluctuations in streamflow caused by water diversions more clearly in dry years than in wet years). Gauges located downstream of diversions that record information at 15-minute intervals often provide revealing information about the time periods and extent to which water diversions impact streamflow. Mapping the connectivity of important stream sections or depths of pools that provide key rearing habitat during different streamflow conditions can help correlate the impacts of streamflow on habitat availability.

If existing flow data are missing and it is not possible to collect new data, there are great resources available that can help a conservation entity to initially assess impaired flows. One such tool is called the ***California Environmental Flow Framework's (CEFF) Natural Flows Database***[12]. This database provides estimates of what full natural flows would be in different water year types, absent any diversions, and, in some locations near long-term gauges, provides an estimate of impaired flows. Another option is to talk with local landowners, who can often indicate which streams seasonally go dry in some years, or historically had year round flows. Estimates of "functional flows" – flow elements of a natural flow regime that support important ecosystem processes – are also available through CEFF for nearly all streams in California, and are helpful in understanding ecological needs and flow alteration in areas of interest.

Identifying the priority watershed for an initial collaborative water management plan should take into account which tributaries are most critical for fisheries recovery and where a change in management actions could measurably enhance flows and decrease water temperature. To assess the current status of fisheries in priority watersheds, reference existing state and federal fisheries recovery plans that synthesize existing studies by watershed and habitat conditions, conduct a stream assessment, and/or review any existing assessments.

[12] *https://rivers.codefornature.org/#/home*

Conservation entities and scientists should analyze available land use data and water rights records to identify water diversions and potential areas with impaired flow. They can use the State Water Board's projections of small domestic use per household to calculate a water budget based on the square footage of irrigated lands, in order to get a general estimate of water use within a tributary watershed. Another approach is to utilize GIS software to map human water needs, such as residences, wineries, and agricultural fields, and assign demand estimates to each digitized feature in order to identify the areas with significant dry-season water demand. Another way to identify areas with significant water use is to conduct a basic water rights analysis to identify landowners in areas of interest who have registered claims or rights to divert water in the dry season. Water rights data can also reveal water uses that are not apparent from remote sensing alone (such as large appropriative water rights or water used for practices like grazing).

Cultivate landowner support for implementing environmental water projects

Collaborating to enhance streamflows and water supplies within a tributary or a larger watershed is a long-term endeavor that requires building and maintaining community support. The saying that "there is never a second chance to make a first impression" rings true for community outreach. Voluntary conservation initiatives will benefit from early engagement that establishes community buy-in. A robust outreach effort with support from key local leaders can increase awareness, support and participation. Ultimately, the level of local support will help determine the tributary watershed that is selected for a first planning effort.

QUICK TIP: *It is critical to identify leaders and early adopters in the community who are willing to pioneer pilot projects and lead by example. These early adopters often become ambassadors who can effectively represent the project and process with their neighbors. In some CWM efforts, connecting with these leaders is done very early in the overall process as a way to garner enough support from the community to develop a CWM plan, while in other efforts the early adopters' projects are the first to be implemented once a CWM plan is developed.*

Phase 2: Create a collaborative water management plan

A CWM plan summarizes the watershed, hydrologic, and fisheries conditions, flow objectives and restoration goals, and helps guide development and implementation of management actions and projects. While the planning effort might identify initial projects, the plan is not intended to be prescriptive at the outset. Rather, it should create the enabling conditions for ongoing collaboration and be adaptive to new information and increased participation by current and future residents. A plan lays the foundation for achieving the streamflow goals that are collectively identified, but it may take many years to achieve, especially for larger watersheds with many residents.

Step 3: Focus area outreach to support development of a plan

***Goal:** Build on the existing outreach effort in the selected target tributary watershed to identify restoration partners and assess streamflow needs and water use at a finer scale.*

Focus area outreach and community engagement

Once a tributary or sub-watershed area has been selected as the focus area to initiate a CWM approach, project proponents should conduct targeted outreach to identify and begin coordination efforts with key stakeholders within this focus area. Stakeholders include landowners and other water users, local conservation groups, road or neighborhood associations, farm associations, and other entities that represent or are familiar with the landowners and water users within the focus area, as well as the issues that are important to them. Discussing the overarching concepts of a plan will familiarize them with potential resources that a CWM approach can offer and can help identify program participants.

Early on, it is helpful to develop factsheets that summarize watershed information, including streamflow conditions, fisheries habitat, and potential management actions. A webpage is a good platform to provide updates and post real-time flow data if available. Having visual resources available on a website or on printed materials can help landowners understand how quickly summertime flows diminish and how their water management actions may impact the stream. Chapter 4 provides greater detail on outreach and communication strategies.

Conduct water use assessment within the focus area

In order to create an effective CWM plan, it is important to understand water usage patterns within the focus area. While initial water use assessment efforts provided coarse information about water supply demands, more detailed information is needed to adequately assess an entity's or individual's water usage, water needs, and constraints that might limit options for water management projects. The most effective ways to gather information about individual water use are through one-on-one meetings or water usage surveys. The advantage of a survey is that it provides a framework for residents to think about their water usage, suggests mechanisms to prevent water loss, and offers opportunities to collaborate with neighbors.

***QUICK TIP:** Project development is often conducted in a series of rounds that include general outreach, targeted landowner outreach, funding, design, and implementation, with each round building on the success of the previous rounds and generating additional momentum.*

Water use survey recommendations:

- Notify all water users in the watershed that they will receive a survey. Describe the purpose of the survey and how the data will be used and made available.
- Mail a printed copy of the survey with a stamped remit envelope and also post an online version that can be emailed to individuals.
- After the results have been compiled follow up by providing a confidential summary of the results to the community.
- Use the survey to identify water users who are interested in participating in the CWM planning process. Potentially design a water management project for their property.

An important factor to consider is the extent to which water users are getting water from direct diversions vs. from wells. This has a significant impact on the types of projects that will be effective for improving streamflow. Projects that enable seasonal forbearance of direct diversions have a clear and immediate impact on downstream flow. The impacts of well pumping on instream flows are highly variable. A deep well that pumps from an isolated aquifer may not impact streamflows at all, while a shallow well in alluvial soil may have a direct and almost immediate impact on streamflow conditions.

Step 4: Create the collaborative water management plan

Goal: ***Develop a plan that outlines the flow objectives, hydrological and fisheries information, water use, existing water rights, and project and permitting considerations.***

Incorporate information and selected approaches into a collaborative water management plan

Informed by the initial assessments, prioritization, and community outreach efforts, the facilitating conservation entity can collaborate with water users and other stakeholders to develop flow objectives and restoration goals, refine the program strategies, develop a suite of flow enhancement options, and identify the associated permitting considerations. A CWM plan will provide a blueprint to develop restoration projects and promote management actions that can address individual water needs and provide mutual benefits, including cost savings for participants. It synthesizes information about watershed conditions, provides information on flow objectives and restoration goals, provides guidance for voluntary actions that do not require infrastructure (e.g., coordinated timing of diversions), and identifies the types of infrastructure projects that could improve the ecological health of an important stream and serve as demonstration projects.

Potential Elements of a CWM Plan

- Identify the purpose of the plan, the parties involved in its development, and the rationale for the chosen approach(es). Include a description of the key goals and objectives of the CWM effort.
- Describe the watershed conditions, including geology, climate, land use, and hydrology.
- Include a hydrologic evaluation that compares rainfall, stream discharge, and human water use on annual, seasonal, and monthly scales. Determine whether other water sources, such as groundwater, are available and to what extent they are being used to meet water needs.
- Identify the focal species or environmental processes driving the interest in improving instream flows. At a high level, what key limiting factors or impairments is the CWM approach aiming to address.
- Develop flow objectives and restoration goals. These objectives and goals may take a more general tone, focusing on restoring ecological processes and functional flows that protect an array of native plants and animals, or may focus on specific species.
- Recommend strategies to achieve the identified goals and objectives of the CWM plan. Include coordinated approaches that the community can take together, as well as the suite of recommended site-specific tools recommended for use (where practical).
- Summarize the administrative approach for plan implementation, including ongoing community communication and coordination efforts, monitoring and data collection, permitting approaches, project prioritization approach, and funding strategy. Identify key roles of plan participants.
- Outline an adaptive management strategy that can be used to guide the community through updating the CWM plan approach as needed to incorporate changes in project approaches and/or expansion of efforts beyond the initial participants.

Develop specific flow restoration goals

Developing quantitative goals for flow restoration is an essential part of collaborative water management. These flow objectives and restoration goals: 1. help identify flows needed at different times of year to support a species of interest or a broad suite of species and ecological processes more generally; and 2. should balance these ecological needs with human water needs. Setting such goals helps quantify the extent to which flows are insufficient in stream reaches that support, or historically supported, suitable habitat, and where the potential exists to enhance flows to an ecologically significant level. The California Environmental Flows Framework is an approach that can be used to identify recommendations for flow restoration projects. CEFF was designed to provide technical guidance to support efficient development of environmental flow recommendations that balance ecosystem and human water needs. The CEFF provides generally protective ecological flow criteria for each stream reach in the state based on a functional flows approach to protect native species[13]. It provides a stakeholder-driven planning process for assessing those criteria in light of flow alteration and existing human water uses, and helps to develop flow recommendations that account for both ecological and human needs. The ***CEFF Guidance Document***[14] describes the CEFF process for developing flow recommendations, which includes elements such as: defining management goals, evaluating the range of natural flows that historically supported native species and ecological processes (aka functional flow metrics), evaluating non-flow factors such as land changes from historical management that may be impacting flow conditions, assessing flow alteration, evaluating management scenarios and trade-offs, defining environmental flow recommendations, and developing an implementation plan. CEFF also provides guidance for when more detailed site-specific studies may be needed to develop flow recommendations.

Identify potential water management tools and strategies

The selection of water management tools and strategies to implement on-the-ground projects will most likely begin early on, when you are first engaging with residents in the watershed. Discussions with water users and landowners about water use and needs, possible management actions, and ways to improve water supply reliability, will naturally generate project ideas. Most site-specific projects will emerge over time, and the CWM plan should help highlight where specific types of management tools (as described in Chapter 2) and agreements (as described in Chapter 5) could be most effective. For example, in reaches where a number of water users are directly diverting from the stream, developing diversions and storage projects in combination with a forbearance agreement program that coordinates water diversion timing could significantly improve streamflows. In places where there are not many direct diverters but legacy land uses have modified the availability of summer base flows, upslope or instream projects to help improve shallow groundwater recharge would be a good option. Overall, it is up to the conservation entity leading the CWM plan to synthesize the information about the water resource needs and restoration goals, landowner interests and to creatively identify opportunities for improvement.

Establish a long-term flow monitoring plan

Some level of ongoing flow monitoring is essential to provide continued assessment of flow needs and to facilitate ongoing implementation of management actions that are based on streamflow or temperature thresholds. In addition, ongoing monitoring can help quantify cumulative program benefits. It is a good idea to establish a monitoring location that is easy to maintain and where landowners have granted secure long-term access/permissions to provide continued data to inform decision-making. Some projects are likely to need permits or new water rights, so flow data from a nearby gauge can help answer water availability questions.

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[13] *Flow criteria are provided at https://rivers.codefornature.org/*
[14] *Guidance document for implementing CEFF criteria may be found at https://ceff.ucdavis.edu/guidance-document*

Also, some project permit terms or new water rights may have flow threshold requirements. Having access to gauge data in the watershed can make it easier for project managers and residents to effectively comply with terms identified in permits or agreements as they manage their water diversions.

Phase 3: Implement the collaborative water management plan

The implementation of a CWM plan will take many years, especially in large watersheds with many landowners. An underlying reason for emphasizing a collaborative approach is to foster landowner stewardship that will support long-term efforts. A plan should be flexible enough to accommodate the changing needs, interests, and additional participation of residents. Opportunities to develop and implement projects will ebb and flow over time as funding, local capacity, and needs change. Initial emphasis should be on implementing projects that meaningfully advance progress towards restoration goals, or that will successfully demonstrate different approaches to water management that benefit landowner water supply reliability, improve streamflow, and increase visibility and interest for the program in the watershed.

Step 5: Implement a collaborative water management program

Goal: Create a pipeline of projects by developing proposals, establishing funding sources, completing projects, and growing community awareness and support.

Develop project proposals with willing participants

Work with willing water users to develop water management project proposals and conceptual designs that help address water users' interests, needs, and constraints. For some water users, a pond or tank system might be the most desirable and appropriate solution to reduce reliance on summer water diversions. However, such systems are costly and require permits and possibly even additional biological studies. A simpler option for individual water users might be to focus on rainwater harvesting, which can generate significant amounts of water, particularly for landscape irrigation, with fewer permitting requirements. Other options include landowner coordination to refine management of their existing systems. A more detailed discussion of water management tools is included in Chapter 2.

> ***QUICK TIP:*** *Consider developing agreements that clearly describe the intended efforts, outcomes, and participant responsibilities to help enable plan implementation, promote informed decision-making, and support project permitting (see Chapter 5).*

Seek funding for water management project design and implementation

Funding is essential to implement most water management actions on the ground. Many landowners, particularly in agricultural regions, may be willing to pay for infrastructure and to cover operating costs, but need assistance with technical capacity and permitting. While most applicable grant programs allocate more funding for shovel-ready projects than for project design, it is possible to obtain grant funding for both. The Wildlife Conservation Board has a streamflow enhancement program with an annual solicitation. The State Water Board and CDFW both have programs that can fund planning and implementation efforts. The State Coastal Conservancy has grant solicitations for restoration projects that benefit coastal regions. The Natural Resources Conservation Service is also a source of funding for small agricultural projects. The Integrated Regional Water Management program provides funding and technical assistance.

> ***QUICK TIP:*** *Consult with funding agency staff before they post their grant proposal solicitation notices. They are limited on the advice they can provide once notices are posted.*

Get "shovel-ready"

In order to get to the shovel-ready implementation phase, projects need to adhere to county building and grading codes, California Environmental Quality Act (CEQA) requirements, and a variety of state and federal regulations. While some projects can be accomplished without any permits, others will require permits and approvals from multiple agencies. Establishing relationships with permitting agency staff and engaging them in an overall CWM effort can help ensure that these staff members understand proposed projects and can provide early guidance for achieving permit compliance. It is beyond the scope of this guidebook to provide an exhaustive permitting checklist, since each project has its own requirements and permitting pathway.

One important thing to keep in mind is that any time a state or local agency takes an action that may significantly affect the environment, the agency must analyze and disclose those actions in a document that satisfies CEQA – usually a Mitigated Negative Declaration (MND), or sometimes a more extensive Environmental Impact Report (EIR). Such actions include issuing permit approvals and providing funding through grant programs. In most cases, a local permitting agency will serve as the "lead agency" charged with ensuring CEQA compliance for a project. RCDs can also fill this role in the case of water management and conservation projects conducted on private lands, where the RCD provides technical assistance, project management, or grant management.

> ***QUICK TIP:*** *Make sure you adequately budget for each phase of permitting. Plan for the worst-case scenario, not the best!*

Table 2: Common permitting and regulatory requirements for projects

Agency	Type of Permit or Approval
Local or state agency project "lead"	CEQA
Local county or city	building and grading permit
California Department of Fish and Wildlife	LSAA (Fish and Game Code Section 1600)
State Water Board	water rights applications, registrations, and petitions
Regional Water Quality Control Board	State Water Quality Certification (Clean Water Act Section 401)
U.S. Army Corps of Engineers	Clean Water Act Section 404 permit

Coordinate information exchange and ongoing communications

Ongoing communication is an important part of CWM plan implementation. In situations where there is a coordinated diversion or forbearance schedule, it is important to provide timely information in readily accessible formats, such as the project website, signage within the community, and local public service announcements on community radio and websites. Targeted emails and letters can be an efficient way to remind participating water users about the diversion schedule and important streamflow information. Phone calls take more time than using an email distribution list or mailing a form letter, but they are a way to check in with participants directly to make sure they received the information and can provide an opportunity to solicit direct feedback from participants. To be thorough, utilize multiple mechanisms for communication (see Chapter 4 for additional information about communication strategies).

Providing ongoing communication about monitoring efforts and monitoring results is also an important way to keep participants informed and engaged in the program. Public forums such as community meetings, a website, public signage, or site tours can convey streamflow monitoring data and other program-related information to both program participants and others in the community who may become interested in participating to modify their water management. In addition, sharing information about program successes and lessons learned with the broader community, both within the larger watershed and beyond it, can help further CWM efforts at large (see Chapter 7 for information about expanding and exporting the CWM model).

Reassess and adapt

A CWM plan should not be static. Conditions on the ground are likely to change during the time that it takes to plan and implement successive rounds of project implementation, so continuing to monitor streamflow and incorporating the data into an adaptive strategy is important. Project implementation can

improve conditions; and changes in land use, climate, ownership, water use, and other variables can influence streamflows. These changes may make it necessary to adjust overall CWM program goals and objectives over time. In addition, factors or conditions that might not have been considered earlier may become important, so the ability to incorporate them and adapt the plan will be critical to success.

Sustain the program

Sustaining a CWM program requires monitoring, ongoing communication, and support from water users and other program participants. Streamflow monitoring and participant communications can be streamlined, but the program still requires funding for its entire duration. In the case of forbearance programs and Safe Harbor Agreements, the duration of the effort can be 10–20 years or more. Most grants only provide three years of monitoring funding, and only if the monitoring is linked to implementation. Other strategies to cover annual costs could include assessing landowner fees and/or obtaining non-grant support from county or state funds, in acknowledgment that the NGO is acting as a water agency and fulfilling a critical public service.

Chapter 7

Expanding and Replicating the Collaborative Water Management Model

An overarching goal of the CWM approach is to increase the use of voluntary collaborative water management strategies within and across watersheds to broadly accelerate and amplify streamflow improvements that benefit communities, farmers, fisheries, and nature.

The ability of an RCD or other conservation entity to expand an established CWM program beyond the initial participants within a sub-watershed or replicate the effort in other watersheds will depend on a range of factors, including environmental and regulatory imperatives, receptiveness of the community, and economic and social drivers that influence people's water use.

Successful expansion or replication of a CWM approach often depends on whether the local RCD or other conservation entity can achieve the following:

- Leverage existing conservation efforts
- Broaden community engagement
- Identify new project proponents who can assist with technical support and project implementation
- Obtain funding necessary to support collaborative planning, outreach and education, project design, and project implementation

There are three approaches for expanding or amplifying an established CWM effort:

- Expand landowner participation within the same watershed or sub-watershed
- Replicate the tools, strategies, and project approaches in other watersheds within the region
- Amplify the use of CWM approaches elsewhere across the state by sharing information with other conservation entities, water users, and agency staff

Expand landowner participation within the same watershed

The initial CWM planning effort and associated pilot projects will hopefully inspire other water users within the same watershed or sub-watershed to participate. Posting media resources on your website, such as radio recordings, newspaper articles, and photo histories, is a great way to promote the program and make it easy for neighboring landowners to learn from the project. Hosting community meetings for landowners with water rights attorneys or other resource professionals can help answer their questions and concerns.

Prominent signage within the community that provides information about stream conditions or identifies the watershed or its key features can help increase local landowner awareness and curiosity about the program. Signage that identifies landowners participating in a collaborative water management program, like the wooden blue salmon signs used by Sanctuary Forest Inc. in the Mattole River watershed, help build community pride and interest in participating in a local program (see Chapter 8).

Showcasing successful pilot projects can help recruit additional participants, secure design and implementation funding, and get more projects on-the-ground. Demonstration projects establish a proof of concept and track record that can entice other water users who were previously unaware of the effort or were hesitant to get involved. Water users who have benefitted from a water project can be particularly compelling advocates for efforts that enhance flows.

In addition, successful demonstration projects pave the way for additional funding to expand the collaborative water management program.

Replicate the tools, strategies, and project approaches in other watersheds within the region

An RCD or other conservation entity that has gained valuable insights by implementing a CWM effort in one watershed can use that experience to guide similar efforts in a nearby watershed within the same region. Replicating a CWM effort in a new watershed can use the same evaluation criteria described in Phases 1 and 2 that take into consideration the history of stewardship within the watershed, the value of salmonid habitat, baseline information about flow conditions, and whether there are existing social structures and community leaders that could champion the effort. It is also helpful to identify what level of conservation work has already been accomplished in the watershed, determine who the established project proponents are, and reach out to conservation entities that are already active in the watershed to determine whether the CWM framework and goals would complement their work. Alternatively, the conservation entity can play a supporting role by offering guidance to other entities working in nearby watersheds without needing to lead a CWM effort in a new watershed.

For example, in Redwood Creek (a critical tributary for salmon habitat in the South Fork Eel River), Salmonid Restoration Federation (SRF) explored the feasibility of replicating the storage and forbearance program approach that Sanctuary Forest Inc. (SFI) pioneered in the Mattole River watershed, a watershed that borders the Redwood Creek watershed. The success of the approach demonstrated by SFI in the Mattole, combined with regulatory pressure and SRF's social credibility in Redwood Creek, enabled SRF to secure funding to conduct a feasibility analysis. The feasibility study helped determine whether the storage and forbearance program could be implemented in Redwood Creek or if other types of flow enhancement activities would be more beneficial.

It is important to empower individual members within the community to lead and participate in the development of a specific program that is appropriate to their watershed and their community. Field tours of demonstration projects can create an informal venue for water users, conservation entities, and others who are potentially interested in implementing a CWM approach to learn about project successes. Having an example that demonstrates how a community came together to collectively solve a complex problem provides an opportunity to speak about the project's successes, challenges, and lessons learned with landowners in the same watershed, as well as from adjacent tributaries, communities, and watersheds. They may then be motivated to come together to customize an approach that is tailored to their local social, economic, and environmental concerns.

Amplify the use of CWM across the state by sharing information with other conservation entities, water users, and agencies

Successful scaling and adoption of CWM approaches beyond initial pilot efforts and into new regions requires partnering with local groups who can provide the necessary institutional knowledge, social credibility, and technical capacity. Local partners could include RCDs, watershed groups, or other nonprofit organizations who are familiar with the conditions and issues associated with a specific watershed. In some situations, a conservation organization that advocates for CWM approaches may not lead or even directly participate in the development of CWM plans outside a small area of the state, but can assist the larger effort by sharing knowledge, insights, and technical expertise with others. A few of the more common approaches for doing this are described below.

Outreach via annual gatherings, conferences, and networks

There are multiple venues, events, and opportunities to reach conservation practitioners who are interested in learning about CWM and possibly applying it in their communities. Annual conferences hosted by entities like the Salmonid Restoration Federation, the California Council of Land Trusts, Localizing California Waters, and the California Association of Resource Conservation Districts are attended by a geographically broad audience of conservation practitioners. Additional opportunities to highlight CWM approaches and on-the-ground demonstration projects include collaboration with existing coalitions and their communication platforms. The ***California Environmental Water Network***[15], ***Salmonid Restoration Federation***[16], and ***River Network***[17] are coalitions that are focused on streams and rivers in California. These coalitions work to create connections among their members and often facilitate the sharing of information, tools, and resources, as well as hosting webinars or trainings on specific topics.

[15] https://www.casalmonandsteelhead.org/solution/collaborative-water-management/
[16] https://www.calsalmon.org/
[17] https://www.rivernetwork.org/

Spatial Analysis

A spatial analysis can help identify places where a CWM may be a useful approach for addressing streamflow and water supply needs. This approach must be accompanied by a deeper-dive investigation of factors such as community interest and the feasibility of water management projects that significantly improve streamflows, which are important for CWM success. Existing spatial data can be used to identify places in California that have freshwater biodiversity, altered hydrological conditions, and human water use and thus might benefit from a CWM approach. Another current opportunity that could advance collaborative water management planning is the NOAA Fisheries and CDFW Salmon Habitat Restoration Priorities (SHaRP) process to identify effective restoration in priority areas of salmon strongholds. This effort has a public engagement component to solicit on-the-ground knowledge from stakeholders that will ultimately inform prioritization efforts. These enabling conditions could be informed by a range of factors, including the presence of multiple diversions in a ***losing reach*** of a stream, overallocation of scant water resources, and whether there is funding and technical support available to assist in CWM planning efforts.

Communications with regulatory and funding agencies

Cooperation and support from state and federal resource agencies are key factors that can help water users succeed in improving instream flows. Conservation entities and coalitions should encourage regulatory and funding agencies to support community-driven approaches to water management. One form of agency support is allocating staff time to proactively participate in a CWM effort and help a collaborative group of stakeholders navigate previously uncharted strategies for policy compliance. This is particularly important as it can result in improvements in the immediate watershed as well as accelerating efforts elsewhere. For example, once there is an established effort that can be used as an example, such as a template Safe Harbor Agreement to protect salmon or steelhead or batched instream flow dedications to improve and protect seasonal streamflow levels, it is much easier to replicate those efforts in other watersheds.

Working with state and federal agencies to demonstrate how CWM efforts can meet agency objectives can also increase agency financial support for the capacity and technical needs of organizations facilitating on-the-ground efforts. In addition, it is important to identify, and if possible reform, federal, state, and local policies that would benefit from a more programmatic approach or more streamlined permitting for water users working cooperatively to manage water resources. This effort requires ongoing collaboration with government agencies, nongovernmental organizations, and organizations engaged in voluntary conservation efforts, as well as input from committed water users who are participating in CWM plans. Working with state and federal agencies to demonstrate the efficacy of collaborative water management efforts can establish a pathway for similar cooperative efforts. Once there is a proof of concept, it is much easier to replicate or modify a successful effort.

The SHaRP Model

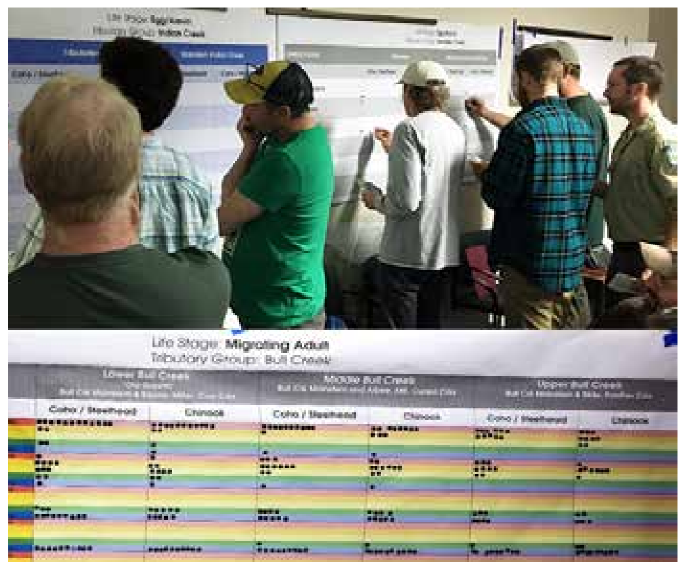
SHaRP is the acronym for Salmonid Habitat Restoration Priorities, a new model for collaboration that creates a targeted, site-specific, and scientifically-sound habitat restoration strategy for an area important to recovery of salmon and steelhead.

NOAA Fisheries and the California Department of Fish and Wildlife (CDFW) developed the SHaRP model and first applied it to the South Fork Eel River. These agencies previously developed separate recovery plans for all salmonid species threatened with extinction, which are necessarily broad in scope and scale. At the local level, restorationists, landowners, and government agencies build on these plans by planning and implementing habitat restoration at the project- and stream-reach scale.

SHaRP provides a structure for collaboration among those with deep knowledge of a watershed such as tribal partners, NGOs, agency staff, and landowners. Individual organizations often come to CDFW or NOAA Fisheries to identify the best habitat restoration actions to pursue, usually with a particular project and stream in mind. The SHaRP model turns those individual conversations into a larger collaboration with a watershed's entire restoration community, resulting in strategic focus on the restoration actions most needed to benefit the salmon and steelhead in a watershed. At the heart of the SHaRP model are the observations and experiences of those who have spent a lifetime living and working in a watershed.

How SHaRP works

The process starts with identifying the focus areas within an overall watershed that have the highest potential to support healthy salmon and steelhead. Local experts in each focus area then come together to evaluate the challenges facing each life stage of each species of salmon and steelhead, and agree upon the best restoration solutions to these challenges. Action plans are developed for each focus area based on their deliberations. Together, these plans describe a strategy that will maximize benefits to all the threatened and endangered salmon and steelhead in the overall watershed by focusing dollars and effort on locations that will have the most impact.



Local experts score the severity of impacts to habitat from various limiting factors for coho salmon, Chinook salmon, and steelhead during a South Fork Eel River SHaRP meeting.

The first application of SHaRP in the South Fork Eel River

Individuals with deep knowledge of the South Fork Eel River and the habitat needs of its salmonids participated in the first application of the SHaRP model, including representatives of the Wailaki Tribe, NGOs, other federal agencies, universities, landowners, and land managers. Over fourteen days spaced over two years, this group identified the biggest habitat problems and specific restoration solutions for seven focus areas of this critically important watershed. The resulting SHaRP plan, released in May 2021, includes action plans for these seven focus areas - Bull Creek, Redwood Creek, Sproul Creek, Indian Creek, Standley Creek, Hollow Tree Creek, and the South Fork Eel River Headwaters. Each action plan contains detailed descriptions of the restoration projects needed in each focus area. For example, the Redwood Creek Action Plan identifies the need to improve off-channel habitat for winter-rearing juveniles in specific reaches of Somerville Creek.

Participants use available data to identify and locate needed restoration projects during a South Fork Eel River SHaRP meeting.

SHaRP expands in Northern California

Due to community feedback on the success of the first application of SHaRP, implementation of the SHaRP model recently began in four new areas of northern California, which together with the South Fork Eel River are the geographic focus of CDFW's North Coast Salmon Project Initiative: the Lower Eel River, Mendocino Coast streams, the Lower Russian River, and Lagunitas Creek. In 2021, CDFW will direct new habitat restoration funding to the North Coast Salmon Project locations as part of the Cutting the Green Tape Initiative to increase the pace and scale of ecological restoration and stewardship

You can learn more about SHaRP and its implementation at https://www.fisheries.noaa.gov/west-coast/habitat-conservation/salmon-habitat-restoration-priorities.

Chapter 8

Collaborative Water Management Case Studies

CWM approaches applied in watersheds in California typically follow the general framework described in Chapter 6 to develop community-based flow enhancement programs.

Although the framework may be similar, social, economic, and environmental factors determine the water management approaches that are best suited to the specific watershed conditions and land-use practices in various communities.

Below are four case studies that show how a CWM approach may vary from one watershed to another, depending on the specific conditions and the participants. All of these efforts strategically address limited water supply availability during the summer months in order to meet habitat needs for juvenile salmonids and provide a sufficient water supply for rural communities. The case studies are:

- The Mattole River Flow Improvement Effort
- The Bodega Valley Rainwater Catchment and Alternative Water Supply Pilot (Salmon Creek)
- Dutch Bill Creek Streamflow Improvement Plan (Russian River)
- The Mill Creek Collaborative Water Management Plan (Navarro River)

The Mattole River Flow Improvement Effort

Background

The Mattole River is located in coastal Northwestern California, where it flows from its temperate forest headwaters to the Mattole estuary at the westernmost point of the continental United States. The Mattole River watershed contains hundreds of private parcels with no municipal infrastructure and there are many water diversions for homesteads and cannabis cultivation. The Mattole has also been the epicenter of community-based restoration for more than three decades, as watershed groups and residents have struggled to protect remnant salmon populations and restore habitat. Sanctuary Forest Inc. (SFI) pioneered low-flow monitoring techniques there and their monitoring bore witness to tributaries becoming disconnected and dry seasons becoming longer. Extended drought conditions have imperiled salmonids and motivated the community to participate in a flow enhancement program.

Key strategies

SFI developed two primary strategies to improve Mattole flows by storing water during the wet season for use in the dry season. These strategies aimed to:

- Change water diversion timing by establishing a storage and forbearance program.
- Restore ground and surface water hydrologic functions impaired by land-use practices.

The storage and forbearance program was identified and developed at community meetings in response to severe low flow conditions. Participating landowners refrain from exercising their water rights during the low-flow season in exchange for receiving a water storage system and a property water management plan to ensure an adequate water supply. The program uses a template forbearance agreement that provides sufficient detail for landowners to successfully manage stored water and comply with the program. For SFI, their managing the program involves monitoring during the low-flow season, sending landowners notices about forbearance periods, and providing the technical support needed to ensure forbearance.

Figure 7: Mattole Watershed

The second strategy focuses on restoration of hydrologic functions and increased groundwater storage. Past land-use practices, including extensive logging and road systems, have greatly decreased groundwater storage capacity, resulting in higher winter runoff rates and lower summer flows. Removal of large wood from streams has also decreased groundwater storage through channel incision and loss of floodplain connectivity. SFI is implementing upslope and instream pilot projects to increase groundwater storage as needed to sustain summer streamflows. The upslope terrace project at Baker Creek, known as the "Baker String of Pearls," is based on johads (infiltration ponds constructed within the natural topography with earthen berms) in India. Its objective is to collect hillslope runoff in ponds, raising the adjacent groundwater levels and slowing groundwater flow to the creek. SFI's instream projects are designed to mimic the scale and function of beaver dams and are designed to improve floodplain connectivity and winter habitat, as well as increasing bank storage and improving summer flows.

Fish passage is addressed through step pools that meet jump height criteria and side passages around structures. Structure types include log and boulder weirs for sites that are entrenched down to bedrock and post and weave structures for sites with alluvial streambeds. Both weirs and post assisted structures are channel spanning with installation of a clay and gravel wedge on the upstream side to raise instream water levels thereby increasing streambank storage needed to sustain summer flows.

Preliminary results from effectiveness monitoring indicate that both the upslope and instream pilot projects are improving summer flows. However, due to the small scale of the projects and the rapid draining soils of the Mattole headwaters, flow benefits do not persist into the late summer. Separate projects will be needed to address each low-flow tributary, along with strategies to slow subsurface flows. SFI is now incorporating subsurface restrictive layers in their design plans for both upslope and instream projects.

Methods

When the storage and forbearance program was initiated, no in-depth instream flow studies had been performed within the Mattole River watershed, so pool connectivity was the basis for forbearance. SFI staff walked the losing reach of the Mattole headwaters to determine the locations where streamflows would first become disconnected. In consultation with CDFW staff, they set streamflow forbearance thresholds 0.5 cfs higher than the flows at which disconnection would occur. Then they compared streamflows with maximum cumulative human use impacts to establish restricted pumping thresholds, including reduced pumping rates and assigned pumping days. In addition, Trout Unlimited (TU) performed an instream flow study to determine optimum flows for rearing and spawning, as well as a more thorough determination of human water use impacts. The data approach and the mechanics of operating the storage and forbearance program are comprehensively described in the 2013 ***Mattole River Headwaters Streamflow Improvement Plan***[18].

Community engagement approach

As a first step, SFI conducted community outreach and held meetings to discuss the low-flow problem and collect landowner input on potential solutions. Community members identified storage and forbearance as a potential solution. After the first few projects had been implemented, participants shared their experience of the program with others in the watershed. Education and outreach have fostered community appreciation and pride in the program, with many households practicing conservation and voluntarily installing water storage on their own. SFI also provides signage featuring a wooden blue salmon to participating landowners and has installed prominently displayed streamflow signs that are updated weekly to show flows in gallons per minute on the mainstem and various tributaries.

The operation of the seasonal storage and forbearance program requires monitoring of streamflows, landowner notifications, and landowner compliance monitoring for the term of the forbearance agreements. SFI conducts streamflow monitoring in each tributary stream that has water users involved in the program, in addition to the main stream channel, to ensure that cumulative impacts do not exceed bypass flow requirements. A flow correlation has been made such that tributary flows can be estimated from the mainstem flow, thereby reducing the workload.

[18] http://www.sanctuaryforest.org/wp-content/uploads/2014/12/Mattole-Streamflow-Improvement-Plan.pdf

Landowner notifications include several phone calls before flow restrictions are put in place, including calls to ensure that water system maintenance has occurred and tanks have been filled, calls to initiate assigned pumping days, and calls at least one week prior to forbearance. Forbearance letters are sent to all participants, detailing the specific restrictions for their water source, along with water use logs to help ensure that their water supply lasts for the entire season. At the end of forbearance, all landowners are notified that they can begin diverting again and are notified if any flow restrictions remain in place. Compliance monitoring is performed after the end of the forbearance season and includes phone calls or site visits with all landowners to ensure that no pumping took place during forbearance, discuss any concerns, and record each landowner's total water use during the dry season. Technical assistance is also provided to landowners as needed for issues with their water systems and for water rights reporting.

Highlights of the effort

- The storage and forbearance program has been very successful. It includes over 1.8 million gallons of water storage capacity and over 30 forbearance agreements.
- Over time, the effort has evolved to address legacy land use impacts on water infiltration and recharge rates, in addition to current water use.
- The Blue Fish Program has engaged community members. This program provides wooden blue salmon signs for each participating family's driveway, inspiring neighbors to "earn" their own blue fish by conserving and storing water on their own or joining the grant-funded program.
- SFI, as a streamflow enhancement pioneer in California, has freely shared their methodology to contribute to the development of restoration strategies for water scarcity and climate change adaptation in other communities and watersheds.

Lessons learned

- Both of the strategies used in the Mattole River watershed were informed by projects in other parts of the world. SFI incorporated lessons learned from beaver pond stream restoration in Oregon and johads built to slow rains and recharge groundwater in India.
- The program has benefited landowners in unexpected ways. First, it has improved water quality because the storage capacity allows landowners to pump when the water is clear. Additionally, diversion pumps can be stored on shore during high streamflows and there are fewer problems with frozen pipes because the pipes were buried underground in accordance with the project design.

The Bodega Valley Rainwater Catchment and Alternative Water Supply Pilot Program

Background

The Salmon Creek watershed is a small coastal watershed that drains directly to the Pacific Ocean. The 35-square mile watershed is largely comprised of rural residential and agricultural properties and includes three small villages. It historically supported a good salmon run. Salmon Creek, like many coastal creeks on the central and north coast, suffers from low summer streamflows and the geology provides limited groundwater for water supply needs. Beginning in the early 2000s, resource agencies became interested in restoring the creek and re-introducing endangered coho salmon to the watershed.

Multiple organizations work within the Salmon Creek watershed to improve habitat conditions for salmon and to help landowners be good stewards of their land. The Salmon Creek Watershed Council, formed by a group of watershed residents, has been a forum for these organizations to connect and collaborate on projects. After a study of estuary function[19] indicated that low summer streamflows jeopardized juvenile salmon survival in the watershed, Prunuske Chatham, Inc. and the Occidental Arts and Ecology Center's WATER Institute researched and developed the ***Salmon Creek Water Conservation Plan (2010)***[20].

Key strategies

Key findings from an extensive analysis of water demand, land use, and hydrology informed the conservation strategies and guided focused approaches to improving dry-season streamflows. Proposed conservation strategies included educating the public on efficient water use, reducing withdrawals from the creek and wells that feed upland springs, managing stormwater runoff to maximize infiltration, and developing alternative water supplies, such as rainwater harvesting, and storage.

Figure 8: Salmon Creek Watershed

A community-based pilot program was initiated in 2010 that demonstrates how installing large-scale rainwater harvesting systems can improve instream flows and provide water security for municipalities, residents, and agricultural producers in a water-scarce area. Bodega was considered a disadvantaged community, with a tenuous water supply, and the cost of water there is one of the highest in the state. The Bodega Water Company (BWC) is a member-owned, mutual benefit corporation that supplies potable water to 39 hookups and is one of the larger single users of Salmon Creek water in the Bodega Valley.

Methods

The goal of the pilot program was to replace all non-potable water uses (e.g., livestock and outdoor irrigation) that were using BWC potable water with harvested rainwater. The methods included:

1. Replacing and significantly increasing water storage capacity for weekly dry season pumping requirements.

[19] *http://salmoncreekwater.org/project/SalmonCreekEstuaryStudy.pdf*
[20] *http://salmoncreekwater.org/water-conservation-plan.html*

2. Fixing documented leaks in storage and line system to reduce their monthly unaccounted-for-water volumes and associated pumping requirements.

3. Replacing the use of shallow wells in the Bodega Valley with alternative water supplies, such as roofwater harvesting systems or off-channel ponds.

4. Replacing instream riparian pumps with roofwater harvesting and storage systems.

5. Excluding livestock from stream access during the dry season and developing alternative water sources to meet water needs including roofwater harvesting storage systems or off-channel ponds.

Like many coastal watersheds, water diversions have a significant impact on instream flows, particularly during dry summer months. Several watershed and habitat assessments documented poor summer instream conditions that were affecting salmonid survival. Prunuske Chatham, Inc. and the Occidental Arts and Ecology Center conducted extensive GIS-based mapping and community-wide water supply and demand data collection and analysis in order to better understand water use and demand conditions in the Salmon Creek watershed and to be able to communicate the results and rationale for future potential water conservation and streamflow enhancement projects. This included a **per capita analysis**[21] of water used by rural residential properties, agricultural operations, and local municipalities (e.g., residents, utilities, fire stations). Taken together, residential water use surveys, metered water data from municipalities, and interviews with agricultural producers in the watershed provided a detailed picture of water demands and use. Initially most residents believed agriculture was the biggest water user in the watershed, however, the assessment showed that residential water use is greater.

Participants in the Bodega Valley Rainwater Catchment and Alternative Water Supply Pilot Program were selected based on interest and significant use of directly diverted water from Salmon Creek for non-potable uses. For Bodega Water Company members in the village of Bodega, their monthly metered use data was analyzed to determine the amount of water they used for non-potable (summer irrigation) uses.

Community engagement approach

Limited summer water and high municipal water rates created a situation in which residents were already aware of, and conservation-minded about, the summer water supply. Economic, regulatory, and environmental pressures catalyzed the community to cooperatively explore solutions to water scarcity. The Salmon Creek Watershed Council and collaborating organizations began hosting public meetings to share information with residents about watershed conditions, salmon populations, and what could be done to improve water reliability and streamflows. The Occidental Arts and Ecology Center offered workshops and tours to showcase water conservation strategies, stormwater management, rainwater catchment, and roofwater harvesting methods. These workshops and tours raised awareness of the water scarcity issue and provided tangible examples of water storage options.

Gold Ridge RCD secured funding to design and install roofwater catchment and storage systems for the Bodega Valley Pilot Program. At community meetings, residents were told about the opportunity to participate and the prioritization approach for selecting participants. There was strong initial participation, after which additional funding was secured for several phases of implementation.

[21] "Per capita water use or per capita demand is a standard measurement for public water systems—it is a measure of the water use per person. Most typically per capita demand is expressed in the unit "gallons per person per day" or GPCD. In California the recognized standard for per capita demand is total water produced divided by total population served. This "gross per capita" figure includes all water uses in a community including residential and commercial use, fire flow, system maintenance use, as well as unaccounted for water." (Salmon Creek Water Conservation Plan)

Highlights of the effort

- As of 2017, 17 rainwater catchment systems had been installed with a total storage of 1,897,000 gallons or 5.8 acre-ft. The projects are distributed amongst water user types (residential, small agriculture, and large commercial agriculture). Of the systems, nine reduced demand from the municipal supplier BWC, three were large agricultural operators, and the rest were rural residential or small agriculture properties. Nearly all of the direct diversions in the Bodega Valley have been replaced with alternative supplies and sufficient storage to get through drought years.
- The program pioneered roof water harvesting and storage to provide significant water supplies for agricultural uses. Storage facilities included a 230,000-gallon underground water tank for a grazing operation and a 1.34 million gallon pond for a dairy.
- The program was able to engage a range of stakeholders and obtain collective community buy-in to implement a significant number of projects and significantly reduce direct diversions. Ongoing interest by local stakeholders and funders was maintained by demonstrating an array of rainwater catchment systems and applications. Presenting the approach as customizable and scalable, rather than one-size-fits-all, resulted in greater willingness to participate.

Lessons learned

- Early outreach efforts in the form of workshops, demonstration projects, and community meetings were key to obtaining widespread support, as were site-specific data on water use and demand.
- Each rainwater catchment system is different and requires detailed site-specific design and permitting. Larger volumes of water to be stored required greater design efforts and more funding.
- Agricultural producers with extensive barns and outbuildings, such as dairies, can capture and store significant volumes of water. Ponds are the most cost-effective means to store large volumes. While underground tanks have benefits, groundwater conditions, drainage, the installation approach, cost of materials, and reliability issues are drawbacks.
- Working collaboratively with partnering landowners and institutions in a losing reach presents the best opportunity to enhance flows for juvenile salmonids and improve water reliability for participants.

Dutch Bill Creek Streamflow Improvement Plan, Russian River Watershed

Background

The Russian River Coho Water Resources Partnership (Partnership) was formed in 2009 as a multidisciplinary collaboration among California Sea Grant, Gold Ridge Resource Conservation District, Occidental Arts and Ecology Center's WATER Institute, Sonoma Resource Conservation District, and Trout Unlimited, with support from the National Fish and Wildlife Foundation and Sonoma Water. Its goals are to work with agricultural producers and private landowners to improve streamflow and water supply reliability within the Russian River watershed, and to ultimately recover Coho Salmon. The Partnership's approach integrates targeted outreach and community support; project development, implementation, and evaluation; strategic water rights and policy changes to improve water management; and streamflow, fisheries, and habitat monitoring to inform decision-making. The Partnership and its agency partners identified five priority tributaries within the Russian River watershed in which to work and has completed ***Streamflow Improvement Plans (SIP)***[22] for most of them.

This case study focuses on Dutch Bill Creek, one of the Partnership's five priority tributaries. Dutch Bill Creek has a rich history of community stewardship and habitat restoration. This watershed has seen years of community engagement, outreach and education, instream habitat assessments, water quality monitoring, fish passage and dam removal projects, instream structure and large wood placement, sediment reduction projects, upland recharge, and coho Salmon releases, and monitoring. This diverse catalog of previous projects has collectively improved conditions for Coho and laid the foundation for the current work to enhance streamflow in the watershed.

Figure 9: Russian River Watershed

Key strategies

Flow improvement actions that were identified in the Dutch Bill Creek SIP and have been/are being implemented in the watershed include:

- Reducing or eliminating direct dry season diversions from mainstem Dutch Bill Creek and its tributaries with institutional and residential users.
- Pursuing flow releases from ponds and spring-to-surface-water reconnection.
- Assessing the impact of stormwater runoff and exploring infiltration and groundwater recharge opportunities.

Recommended strategies for reducing or eliminating diversions include:

1. Reducing demand where possible through conservation, water-use efficiency improvements, reductions in irrigated acreage, etc.

[22] *http://cohopartnership.org/sips/*

2. Evaluating and developing alternative sources of water, such as rainwater catchment, graywater reuse, and others.

3. Constructing water storage to facilitate changes in the timing of diversion from the dry to the wet season.

In addition, the Dutch Bill Creek SIP identifies conservation strategies to reduce the individual and cumulative impacts of diversion on salmonids through changes in points of diversion and regulatory storage (e.g., diverting water into storage at a low rate and pulling from that storage at a higher rate).

Methods

TU and CEMAR studied the magnitudes, timing, and frequency of both high and low instream flows to characterize each stream. More recently, the team has focused on the impacts of drought and water management on low streamflows.

TU utilized stream gauges, field surveys, and remote sensing with GIS. They use GIS models to examine water supplies and human water needs based on land use and water use estimates. They also use water rights data to estimate the impacts of water diversions on streamflow conditions. Gauges provide streamflow data, including water depth, temperature, and streamflow. Together these data, coupled with robust fisheries and habitat monitoring conducted by California Sea Grant, allow the Partnership to prioritize streamflow enhancement projects in locations where they will have the biggest impact[23].

Community engagement approach

The success of this project is largely due to the robust restoration partnerships in this watershed, especially the stewardship and participation of many private and public landowners and water users. The ability to implement early projects that served as good demonstration sites also helped inspire others to participate.

Highlights of the effort

- The Partnership "applies a systematic, watershed-scale approach that brings together landowner interests, streamflow and fish monitoring, technical, planning, and financial assistance, and water rights and permitting expertise to modify water use and management to improve instream flow."[24]
- The Partnership prepared a SIP for the watershed. This document provided a successful blueprint that has been replicated in other watersheds.

Lessons learned

- Monitoring the effectiveness of a project is challenging on a micro-level, where flow improvements are small but significant.
- In a watershed like Dutch Bill Creek, which has been impacted by landscape-scale land use and cover changes over the past 150 years, maintaining connected streamflow throughout the dry season in all years may not be achievable solely by addressing water demand and use. In such situations, the goal of water use management should be to "bend the curve" – to reduce the incidence and spatial and temporal extents of surface flow disconnection. In the long term it will be necessary to also address large-scale land use patterns to achieve more robust streamflow improvements.

[23] *http://cohopartnership.org/streamflow-monitoring/*

[24] *Dutch Bill Creek Streamflow Improvement Plan*, The Russian River Coho Water Resources Partnership, March 2017

The Mill Creek Collaborative Water Management Plan

Background

The Navarro River and its tributaries are highly impaired due to legacy impacts from land management practices, increasing agricultural and residential demands, and ongoing water diversions. Low flows due to water supply impacts often do not provide sufficient summer rearing habitat for juvenile Coho Salmon and Steelhead populations, a critical limiting factor for the survival of these species in the watershed. The Navarro Flow Enhancement Partnership (Flow Partnership) was established in 2014 in the watershed to work with local landowners to develop and implement management actions and projects for restoring instream flows. The partnership includes the Mendocino County RCD, The Nature Conservancy, and TU. This case study focuses on CWM strategies in Mill Creek, the largest tributary in the basin.

Key strategies

In the initial years of the Flow Partnership, the primary focus was on community outreach, collection of streamflow data, fish habitat assessment, analysis of water use and needs throughout the basin, and implementing initial flow restoration projects. Using the information gathered and lessons learned about project development from flow restoration efforts in the Navarro River watershed and elsewhere, a CWM approach was developed to increase the scale and pace of implementing flow enhancement projects that also improve water supply reliability for landowners. The Mill Creek tributary was selected as a demonstration watershed for development of a CWM plan for several reasons:

1. The watershed was identified as a priority for recovery of listed Coho Salmon and Steelhead by state and federal fisheries agencies.

2. Flow data indicated that the watershed was impacted by stream diversions.

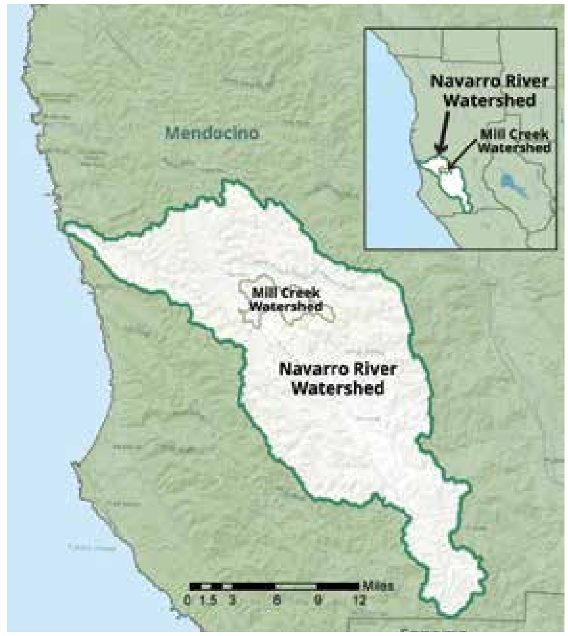


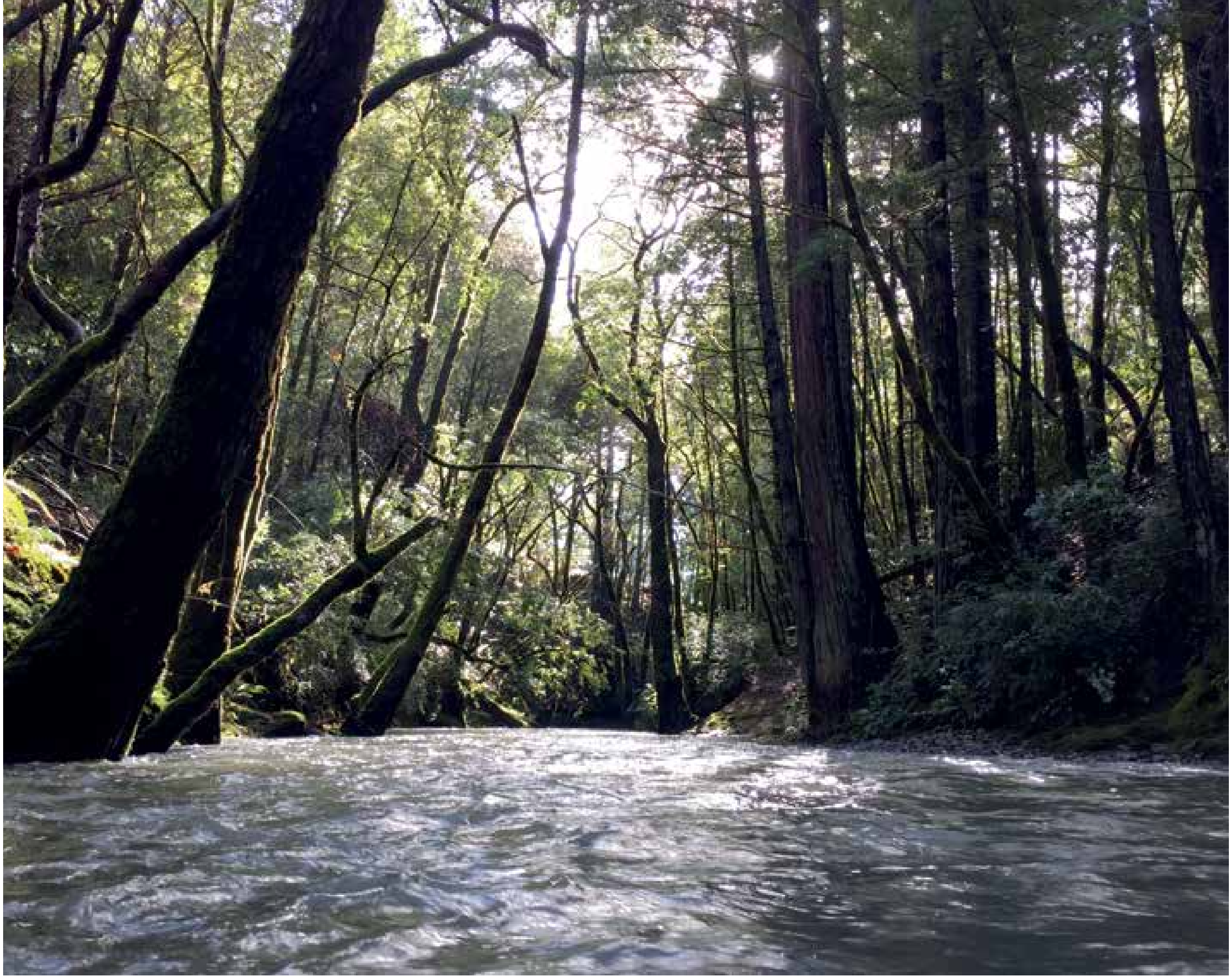
Figure 10: Navarro River Watershed

3. The moderate-sized Mill Creek Collaborative (approximately 120 properties) was large enough for modifications in water use to make an impact to instream flows.

4. Many water users expressed strong support for water supply and fisheries restoration efforts.

The Flow Partnership and community stakeholders have begun efforts to develop the ***Mill Creek Collaborative Water Management Plan***[25] (to be completed in August 2021) to provide the necessary information to support future streamflow improvement efforts in the watershed. The plan will summarize essential information about the health and water management needs of the watershed, as well as water use and long-term flow objectives to improve fish habitat and water supply reliability. In addition, it will cover the range of flow restoration projects that are commonly used (e.g., tank or pond storage, rainwater capture, groundwater replenishment projects) and indicate which ones might be most effective in different parts of the Mill Creek watershed, based on these analyses. The plan will also include information about ongoing data collection needs, types of agreements to support ongoing collaboration among landowners, and related water rights and permitting considerations.

[25] *https://mcrcd.org/resources/flow-enhancement*



Methods

To support assessment of current conditions and development of flow restoration projects, a network of 16 gauges was installed in the Navarro River watershed to complement the only U.S. Geological Survey gauge in the watershed, which was near the mouth of the river. Estimates of seasonal and total water use in the entire basin were developed at a parcel scale using remote sensing and based on land use type (residential, commercial, and agricultural). Priority reaches for salmonids were identified using existing data and recovery plans for fish populations from state and federal agencies, information from a local timber company that had conducted fisheries research, some data collection and analyses by the Flow Partnership on streamflow temperature suitability, and limited fish surveys in select reaches of key tributary watersheds.

Community engagement approach

For several years, the Flow Partnership had been conducting outreach broadly within the Navarro watershed. At the outset of this new effort in Mill Creek, it was important to significantly increase outreach and engagement to inform residents about the planning effort and to garner their support and participation. It helped that the Flow Partnership had already completed several flow restoration projects in the Mill Creek watershed and had worked collaboratively with landowners to operate four stream gages in the watershed. Outreach efforts also included community workshops, informational mailings, a water use survey, and individual calls and meetings.

Highlights of the effort

- The Mill Creek effort was the result of a systematic approach to evaluate the appropriate scale and location for launching a CWM effort.
- A very robust data collection and analysis effort was initiated several years prior to selecting the plan area within the larger watershed in order to inform the selection of the focus area and develop baseline data.

Lessons learned

- The need for the CWM framework for Mill Creek and its purpose evolved over time to address three fundamental challenges to restoring summer baseflows to support juvenile salmon habitat:

  1. After assessing the potential to work with the largest diverters as a "silver bullet" strategy for restoring flows, it became clear that the biggest users were either already employing practices that minimized impacts to dry-season base flows or they were not located in the right places to affect rearing habitat.

  2. When the instream flow benefit of individual projects with landowners was calculated, it showed that the contribution of each project to reduce dry-season diversions was relatively small, so achieving flow restoration objectives would require broad participation by landowners in the watershed.

  3. Implementing many projects within a given watershed would require a planning strategy that incentivizied landowners to participate by focusing on the benefits to their water supply reliability and by providing a framework that made it easy for them to engage voluntarily.

- Outreach in rural watersheds is time consuming. The needs of each landowner and their motivations to participate are often unique, requiring flexibility and patience. Implementing flow restoration projects will always be somewhat opportunistic and rely on the presence of a willing landowner.
- Projects that mitigate the land-use impacts in the watershed that decrease dry-season groundwater contributions to streams will be essential.

GLOSSARY

Appropriative water right: The right to take water for use on non-riparian land or store water on riparian lands so it can be used at a time that it would not naturally be available. Water right permits and licenses issued by the State Water Board are appropriative water rights.

Aquifer: An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated materials. An aquifer encompasses all of the groundwater in a given area.

Baseflow/base flows: The portion of streamflow that is sustained between precipitation events by delayed water contributions from sources such as shallow sub-surface flow and snowmelt.

Collaborative water management (CWM): A watershed-based approach in which landowners or water users implement water management practices and improvements in a collaborative mannerto improve streamflows and water supply reliability.

Conservation easement: A voluntary, permanent, legally binding agreement that restricts the uses of or activities on a property for conservation purposes, even if it changes ownership.

Conservation entities: A term used within this document to refer to local resource management organizations or agencies, including but not limited to RCDs, watershed groups, and nonprofit conservation organizations.

Dewatered: A stream that has experienced a significant water loss. The channel may not go completely dry (there may be isolated pools or wet substrate), but it no longer has a flow.

Diversion: Taking water out of a stream for use. Diversion involves taking water by using gravity or pumping from a surface stream or subterranean stream flowing through a channel or other body of surface water into a canal, pipeline, or other conduit. It includes impoundment of water in a reservoir.

Forbearance: Refraining from doing something that one has a legal right to do. In the case of water rights, forbearance means refraining from using a legal water right (especially during key time periods or conditions such as when water temperature is high or flows are low).

Functional flows: Aspects of the flow regime that directly relate to ecological, geomorphic or biogeochemical processes in riverine systems.

Gauge network: A system of measurement devices to understand streamflow in a watershed.

Ground truth: To check the results of initial water availability and water use estimates for accuracy by comparing the estimates with on-the-ground surveying and data collection.

Groundwater recharge: To increase the amount of water stored underground by adding surplus surface water to the local aquifer during wet periods.

Infiltration: The permeation of surface water into the ground via filtration.

Instream dedication: An instream flow transaction in which water is designated to remain instream to support fish and wildlife. Water rights holders who choose to dedicate their water instream should have this intention recognized by the Water Board, under Water Code Section 1707, in order to avoid forfeiting their rights and/or having downstream users take the water.

Instream flow: A specific streamflow, measured in cubic feet per second, at a particular location for a defined time, which typically varies seasonally.

Instream use: The beneficial value of water for fish and wildlife when it is allowed to remain in a stream or river without being diverted.

Listed species: Species that are considered at risk of becoming endangered or extinct, at a state or federal level, and that are included on official lists of threatened or endangered species and qualify for legal protection in their habitat ranges.

Losing reach: The section of a stream or river that goes dry from water loss, usually because the water table is below the bottom of the stream channel.

Refugia (singular, refugium): Areas in which a population of organisms can survive a period of unfavorable conditions. For example, thermal refugia are areas of relatively colder water where juvenile salmonids can retreat during warmer periods of the year.

Resource Conservation District (RCD): A special district within the state of California, a locally governed agency that implements projects on public and private lands; educates landowners and the public about resource conservation; and provides a link between federal, state, and local programs.

Riparian water right: The right of a landowner to use the natural flow of surface water from a water source located immediately adjacent to, or within, their property for reasonable use on their property.

Storm-proof: To make impervious to damage by wind, rain, or snow.

Stream reach: A section of a stream, typically along which there are similar hydrologic conditions, such as discharge, depth, or area.

Total Maximum Daily Load (TMDL): A regulatory term in the U.S. Clean Water Act that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

Watershed charter: An agreement that defines the project goals among landowners in a specified watershed area and the agreed upon tasks to accomplish these goals.

Water right: A legal entitlement authorizing the holder of this right to divert water from a specified source and put it to beneficial, non-wasteful use.

The following organizations and websites host many of the shared resources in this document:

The Nature Conservancy: www.nature.org/california

Salmonid Restoration Federation: www.calsalmon.org

Trout Unlimited: www.tu.org

Sanctuary Forest: www.sanctuaryforest.org

Mendocino County Resource Conservation District: www.mcrcd.org

APPENDIX A: INFORMATIONAL RESOURCES

This appendix includes a variety of resources, arranged in order by topic and date, that can inform CWM. Some of the resources were cited in the text, while others are additional resources that are relevant to the topic.

Water Conservation and Storage

Water Stewardship Guide: Conserving and Storing Water to Benefit Streamflows and Fish in North Coast Creeks and Rivers, Kyle Keegan and Sanctuary Forest, 2017
http://www.sanctuaryforest.org/wp-content/uploads/2017/10/Water-Stewardship-Guide-Booklet-Form.pdf

Resilience in a Time of Drought—A Transferable Model for Collective Action in North Coast Watersheds, Sara Schremmer, Prepared for Sanctuary Forest
http://www.calsalmon.org/sites/default/files/files/GuideForCollectiveAction_2014.pdf

From Storage to Retention: Expanding California's Options for Meeting Its Water Needs California Roundtable on Water and Food Supply, November 2012
http://www.aginnovations.org/result/2015-05-10/from-storage-to-retention-expanding-california-s-options-for-meeting-its-water-needs

Options and Obstacles: Living with Low Water Flows in the Mattole River Headwaters,
Tasha McKee, Sanctuary Forest, 2014
www.sanctuaryforest.org/wp-content/uploads/2014/12/Options-and-Obstacles-Living-with-Low-Flows-Copy.pdf

Best Management Practices

Watershed Best Management Practices for Cannabis Growers and Rural Gardeners, Mendocino County Resource Conservation District, 2016
http://mcrcd.org/

Land Stewardship Guide, Reducing Runoff and Increasing Infiltration in the Mediterranean Climate of Northern California, Kyle Keegan and Sanctuary Forest, 2017
www.sanctuaryforest.org/wp-content/uploads/2017/10/Land-Stewardship-Guide-Booklet-Form.pdf

Quick Guide to Watershed Best Management Practices, Salmonid Restoration Federation, 2016
http://www.calsalmon.org/sites/default/files/files/2016_Quick_Guide_to_Watershed_BMP_Brochure.pdf

Winegrower and Winery Best Management Practices for Reducing Water Use
https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=101473&inline

Handbook for Forest, Ranch and Rural Roads, William Weaver, Eileen Weppner, and Danny Hagans for Pacific Watershed Associates, April 2015
http://www.pacificwatershed.com/sites/default/files/roadsenglishbookapril2015b_0.pdf

Slow It. Spread It. Sink It! A Homeowner's and Landowner's Guide to Beneficial Stormwater Management, Sonoma Valley Groundwater Management Program, 2010
https://oaec.org/publications/slow-it-spread-it-sink-it/

Water Rights and Instream Flow Resources

Managing Diversions in Unregulated Streams Using a Modified Percent-of-Flow Approach, Freshwater Biology, Mierau, July 2017
https://onlinelibrary.wiley.com/doi/epdf/10.1111/fwb.12985

A Practitioners Guide to Instream Flow Transactions in California, Small Watershed Instream Flow Transfers (SWIFT) Working Group, March 2016
http://www.calsalmon.org/sites/default/files/files/SWIFT_Guide_Instream_Flow_Transactions.pdf

Small Domestic Use Registration Curriculum, SRF and Trout Unlimited, 2016
https://www.calsalmon.org/sites/default/files/files/SDU_Walkthrough.pdf

Navigating Water: Regulations for Small-Scale Water Storage Projects in California's Five County Region, Salmonid Restoration Federation, 2016
http://www.calsalmon.org/sites/default/files/files/5Counties_Navigating_Water_Compliance.pdf

Sanctuary Forest's Mattole Flow Program: Legal Options for Streamflow Protection, Sanctuary Forest, December 2014
http://www.sanctuaryforest.org/wp-content/uploads/2014/12/Legal-Options-for-Streamflow-Protection.pdf

Know Your Water Rights Brochure, Salmonid Restoration Federation and Friends of the Eel River
www.calsalmon.org/sites/default/files/files/RedwoodCreek_WaterRights.pdf

State Water Board information about water rights registrations
https://www.waterboards.ca.gov/waterrights/water_issues/programs/registrations/

Evaluating and Protecting Environmental Water Assets: A Guide for Land Conservation Practitioners, Alford, June 2020. www.nature.org/california

Water Conservation and Streamflow Improvement Plans

Dutch Bill Creek Streamflow Improvement Plan, The Russian River Coho Water Resources Partnership, March 2017
http://cohopartnership.org/wp-content/uploads/2018/06/Dutch-Bill-Creek-Streamflow-Improvement-Plan.pdf

Water Stewardship Guide—Conserving and Storing Water to Benefit Streamflows and Fish in North Coast Creeks and Rivers, Sanctuary Forest, 2017
http://sanctuaryforest.org/wp-content/uploads/2017/10/Water-Stewardship-Guide-Booklet-Form.pdf

Bodega Valley Rainwater Catchment and Alternative Water Supply Program, Ag Innovations Network, 2013
https://oaec.org/wp-content/uploads/2014/12/BodegaValleyRainwaterCatchment.pdf

Salmon Creek Water Conservation Plan, Prunuske Chatham, Inc., Virginia Porter Consulting, and Occidental Arts and Ecology Center's WATER Institute, for Coastal Conservancy, June 2010
http://goldridgercd.org/documents/SalmCkWatCons.pdf

Salmon Creek Estuary: Study Results and Enhancement Recommendations, Prunuske Chatham for Salmon Creek Watershed Council and Occidental Arts & Ecology Center, June 2006

California Policies, Initiatives, and Reports

Cannabis Cultivation Policy: Principles and Guidelines for Cannabis Cultivation, State Water Board, 2019
https://www.waterboards.ca.gov/water_issues/programs/cannabis/docs/policy/final_cannabis_policy_with_attach_a.pdf

Managing California's Freshwater Ecosystem's Lessons from the 2012-2016 Drought, Public Policy Institute of California
http://www.ppic.org/wp-content/uploads/r_1117jmr.pdf

California Water Code: Section 1707
https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/PCFFA&IGFR/PCFFA_01_WC1702.pdf

California Water Action Plan: Actions for Reliability, Restoration, and Resilience, CA Natural Resources Agency, Update 2016
http://resources.ca.gov/docs/california_water_action_plan/Final_California_Water_Action_Plan.pdf

Policy for Maintaining Instream Flows in Northern California Coastal Streams, State Water Board, Division of Water Rights, 2014
www.waterboards.ca.gov/waterrights/water_issues/programs/instream_flows/docs/adopted_policy.pdf

California Voluntary Drought Initiative, NOAA Fisheries and California Department of Fish and Wildlife, 2014
http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/voluntary_drought_initiative.html

Lake and Streambed Alteration Program, California Department of Fish and Wildlife
https://wildlife.ca.gov/conservation/lsa

Safe Harbor Agreements

Safe Harbor Agreements, Frequently Asked Questions, US Fish and Wildlife Service, 2017
https://www.fws.gov/endangered/landowners/landowners-faq.html

Endangered Species Permits: Directions for Preparing a Safe Harbor Agreement, U.S. Fish and Wildlife Service, updated May 2019
https://www.fws.gov/midwest/endangered/permits/enhancement/sha/shadirections.html

Working Together, Tools for Helping Imperiled Wildlife on Private Lands, U.S. Fish and Wildlife Service, December 2005
https://www.fws.gov/endangered/esa-library/pdf/ImperiledWildlifeFinalDec2005.pdf

A Landowner's Guide to Dry Creek Habitat Enhancement "Safe Harbor" Agreement, NOAA Fisheries
http://www.westcoast.fisheries.noaa.gov/publications/habitat/fact_sheets/dry_creek_safe_harbor_agreement_landowners_guide.pdf

Safe Harbor Agreements, California Department of Fish and Wildlife
https://wildlife.ca.gov/Conservation/CESA/Safe-Harbor-Agreements

Groundwater Management Resources

Groundwater Dependent Ecosystems Under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans, The Nature Conservancy, 2018
https://www.scienceforconservation.org/assets/downloads/GDEsUnderSGMA.pdf

Keeping Accounts for Groundwater Sustainability, Rob Gailey et al. for UC Davis Center for Watershed Sciences, 2015
https://californiawaterblog.com/2015/05/10/getting-to-the-big-picture-in-groundwater-management/

SGMA Groundwater Management, Department of Water Resources
https://www.water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

Streamflow Data Tools

USGS Current Water Data for California, U.S. Geological Survey, updated June 2020
https://waterdata.usgs.gov/ca/nwis/rt

The Water Management Planning Tool, California Department of Water Resources
https://gis.water.ca.gov/app/boundaries/

California Data Exchange Center, California Department of Water Resources
https://cdec.water.ca.gov/

California Institute for Water Resources, University of California
http://ciwr.ucanr.edu/

Drought and Water Information, California Institute for Water Resources, University of California
http://ciwr.ucanr.edu/California_Drought_Expertise/Drought_information/

Natural Flows Database, The Nature Conservancy, U.S. Geological Survey, and University of California-Davis
https://rivers.codefornature.org/#/home