Watershed Management Resource Management Strategy

CALIFORNIA WATER PLAN UPDATE 2023

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Contents

Figures

Acronyms and Abbreviations

CCI	California Climate Investment
CVP	Central Valley Project
DWR	California Department of Water Resources
IRWM	integrated regional water management
JPA	joint powers authority
RCD	resource conservation district
RMS	resource management strategy
TCSI	Tahoe-Central Sierra Initiative
TCSI Blueprint	Tahoe-Central Sierra Initiative's *Blueprint for Resilience*
USFS	U.S. Forest Service

1. Introduction

Watershed management is a multidisciplinary systems approach to managing the water resources, natural environment, and human activities within a watershed to satisfy and balance social, economic, and environmental priorities. Watershed management serves to integrate planning for land and water; it takes into account ground and surface water flow, recognizing and planning for the interaction among water, soil, plants, animals, and human land use found within the physical boundaries of a watershed (Red Deer River Watershed Alliance 2015).

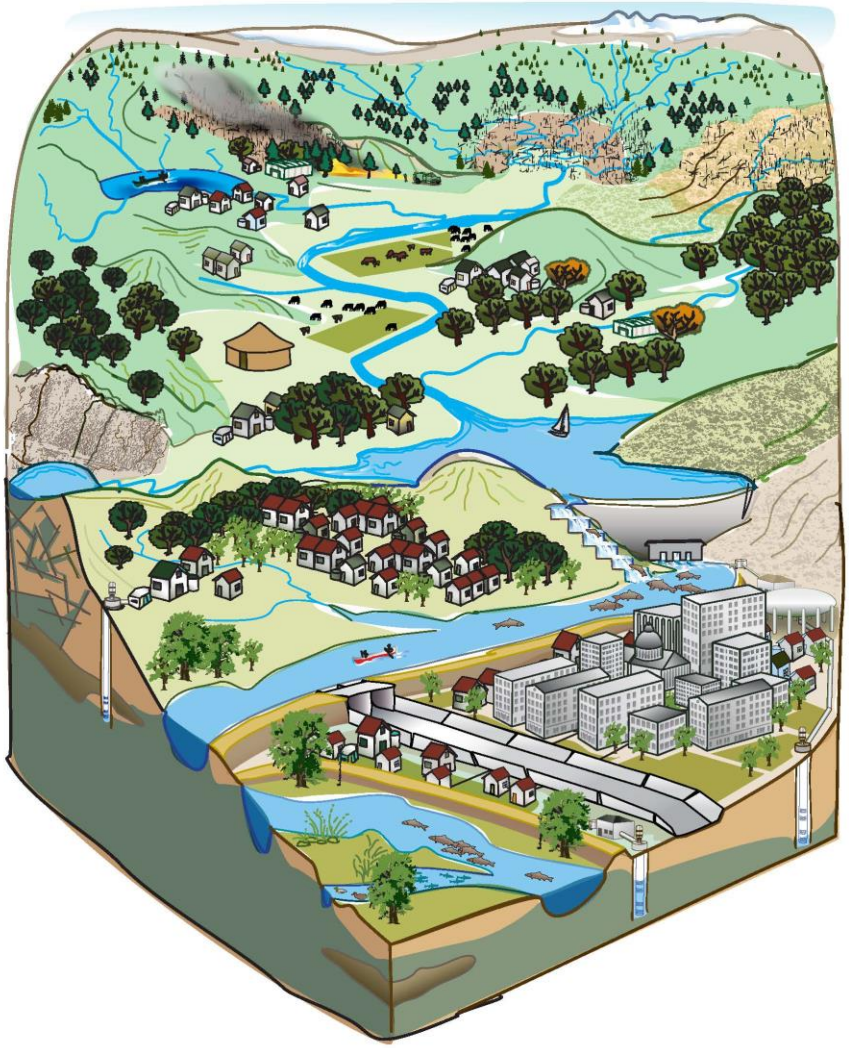
Watershed functions provide the goods, services, and values desired by human communities that are affected by conditions within a watershed. The practice of community-based watershed management, which is ongoing in hundreds of watersheds throughout California, has evolved as an effective approach to natural resource management. Many water managers and agencies are focused on organizing and planning at the watershed scale. These community-based efforts are carried out with the active support, assistance, and participation of several State agencies and programs.

Managing at a watershed scale has proven to be useful for the coordination and integrated management of the numerous physical, chemical, and biological processes that make up a river basin ecosystem. A watershed serves well as a common reference unit and basis for greater integration and collaboration for the many different policies, actions, and processes that affect the system.

2. The Importance of Watersheds

A watershed is the land area from which water drains into a stream, river, or reservoir. A watershed includes all natural and artificial (human-made) features, including its surface and subsurface features, climate and weather patterns, geologic and topographic history, soils and vegetation characteristics, and land use. The watershed for a major river may encompass multiple smaller watersheds, separated by ridges, that ultimately combine at a common point. The headwaters are at a watershed's highest point and is where a watershed begins. From the headwaters, water stores in snow and soil or runs off to lower elevations forming streams which flow into rivers, reservoirs, and floodplains, percolating into groundwater aquifers or eventually flowing into the ocean or an inland lake.

Figure 1 Watershed: A Whole-System Context



Similar to the interdependent ecological processes present in a watershed, watersheds contain a complexity of communities, beneficiaries, jurisdictional boundaries, and governing authorities that ultimately drive watershed management. Using watersheds as organizing units for planning and implementation of natural resource management can help align the social and ecological complexity of a watershed around the following principles:

- Watersheds describe a natural system more accurately than typical jurisdictional boundaries.
- Conditions and trends can be analyzed based on the entire natural system in concert with economic and social conditions.
- Multi-objective planning is facilitated by inclusion in, and reference to, a whole-system context.
- Learn from holistic watershed management approaches that Tribes have been practicing and leading since time immemorial, which includes the application of Traditional Ecological Knowledge.
- Communities, including resource managers and regulatory agencies within, and outside, a particular watershed can better track and understand the cumulative impacts of management activities on the watershed system.
- Communities and managers within each watershed can adjust their measures and policies to meet management goals more effectively across scales, including regional and statewide goals.

Water naturally functions as a system. Groundwater and surface water, storm water, water supply, floodwater, and wastewater are all integrated as one system. A drop of water in a reservoir can become future drinking water, critical habitat in a stream, or detrimental floodwater in someone's basement. Working at the watershed level addresses the natural system more comprehensively than single purpose management approach and can better account for cumulative impacts and trends throughout the water system than jurisdictional or political boundaries.

Effective management recognizes the mutually dependent interaction of various basic elements of a watershed system. The hydrologic cycle, surface water and groundwater interactions, erosion and sedimentation, nutrient and carbon cycling, energy flows and transfer, soil and geologic characteristics, plant and animal ecology, and the role of flood, fire, and other large-scale disturbance all demonstrate how one part of the water system can affect the entire system. What happens on land affects streams and rivers; water cannot be effectively managed without also managing the land. All of these factors must be considered in context with the others, because

change in one spurs change in the others, creating a different system outcome. Managing watersheds requires a systems perspective that views forest and fire management, land use, agriculture, flood management, groundwater, water supply, water quality, ecosystems, and climate as inextricably linked to each other.

The systems context of watersheds makes them especially relevant to promoting climate change resilience. Climate change is expected to cause new risks and vulnerabilities that can cause cascading effects throughout a watershed including in the communities and ecosystems that connect to them. Expected changes to watersheds are going to demand new capacities to adapt at major scales. Frontline communities face unique risks because they do not have the resources to adjust and respond like others. Climate change and resource scarcity necessitate that holistic water systems be managed to balance and achieve multiple purposes across water resources sectors. Because climate change impacts vary widely across the state and are unique for each watershed, it naturally follows that a watershed-scale lens may point to resilient solutions and adaptative approaches not often found when jurisdictional boundaries divide natural systems. Watershed-scale coordination and collaboration can encompass and influence multiple scales of planning and offer opportunities to better align built and natural systems and accelerate the ability to adapt to climate change. As a result, watersheds can be an appropriate organizing landscape unit for achieving integrated water management and broader social and ecologic climate resilience.

3. Watershed Management in California

California Tribes have been adhering to a holistic approach to resource management since time immemorial through knowledge and practices that were passed down from generation to generation. Inseparable from the culture and societies of California's Tribes, stewardship of their lands, watersheds, and all resources within sought balance, kinship, and reciprocity with nature.

This balance progressively deteriorated as California Tribes were forcefully prevented from stewarding California's natural wealth through State-sanctioned genocide, displacement, laws and policies to prevent native people from managing lands, and many other aspects of the shift to toward managing watersheds for maximum resource extraction or minimum human intervention.

In recent history, the State of California has been steadily increasing its support for holistic watershed-based natural resource management as way heal and strengthen watersheds so that they are healthy enough to meet natural resource needs while supporting intersecting ecological and social goals. While there have been many policy commitments made in the direction of integrated multibenefit natural resource management, funding for this work has cycled with State tax revenue between boom and bust, leaving a mixed legacy. While this approach shares some alignment in spirit and practice with Tribal resource management, California is distinctly far from achieving its goals of balance, kinship, and reciprocity in these lands, opening a great importance for Tribal leadership and co-management.

Today, California benefits from a generally cohesive network of watershed management groups persisting across the state, in large part, because of the enduring commitment of longstanding individual leaders, local agency investment, and recent increases in funding for wildfire resilience. But the organizations within this network vary greatly in capacity, areas of focus, and effectiveness because of fluctuating resources and other organizational factors. While the presence of the current network of watershed management groups statewide makes it a key strategic asset to meeting statewide natural and working lands goals, its variability presents challenges in doing so in a geographically and socially equitable manner.

At their foundations, many watershed groups cite the prior State investments in the Watershed Coordinator program at the California Department of Conservation and long-standing investments in the Integrated Regional Water Management (IRWM)

program at the California Department of Water Resources as key elements to their formation, governance, and focus. These two programs helped initiate watershed management organizations, fortify broad partnerships and governance structures, and provide a durable network that can be leveraged to address broader natural and working lands climate priorities. The IRWM program provides foundational structures and governance that can be utilized to support watershed management statewide. These, and other State programs that support watershed management, require sustained State investment to maintain their effectiveness.

Currently, the size and frequency of catastrophic wildfires is dramatically shifting the focus of the multitude of agencies and partners working within a watershed toward forest health, wildfire resilience, and wildfire recovery. This shift has corresponded with the alignment of historic funding, consensus around multibenefit strategies, and galvanized partnerships between local, State, and federal agencies. This work is being coordinated through the California Wildfire and Forest Resilience Task Force with the Regional Forest and Fire Capacity program at the California Department of Conservation serving in a primary role in helping watershed-based groups build institutional capacity, interconnect to each other, and lead wildfire resilience.

More broadly, California is investing historic levels of funding for climate-smart land management strategies to mitigate and build resilience to climate change. These funding opportunities are being created across many programs and agencies and are being organized around central natural resources policy priorities of the Newsom administration: drought, biodiversity, equity, and natural and working lands climate smart landscapes. Simultaneously, future water supply impacts caused by climate change and catastrophic wildfire are being increasingly better understood, placing increased importance for integrated water management strategies that connect strategies across policy areas, from upper watersheds to groundwater aquifers and meaningfully improve the ecological health of individual watersheds.

Lastly, there is a growing consensus among State and federal agencies surrounding the importance of empowering local, regional, and Tribal leadership. Those closest to the resource with direct interest and knowledge in the land are often in the best position to shape and lead strategies to accomplish overarching State policy goals and local priorities. But the partnerships and priorities that underpin regional watershed management are complex and multidisciplinary, shaped by the types of natural resources benefits sought by the overlapping interests of those involved as well as the many different intersecting types of land ownership and their varied management approaches. In many cases, instead of a single, cohesive watershed

management effort, watershed management happens through a collection of program or land managers who seek to work on issues in the watershed in a cohesive way.

As an example, the IRWM program is the State's primary program for organizing a diverse array of partners toward accomplishing shared interests in water management. The program has defined regions and processes with extensive regional networks of diverse participants with varied and intersecting interests that present a great opportunity to build upon. Concurrently, other State priorities, such as biodiversity and wildfire resilience, can be complimentary goals of water-focused watershed management but may encompass different stakeholders and regional footprints such as eco-regions and firesheds. Successful regional watershed management embraces the inherent overlapping interests, goals, and bureaucracies present within a watershed and sets up a framework tailored to the strength of a region to align large-scale multibenefit actions.

This convergence of more funding and emphasis on achieving multiple benefits through regionally led programs creates a unique opportunity for the existing watershed network to provide the scaffolding to accomplish many intertwined natural resources and socio-ecological priorities. California is fortunate to have strong pockets of watershed management organizations in each region to learn and build from. But variation in capacity and effectiveness across the network is a barrier to fully realizing this opportunity statewide.

4. Benefits of Watershed Management

A collective investment into managing a geographic area through a watershed approach can open opportunities to improve, expand, and sustain a greater, diversified, and more equitable public benefit. By combining efforts through effective collaboration, watershed efforts hold promise to accomplish the following:

1. Minimized conflict: Avoided and reduced conflict and litigation through collaboration across institutional and cultural boundaries.
2. Multiple benefits: Multibenefit projects through cooperation of all stakeholders.
3. Improved trust: Improved interagency and public trust through open, inclusive, transparent, and collaborative planning processes.
4. Collective strength: Results achieved through collective action, shared capacity, and information and data sharing.
5. Reduced costs: Reduced costs through avoidance of duplicate or conflicting plans and projects.
6. Improved outcomes: Comprehensive, climate resilient, sustainable, and permanent water management and environmental stewardship outcomes.
7. Tailored solutions: Regionally tailored water management solutions to address current and projected regional needs in the face of climate change.
8. Equitable and innovative management: Better, more innovative, and equitable water management through the involvement of diverse groups and viewpoints, including Tribes and frontline communities.
9. Diversified funding: Receive funding from multiple local, State, federal, and municipal programs.

5. Watershed Management Best Practices

Interviewing Watershed Management Groups

The development of this resource management strategy (RMS), included interviewing representatives from 15 watershed management groups to learn which components of their organizational structures, implementation techniques, and strategies were most important for long-term success of a watershed management effort. The interviewees represented collaboratives from watersheds in southern, coastal, central, northern, and Sierra regions and varied among having more focused work around water management or fire resilience to integrating many different natural and working land and climate resilience priorities into their work. For many of our interviewees, the IRWM program serves as a foundational mechanism and platform for regional watershed management and continues to provide strong processes for planning, outreach, and collaboration. From the interviews, social structures (organizational, partnerships, political, and governance) were the most important determining factors to long-term successful watershed efforts. While there were many different approaches presented in the interviews, the following best practices capture the most consistent aspects of a partnership that were attributed to long term organizational cohesion, strength, and capacity to scale up efforts. With each best practice, five example watersheds from interviews conducted were selected as models for reference. The example watersheds are a limited sample of diverse approaches and are provided in no order of priority. When combined, the following best practices can help a watershed effort solidify a foundation of leadership effectiveness upon which to pursue and raise resources for long-term goals.

Core Partnership

Watershed efforts are exercises in shared governance that, at their core, always have central parties who serve as pillars to the effort through a lasting commitment to work together at a leadership level. Interviewees shared multiple factors that drove the formation of their core partnerships including legal, regulatory, a local measure, or shared interest in the resource. Building a core partnership requires developing an agreed upon approach that will facilitate the achievement of mutual and individual interests. Interviewees cited the importance of establishing shared goals, respecting individual interests, and establishing a consistent process for setting priorities, making decisions, and working through conflict. Because of the sensitive nature of

this step and its critical importance to future success, many interviewees stressed the importance of having a lead organizer and using an independent facilitator and a structured approach to create the foundation of ongoing partnership.

Example watersheds:

- Lassen and Plumas watersheds.
- Santa Ana River Watershed Project Authority.
- Tahoe Central Sierra Initiative.
- Ventura.
- Yuba Watershed.

Governance

Stability and a trusted process were key attributes for sustained success for all interviewees. While there was broad variability between informal and formal governance models, watershed efforts formed around a formal agreement, such as a memorandum of understanding, were more commonly able to sustain efforts at scale for longer periods of time. Further, organizations with formal governance were in a stronger position to partner with local, Tribal, State, and federal agencies and scale up effort as resources were made available. While governance models should vary based on the origin, make-up, culture, and goals of a partnership, they should be structured in a way that respects the roles and authorities of local jurisdictions, stakeholders, and sovereign Tribal nations, sharing decision-making authorities while creating opportunities for diverse participation and influence.

Example watersheds:

- American River Basin.
- North Coast Resource Partnership.
- Tahoe Central Sierra Initiative.
- Tuolumne and Stanislaus Forest watersheds.
- Western Klamath Restoration Partnership.

Administrative Sponsor

Sophisticated high-capacity administrative support is crucial to manage the fiscal, administrative, and workforce demands of a watershed effort. Interviewees cited critical importance for an entity within a collaborative to serve as an administrative sponsor to stabilize administrative functions and to strengthen the organizational foundation. While administrative sponsorship usually had a baseline funding

component, interviewees placed equal or higher value on a sponsor's ability to leverage the assets of their larger organization (e.g., staff time, financial services, policies and procedures, auditing expertise, office space, facilities, outreach networks) to benefit the work of the watershed effort.

Benefits from administrative sponsorship range from facilitating more durable working partnerships with program funders to increasing equity in a watershed effort by creating administrative structures that support broader participation of partners with less administrative capacity. Strong administrative functions support more durable and longer-term program implementation while providing fiscal assurances to agency partners that their grant funds will be managed appropriately and reach their intended purposes. This often creates escalating opportunities for fiscal and coordinated partnerships.

In the strongest cases, funding for backbone administrative functions was separate from grant funds. This enabled organizations to support stable programmatic efforts while reserving administrative carve-outs from grants for direct project administration. Most often, this support came directly or in-kind from local water agencies or counties most closely aligned with the benefits.

Example watersheds:

- American River Basin.
- Sonoma County.
- Upper Los Angeles River.
- Ventura River.
- Yuba River.

Participation

While most interviewees sought broad participation in their work, they emphasized a need to tailor participation in a watershed effort on an ongoing basis to maintain focus on achieving accomplishments while ensuring equitable participation. Referenced structures were designed around a workflow where partners with clear roles and responsibilities worked on a more frequent and consistent schedule to accomplish their tasks while transparent opportunities to influence those deliverables were opened to a broader audience at key points of the development process.

At the core, key participants were primarily from local governments, municipalities, Tribal nations, non-governmental or academic partners, and locally focused State and

federal agencies (e.g., conservancies, resource conservation districts, CAL FIRE, U.S. Forest Service). In many cases, participation networks stemmed from the extensive stakeholder coordination of integrated regional water management regions. This combination generally ensured that there would be diverse representation in the process geographically, politically, and policy-wise, resulting in better relationships among the participants and support for the effort.

Example watersheds:

- Inyo-Mono.
- Santa Ana River.
- Sonoma County.
- Upper Los Angeles River.
- Western Klamath River.

Outreach and Coordination

From the interviews, robust outreach and coordination strategies were cited as critical for ensuring equitable benefits and long-lasting institutional, community organizational, and practitioner support. Their input was essential to shaping priorities, developing implementation strategies, and garnering ongoing support and awareness. Outreach and coordination strategies were effective when targeted at multiple levels of decision-makers and actors from State and federal government to local governments, water agencies, Tribes, community leaders, and the scientific community.

Further, watershed efforts can be effective at engaging with communities to build support for their work and to create opportunities for residents to participate in watershed restoration or recovery events.

Example watersheds:

- Upper Los Angeles River.
- North Coast.
- Santa Cruz Mountains.
- Western Klamath River.
- Yuba River.

Risk Assessment and Priority Planning

Assessing risks and agreeing on priorities is a foundational social and technical step in watershed management and a key point for cohesion for participants of a watershed effort. The process must consider and respond to unique geographic, biophysical, and social characteristics in the region. Interviewees stressed the importance of being intentional and transparent about how planning areas are defined, risks are assessed, and priorities are determined. In many cases, spatial data and analytical tools helped align partners and stakeholders into a trusted process for understanding the state of the watershed and identifying priorities. Likewise, studies and other academic resources provided key data to help align understandings around current and projected conditions. Finally, identifying priorities down to the project level was helpful for participants and agency partners to see tangible actions that result from planning.

For the most part, the prioritization process identified by interviewees was guided by project readiness, level of benefit, and ease of implementation. But one group in the Santa Cruz Mountains used its planning process to elevate the priority of the most complex and problematic projects for the attention of the full collaborative. Approaches are well known for implementing easier projects and the collaborative time of the full partnership was better spent tackling complexity and barriers to create replicable approaches for similar future projects.

Many interviewees cited a need to update risk assessments conducted through IRWM or other programs to account for changing conditions. This is especially important to align assessments with projected impacts of natural disasters (e.g., wildfires, floods, pine beetle infestation), climate change, and implementation program spending.

Example watersheds:

- American River Basin.
- North Coast.
- Tahoe Central Sierra.
- Santa Ana River.
- Tuolumne and Stanislaus forests.

Effectiveness Monitoring

Science-based processes for understanding whether investments were meeting desired outcomes were credited by interviewees as very valuable for maintaining key

partnerships and fiscal support and guiding future planning and prioritization. But many interviewees cited difficulties in assessing project-level effectiveness because of capacity and scientific or technical data. This challenge presents an opportunity for agency or academic support to help efforts focus on implementation and create consistent methods for evaluation.

Example watersheds:

- North Coast Resource.
- Santa Cruz Mountains.
- Santa Ana River.
- Western Klamath River.
- Yuba River.

Desired Outcomes

Desired socio-ecological outcomes from watershed management are driven by the unique needs of a watershed, the expressed goals of primary funders, and the interests that are represented in the process of priority setting. Despite their own interdependence, desired outcomes are most often divided among desired ecological conditions that require investment in landscape treatments and improvements in the ability to manage water through infrastructure and management decisions.

A watershed approach should create an opportunity to maximally leverage the entire bio-physical attributes of a watershed and the full statutory, political, and financial strength of its partners to meet shared partnership goals. Water management can look to the full watershed, from upper elevation snowpack to ground water basins, as an interconnected system of natural infrastructure to hold, clean, move, and store water for the environment and human use. Throughout this system, investments in restoration should be made at a large enough scale to fortify climate resilience of these assets. Likewise, infrastructure investments can help water managers supplement natural systems and increase the ability to hold water within a system to increase overall yield while providing other ecosystem, cultural, and public safety benefits. As a watershed effort should look across the natural aspects and infrastructure of a watershed for opportunities to improve outcomes, so should it look to the institutional strengths of its partners. Watershed partners often can help develop and stabilize governance structures, bring in and align other funding with shared goals, develop diversified funding strategies, and offer political, media, and community relationships to foster a collective political strategy.

Socio-Ecological Outcomes: Applying the Tahoe Central Sierra Approach as Model

With respect to desired ecological system outcomes, the Tahoe-Central Sierra Initiative's *Blueprint for Resilience* (TCSI Blueprint) is an example of a socio-ecological model to guide development and measure achievement of desired landscape outcomes from watershed management. The TCSI Blueprint was developed by an interdisciplinary team of scientists, land managers, and policy makers through a science-based, consensus building process for a 2.4-million-acre landscape encompassing the Yuba, Truckee, and American river watersheds. While it was developed for one specific landscape, the TCSI Blueprint can be modified to address the specific needs of many watersheds statewide.

The TCSI Blueprint recognizes the interdependent nature of social and ecological values. For the Tahoe Central Sierra region, the following ten pillars were developed to represent desired social and ecological outcomes of this landscape to build climate resilience. The authors of the pillars created actions specific to the region that would help them accomplish each category of goals. Supporting these actions, or "elements," were additional metrics that describe the characteristics of an element in quantitative or qualitative terms. The Tahoe Central Sierra Initiative has learned through their process that when there is agreement among a coalition around a framework of shared values and pathways to achieve them, it helps agencies, landowners, Tribes, businesses, and other stakeholders both plan projects that align with shared values and clearly document progress toward local, regional, and statewide goals.

The TCSI Blueprint is also meant to provide a common but flexible structure to give statewide policy makers managing toward different watershed goals (e.g., water supply, wildfire resilience, habitat restoration, etc.) consistent metrics for understanding progress while providing watershed managers flexibility to assess their landscape conditions, set objectives, design projects, and measure progress toward social-ecological resilience in their region. For this reason, the TCSI Blueprint is currently being applied to all wildfire prone landscapes of the state through the California Wildfire and Forest Resilience Task Force and work by its Science Advisory Panel to develop regional resource kits for local wildfire resilience efforts.

While these pillars are general and could be relevant to multiple regions of the state, it is expected that they could be adjusted to capture unique regional needs and objectives.

Figure 2 Pillars of Resilience

6. Costs of Implementation

To implement watershed restoration at a scale that achieves meaningful climate resilience benefits, actions need to be sequenced across large landscapes over extended timelines with flexibility to respond to changing conditions. Successful implementation at this scale requires stable funding and intentional investment in interdependent administrative, labor, materials, machinery, and community systems that underpin program implementation. By focusing on these systems, watershed efforts can gain control over market driven factors that increase costs and disrupt timelines. The following are some examples of critical areas of investment to enable a watershed effort to stabilize its productivity, achieve its goals, and ensure socio-economic benefits stay in local communities.

Collaborative Capacity

When assembled, the different elements of a watershed effort require a significant collective investment of time and resources into collaborative capacity to develop and implement the kinds of inclusive, equitable, and scalable impacts needed to meet participant, local, State, federal and Tribal goals. Complimentary to this RMS and findings of the interviews, the California Landscape Stewardship Network released a paper in 2022 titled, *Increasing Collaborative Capacity and Infrastructure for Landscape Stewardship*. The paper provides an argument for the importance of collaborative capacity in leveraging the strengths of individual partners to result in greater public benefit. The paper provides detailed recommendations on how to invest in building collaborative capacity and examples of successful collaborative efforts.

Project-by-Project vs. Landscape Scale Grants

As a result of historic funding levels and need, State and federal funding agencies are being stretched to their programmatic and administrative limits by high quantity project-by-project grant programs. Watershed partnerships also struggle to administer increasing numbers of project specific grants and their monitoring and invoicing requirements. Historic statewide calls for action to respond to drought, wildfire risk, and loss of biodiversity matched by equally historic funding levels are creating opportunities for larger, multi-project, system-changing investments that are grounded in regional plans. Similar to the way the IRWM program assesses infrastructure needs across a whole region, watershed restoration efforts are assembling and sequencing multiple types of ecosystem restoration projects across

their landscapes for consolidated funding that together make improvements to resilience.

The Sierra Nevada Conservancy is leading this push in its region through the *Sierra Nevada Landscape Investment Strategy* which includes a Landscape Grant Pilot Program that will seek to align funding from multiple entities to provide one or two large landscape grants that support strategic portfolios of projects across large landscapes over a 5- to10-year timeframe. The California Department of Conservation's Regional Forest and Fire Capacity Program is further funding the development of regional priority plans for forest health and wildfire resilience with an emphasis on the development of actionable project priorities for larger implementation block grants. Ideally, landscape project portfolios will enable simplified collective investment from multiple agencies into watershed restoration that will relieve administrative burden and enable 5, 10, or 20+ years of sustained action at scales necessary to build meaningful climate resilience.

Diversified and Sequenced Funding

While State and federal agencies are allocating historic funding levels to watershed resilience, long-term trends in project-related funding have proven to be cyclical and unstable. From the interviews, it was clear that groups with diversified funding strategies, along with some level of baseline funding, were in much better positions to sustain work through funding volatility. Interestingly, baseline funding did not have to be a majority of overall funding and was often very effective even when it was limited to supporting backbone functions such as administration, strategic planning, and grant writing. Baseline funding needs can also include project design, facilitating coordination between project partners, and project match.

Most often, sustained funding came from a local tax base through either water agencies or local initiatives such as Measure W in Los Angeles County. At the project level, funding portfolios referenced by interviewees included sources from multiple State and federal agencies with different policy goals, utilities, municipalities, private philanthropy, and private enterprise. In these cases, proponents were able to make persuasive arguments to the value that these resources bring to the community. As one example of how to valuate these benefits, the California Stormwater Quality Association developed a report, *The Socioeconomic Value of Urban Stormwater Capture*, that provides multiple new economic valuations for proper stormwater management. Finally, to assist in smoothing out cashflow availability to meet project needs, third party financial products leveraging ecosystem benefits are being developed by entities such as Blue Forest Conservation to finance watershed

investment up front so that cash-flow can be sustained throughout sequenced landscape scale implementation.

Equitable Restoration Economies

Massive mobilization of labor and resources will be required to meet climate resilience goals in California's watersheds. To meet this challenge, historic funding is being allocated to climate resilience in the natural systems and infrastructure in watersheds. Beyond the need for long-term funding, some interviewees cited broader economic systems such as workforce and biomass utilization as primary barriers to accomplishing their forest management goals. Generally, watershed organizations rely on external contractors and service providers to support their efforts. This external reliance puts watershed partnerships in a precarious position between public funding and unstable project cost drivers. Interviewees specifically cited project cost inflation, lack of bidding contractors, supply chain, and housing as major barriers disrupting restoration plans. For many organizations and public agencies working toward watershed stewardship goals, historic project funding offers an opportunity to build local, equitable restoration economies to stabilize their efforts and gain control over external supply chains of labor and services while localizing workforce and economic benefits.

This approach is one that seeks to create a local workforce with a deep knowledge base, guided by traditional and modern stewardship methods, and sustained through livable wages and dignified working and living conditions. In the August 2022 paper, *High Roads to Resilience: Building equitable forest restoration economies in California and beyond*, the Climate and Community Project at the University of British Columbia Center for Climate Justice uses experience from practitioners in the Tahoe Central Sierra region to make a case for the importance of equitable forest restoration economies for accomplishing goals and social improvement, why intentional investment is needed to create them, and specific recommendations for their incentivization.

7. Challenges to Implementation

Implementation Factors

While watershed management has been a policy priority of the State for decades, successful widespread implementation has been challenging to realize. As this RMS attempts to lay out, successful watershed management is reliant on a complex supply chain of interdependent social, scientific, economic, and capacity factors. Adding further complexity, each of these factors may present unique challenges based on the socio-ecological aspects of the place they are being implemented. From the interviews conducted to support this RMS, two specific factors stood out as being centrally important to building a sound foundation to tackle the many challenges to implementing a successful watershed effort: First, a watershed effort needs to have strong administration, led by an entity with baseline capacity to coordinate, organize, and deploy a comprehensive watershed management strategy (e.g., coordinating, planning, implementation). Second, that entity must have trust and tangible partnership with its critical agencies, organizations, and Tribal governments. While not exhaustive, the following are some of the challenges to implementation that determine whether a watershed effort has the administrative capacity and can sustain trusted partnerships that contribute to shared goals.

Baseline Capacity

Baseline capacity enables a watershed effort to be a stable leader, set a strategic vision, and assemble the partnerships and capacities needed to achieve that vision. But most watershed efforts are unable to sustain baseline capacity through project grants. Baseline capacity is most effective when funded independent of administrative allowances for project grants, often sustained through a highly capitalized partner serving as a fiscal sponsor or local funding initiative.

Implementation Capacity

Gaps in implementation capacity affect the consistency and quality of delivering on project or other goals, eroding trust with partners and the communities being served. Implementation capacity needs can take many forms, often falling on administrative, stable workforce, equipment, and facilities.

Watershed efforts should have a clear understanding of their implementation strengths and weaknesses. Once identified, many needs can be met by leveraging the capacity of institutional partners within their watershed. Others may require

funding beyond what's available in their partnership. Watershed efforts should include these costs where possible in their grant applications, or advocate that these costs be made eligible by funding agencies in their grant guidelines.

Governance

Effective governance is a cornerstone of building a long-standing, trusted, watershed effort. Governance structure should be inclusive and respect local, State, federal, and sovereign Tribal nation knowledge, needs, and authorities. Standing up effective governance usually requires an initial investment in facilitation and participation in a development process.

Establishing governance is predominantly a one-time cost, funding agencies that rely on watershed efforts to meet their policy goals should consider funding governance development to enable long-term implementation of goals.

Processes and Procedures

Fiscally and administratively, processes and procedures are critical for building trust with funders that an effort can reliably deliver on implementation goals, be held accountable for expenditures, and be responsive to audits. Further, partnerships rely on consistent processes and procedures for funding decisions to ensure that there are open venues for needs to be expressed and assurances that funding decisions are transparent, fair, and achieve a shared vision.

These are often one-time costs. Funding agencies that rely on watershed efforts to meet their policy goals should consider funding the capacity grants to establish processes and procedures to enable long-term implementation of goals.

Watershed Plan

A watershed implementation plan that identifies risks, assets, desired conditions, and projects to achieve them can fortify partnerships of those working within the watersheds and funders who seek to accomplish the outcomes for state and local benefit. An effective vision and implementation plan should clearly demonstrate how it will help accomplish local and statewide goal plans and include a methodology for identifying priority actions. Watershed plans should provide a transparent accounting of priority projects identified to meet goals, including information on their detail and status. Ideally, an implementation plan will lay out a long-term (10+ years) list of project needs to help establish the policy rational for continued funding.

There are many watershed plans that were funded previously by the State through the IRWM, watershed coordinator, and other programs that need to be updated to include current climate science and priorities. Targeted investments to update and integrate plans could be a cost-effective step to reinvigorate dormant watershed efforts and expand the watershed network.

Funding Stability

Watershed efforts need stable funding to plan and organize strategically, effectively program resources, and sustain implementation. Boom and bust funding cycles, short expenditure periods, delays in reimbursements, and inefficient administrative cost allowances can overstress an organization's effort to efficiently sequence their many demands to accomplish their end goals, resulting in missed opportunities, increased costs, or project delays.

Aligning how projects are funded and how funding is timed with realities in the field could provide critical relief to implementing entities and optimize how resources are deployed, smoothing out ups and downs of the process. One opportunity would be for State budgets to provide encumbrance and expenditure periods that realistically match implementation timelines with opportunities to extend those timelines as much as two years prior to expiration so resources can be planned effectively. Further, many grant programs provide funding on a project-by-project basis, compounding administrative burden for grant agreements, invoicing, and oversight for the agency and the grantee. As is done in transportation and other infrastructure programs, when there is agreement around a plan and the ability of an entity to deliver on its goals, funding agencies should fund implementation of that plan, rather than individual projects. Projects could be bundled into portfolios with flexibility around sequencing provided to the grantee to empower the most efficient and effective use of State funds. By providing flexibility in encumbrance and expenditure periods, watershed efforts can pace their implementation to maximize efficiency and smooth out inherent ups and downs in the State budget.

Monitoring

Understanding the effectiveness of watershed investments is critical to informing whether goals are being achieved and how limited funding should be prioritized. Currently, this is a rapidly evolving field with significant investments being made into remote sensing capacity to help monitor landscapes at a large scale. But, at the project scale, most grant programs do not provide funding over time to monitor the effectiveness of that investment.

There are opportunities in grant programs to include funding and longer timelines for monitoring. There is a shared interest with the State and watershed partners to how different strategies produce within an individual watershed or across different regions. Unfortunately, most funding programs are limited to a five-year grant timeline which is tied to the completion of the capital aspects of a project. That structure ignores the inherent need to watch a project through multiple weather cycles, growth periods, and other changes to the landscape to understand whether it achieved its goals. For the most part, when this work is completed, it is absorbed by the implementing partner, further challenging their fiscal capacity. Funding the relatively small costs for project-level effectiveness monitoring by local partners would strengthen the skill and knowledge of local partners and enable the State to make much more strategic investments of larger capital outlay project grant budgets. This could be accomplished through a longer or continuous appropriation. Tools such as the Watershed Hub, described in Chapter 5, "Focus on Supporting Watershed Resilience," of *California Water Plan Update 2023*, can be useful in developing multi-sector performance tracking metrics that can help inform adaptive management.

Costs If Not Implemented

What are the consequences of not implementing or delaying implementation of the RMS (qualitative or quantitative)?

8. Climate Change

Adaptation

A diverse ecosystem can create resilience within a watershed in the face of climate change and ensure ecosystem services are still provided. The regions within a watershed are interconnected and climatical changes have the potential to affect different areas of the watershed disproportionally. Providing technical information for the decision-making process, so watershed managers understand the potential impacts the region will face, is needed to develop equitable adaptation strategies and resilient projects that remain effective into these future conditions. Understanding how watershed areas interact within the region can lead to better management strategies that allow for adaptation to the challenging effects of climate change.

Infrastructure and land management must be conducted with an allowance for natural ecosystems to respond to climate change. This includes increased floodplain capacity to regulate and capture greater volumes of streamflow or managing species migration to different habitats in response to higher temperatures. Addressing adaptation by understanding the watershed is interconnected will more efficiently manage the threats watersheds face from climate change and create more opportunities for adaptation.

Mitigation

Efforts to curtail greenhouse gas emissions is needed to reduce exacerbating climate change impacts and should be encouraged in a watershed scale. With multiple agencies coordinating on a watershed scale, projects can be better planned to not only serve multibenefits but also become more efficient with construction activities. Projects can be better orchestrated with other entities so that when groundbreaking occurs for a large investments project using extensive construction equipment that generate higher emissions, multiple smaller projects can be constructed in series to effectively avoid having to repeatedly break ground. This coordinated effort of more efficient construction practices would result in assumably less emissions, lower costs, faster deployment of project benefits, and would only be possible through effective watershed partnerships.

Healthy, functioning watersheds can effectively sequester relatively high rates of carbon and investing in multibenefit projects through integrated watershed

management can restore function within degraded habitats (Wang et al. 2016). In particular, forested watershed ecosystems have high carbon sequestration potential and can be used to mitigate against excess carbon in the atmosphere. Ensuring connection between forested areas with riverine and floodplain habitats would restore nutrients into soils and allow for carbon to be sequestered underground. Additionally, restoration within forested areas devastated by wildfire or severe drought is needed to reestablish the capacity for productive watersheds to provide ecosystem services such as carbon sequestration, water quality purification, and water supply.

Watershed Management and the Water Resilience Portfolio

The following are the water management proposals listed in the *Water Resilience Portfolio*:

- 15. Encourage investment in upper watersheds to protect water quality and supply while providing ecosystem benefits.
- 15.1 Encourage enhancement of both forest and water management through watershed coordinator programs, resource conservation districts, and other groups coordinating regionally.
- 15.2 Work toward accomplishing the goals of the California Forest Carbon Plan, which recommends actions to achieve healthy and resilient forests that help the state meet greenhouse gas reduction goals.
- 15.3 Encourage landscape-scale management efforts, modeled after approaches such as the Sierra Nevada Conservancy's Watershed Improvement Program and the Tahoe-Central Sierra Initiative, to restore the health of watersheds and improve community resilience.
- 15.4 Complete plans for watershed restoration investments in the drainages that supply the Oroville, Shasta, and Trinity reservoirs, consistent with 2018 legislation (Assembly Bill 2551).
- 20. Support groups and leaders in each of the state's regions to develop and execute integrated water resilience strategies.
- 20.1 Build on the Integrated Regional Water Management Program and other regional efforts to align climate scenarios and expand watershed-scale coordination and investments that contribute to water resilience. Emphasize integrated, multisector, and outcome-based planning, action, and monitoring.
- 20.2 Structure funding sources to reduce the hurdles for water projects that reflect integrated solutions, produce multiple benefits, and improve watershed function.

- 20.3 Support the capacity, participation, and full integration of Tribal governments and under-represented communities in regional planning processes.

9. Recommendations

The following recommended areas of investment and attention would accelerate watershed management statewide by supporting the organizations that lead these efforts, the partnerships they build, and their capacity to strategically plan and implement projects that result in desired conditions to achieve shared goals. For each of these recommendations, State funding programs should consider making these allowable expenses and project types. In most instances, the lived experiences of the long-standing IRWM program will offer insights, proven approaches, and lessons learned to help those seeking to initiate or expand a watershed management effort. Recommendations for the following subject areas are discussed earlier in this document and are being summarized here with reference in parenthesis to the section where they are discussed.

Core Partnership Development

Time and resources should be invested up front into the development of the central partnership of the parties that will lead a larger governance structure. Building a core partnership requires developing an agreed upon approach that will facilitate the achievement of mutual and individual interests (Watershed Management Best Practices).

Governance

Time and resources should be invested into the development of a governance structure that is agreed upon by the core partnership and will result in equitable participation and program implementation. Establishing governance is predominantly a one-time cost, funding agencies that rely on watershed efforts to meet their policy goals should consider funding governance development to enable long-term implementation of goals (Watershed Management Best Practices and Challenges to Implementation).

Baseline and Implementation Capacity

State funding agencies should include baseline and implementation capacity as eligible costs in project-focused grant programs. Without this allowance, watershed efforts will struggle to deliver needed landscape-scale efforts (Watershed Management Best Practices and Challenges to Implementation).

Outreach, Coordination, and Participation

Watershed efforts should develop outreach, coordination, and participation structures that reflect the communities they are serving and include the critical local, State, and federal agencies and Tribal governments that have interests in the watershed. Similarly, regulatory agencies should coordinate on project reviews as conflicting priorities can pose a significant barrier to multibenefit project development and implementation (Watershed Management Best Practices).

Risk Assessment and Priority Planning

Invest time and resources into assessing risks, desired outcomes, and project priorities. The process must be transparent and consider and respond to unique geographic, biophysical, and social characteristics in the region. Interviewees stressed the importance of being intentional and transparent about how planning areas are defined, risks are assessed, and priorities are determined. In many cases, spatial data and analytical tools helped align partners and stakeholders into a trusted process for understanding the state of the watershed and identifying priorities (Watershed Management Best Practices and Challenges to Implementation).

Effectiveness Monitoring

Time and resources should be invested in understanding whether project implementation is achieving desired outcomes. Effectiveness monitoring helps inform future priorities and provide accountability for public funded investments. Project-based funding does not provide long enough appropriation timelines for monitoring. Funding mechanisms that account for the long-term need for monitoring should be developed (Watershed Management Best Practices and Challenges to Implementation).

Balance Water Management, Infrastructure, and Restoration

A watershed approach should create an opportunity to maximally leverage the entire bio-physical attributes of a watershed and the full statutory, political, and financial strength of its partners to meet shared partnership goals. Water management can look to the full watershed from upper elevation snowpack to ground water basins as an interconnected system of natural infrastructure to hold, clean, move, and store water for the environment and human use. Throughout this system, investments in restoration should be made at a large enough scale to fortify climate resilience of these assets. Likewise, infrastructure investments can help water managers supplement natural systems and increase the ability to hold water within a system to

increase overall yield while providing other ecosystem, cultural, and public safety benefits (Costs of Implementation).

Funding Stability

Watershed efforts need stable funding to plan and organize strategically, effectively program resources, and sustain implementation. Boom-and-bust funding cycles, short expenditure periods, delays in reimbursements, and inefficient administrative cost allowances can overstress an organization's effort to efficiently sequence their many demands to accomplish their end goals, resulting in missed opportunities, increased costs, or project delays. State funding programs should consider funding regional multi-project plan implementation rather than project-by-project grants, provide longer appropriation timelines, and award direct grants for subsequent sequences of proven projects (Watershed Management Best Practices and Challenges to Implementation).

Equitable Restoration Economies

Organizations and public agencies working toward watershed stewardship goals should intentionally leverage their combined historic funding investments to build local, equitable restoration economies to stabilize their efforts and gain control over external supply chains of labor and services while localizing workforce and economic benefits.

10. Watershed Management Group Interviews

In developing this RMS, the authors interviewed representatives from 15 watershed management groups to learn from practitioners which components of their organizational structures, implementation techniques, and strategies were most important for long-term success of a watershed management effort. The interviewees represented collaboratives from watersheds in southern, coastal, central, northern, and Sierra regions and varied between having more focused work around water management or fire resilience to integrating many different natural and working land and climate resilience priorities into their work.

This section provides summaries of the interviews conducted for this RMS. Please contact the organizations directly with any additional interest or questions. The following watersheds and the organizations were interviewed:

- American River Basin: Regional Water Authority and Placer Water Agency.
- Inyo-Mono: Inyo-Mono Integrated Regional Water Management Agency.
- Lassen and Plumas: Sierra Institute.
- North Coast: North Coast Resource Partnership.
- Russian River: Sonoma Water Agency.
- Santa Ana: Santa Ana Watershed Project Authority.
- Santa Cruz Mountains: Santa Cruz Resource Conservation District.
- Southern Sierra: Sierra Resource Conservation District.
- Tahoe-Central Sierra: Tahoe Conservancy, Tahoe-Central Sierra Initiative.
- Trinity: Trinity County Resource Conservation District, Trinity River Watershed Council.
- Tuolumne and Stanislaus: Yosemite Stanislaus Solutions.
- Upper Los Angeles River: Council for Watershed Health.
- Ventura: Ventura County Watershed Council.
- Western Klamath: Western Klamath Restoration Partnerships.
- Yuba: North Yuba Forest Partnership.

American River Basin

Regional Water Authority and Placer Water Agency

Watershed

- Regional planning area includes the American River watershed, portions of the Bear River watershed, the Cosumnes River watershed, and two groundwater subbasins.
- This watershed serves more than 2 million people across six counties and 22 water agencies.
- Regional Water Authority (RWA) has been expanding their planning area over time as they built new partners and transitioned toward more systemwide watershed planning.

Major Risks

- Loss of snowpack from climate change is affecting water supply, flood control, fish and wildlife habitat, hydropower, and recreation.
- Projected water supply-demand imbalance in the future.
- Fish habitat affected by ability to manage flows and water temperatures in Lower American River.
- Flooding from increased early season runoff.
- Hydropower and recreation impacts from shifts in runoff.
- Population growth.

Governance

- RWA is a regional joint powers authority (JPA) that has been a leader in promoting regional collaboration on water supply issues since 2000.
- RWA has not only been the steward of the Water Forum Agreement but has also served as the Integrated Regional Water Management (IRWM) Regional Water Management Group, and coordinates with groundwater sustainability agencies on compliance with the Sustainable Groundwater Management Act.
- Includes water agencies, cities, counties, a flood control agency, and a municipal utility district.
- Foundation of regional collaboration is the Water Forum agreement, a landmark agreement which balances seven key actions to support safe and reliable water supply and to preserve the environment of the American River.
- Central belief driving RWA is that agencies can accomplish more together than separately.

- Member agencies are pro-active, hands-on, and have significant buy-in.

Funding

- Subscription-based membership in RWA.
- Larger agencies, or agencies that benefit more, contribute more than smaller agencies or agencies that benefit less.
- Effectively leveraged federal funding (U.S. Army Corps of Engineers and U.S. Bureau of Reclamation), State funding (IRWM program), and water transfers outside of the basin to fund water system improvements that the local customer base likely couldn't afford.

Strengths

- Strong understanding and acceptance that climate change is a major driver for all their water-related activities. Region values robust analysis of climate vulnerabilities and being proactive.
- Applying IRWM principles to holistically manage all components of water, including water supply, groundwater management, flood management, ecosystems, and forestry management. They have achieved this by breaking down traditional silos and bringing systems together to share and jointly manage overlapping system capacity.
- Unique planning areas including several watersheds, groundwater basins, water management facilitates, and systemwide planning across multiple sectors. Watershed scale collaboration opens new opportunities to improve systemwide shared infrastructure and operations. Transitioned over time from individual projects, brick-and-mortar improvements focus on systemwide solutions and operations. Holistic, system-scale management can identify new opportunities.
- Early wins on more focused issues and geographies (water quality in the Lower American River) established framework for more integrated planning across the watershed scale.
- "All boats must rise" mentality and culture has led to several win-win opportunities. Early wins breed more success. Changing paradigms from viewing floodwaters as a nuisance to using floodwaters as a resource has led to strong collaboration of water supply and flood management agencies.
- Utilized State and federal partnerships to provide high-value services to a limited population base.
- An emphasis on people and relationships has been the driver to successful collaboration.

Key Areas of Improvement

- Evaluating effectiveness through monitoring and adaptive management.

Inyo-Mono

Inyo-Mono Integrated Regional Water Management Agency

Watershed

- Encompasses the watersheds of Inyo and Mono counties.
- Headwaters region provides a significant water source for the Los Angeles Department of Water and Power.
- Large region with several watersheds.

Major Risks

- Water exports and stream flows.
- Water quality, primarily naturally occurring arsenic and uranium.
- Risks from climate change have not been well-assessed.

Governance Structure

- Eastern Sierra Water Association serves as the IRWM agency. It is governed by a voluntary memorandum of understanding (MOU) and has been in place for last decade and a half. Approximately 40 MOU signatories including water agencies, counties, federal and State agencies, Tribes, environmental organizations, and community organizations.
- Leadership group guides the work but doesn't have decision-making power.
- The full group has decision-making power through a formal process.
- Fiscal management is led by two organizations.

Funding

- Predominantly funded through IRWM program with recent funding from the Regional Forest and Fire Capacity program for wildfire resilience planning.

Strengths

- Committed core group that has been together for 15 years.
- Attention to the interests of all participants and their funding needs.
- IRWM project funding keeps group committed.
- The group is able to come together and solve critical community water quality needs.

- Attention is focused on the highest need areas and respect is given to the diversity of needs in the region.
- Strong commonality among parties in the region.
- Project level climate change planning.
- Strong Tribal engagement and participation.

Key Areas of Improvement

- Much of their work dependent on IRWM funding. Funding diversification would reduce risks if IRWM funding is reduced.
- Watershed scale climate projections would be helpful to inform climate change watershed planning.

Lassen and Plumas

Sierra Institute

Watershed

- The South Lassen Watershed Group works within a 1-million-acre footprint that covers the Upper North Fork of the Feather River and the Upper Mill Creek and Upper Deer Creek watersheds at the headwaters of the State Water Project.
- Has some of the last remaining anadromous salmon and fish habitat available in inland California.

Major Risks

- Large scale wildfires, drought, loss of snowpack, and worsening climate change.
- Ecological system is outside the natural range of variation which causes threats to water resources and anadromous fish habitats.

Governance Structure

- The Sierra Institute works with the nine integrated regional water management groups in the Mountain Counties Funding Area, primarily the upper watersheds.
- Watershed coordinator to facilitate and coordinate the Upper Feather River collaborative group. This coordinator was initially funded through the California Department of Conservation's (DOC's) watershed coordinator funding.
- The Sierra Institute supports the watershed group by providing labor and grant writing assistance.

- The IRWM was key in allowing the establishment and guidance for the watershed group.
- More than 25 groups are represented in the collaborative, including State, local, and federal agencies, Tribal representatives, water and hydropower management entities, large landowners, non-governmental organizations (NGOs), and individuals.
- The collaborative encompasses more than 1 million acres, primarily the upper watersheds.
- There is a MOU among all members of the collaborative.
- The group has a strategic plan that guides their activities; there is a strategic planning subgroup that informally meets every other month.
- The larger collaborative meets informally every other month with formal meetings on an as-needed basis, generally every couple of years.
- This governance structure helps to facilitate successful acquisition of different funding streams.
- There is less involvement of downstream water use entities than desired.

Funding

- The watershed coordination grant from DOC was foundational in setting up and maintaining the collaborative. It allowed for effective coordination support.
- The watershed coordinator funding was leveraged for seven times more dollars than the coordinator dollars. Ongoing funding for coordination comes from other sources.
- U.S. Forest Service (USFS), U.S. Bureau of Reclamation, and California Climate Investments grant funding for planning and implementation work.

Strengths

- Envision and work toward large multibenefit planning and projects. The 160,000-acre West Lassen Headwaters Project is an example.
- Working toward a 1-million-acre multibenefit project with proportionate levels of funding.
- Emphasize effective facilitation as a key for engaging collaborative members and working toward large multibenefit projects.
- Effectively engaging multiple federal landowners (e.g., USFS, Bureau of Land Management, National Park Service) and gaining their support.

- Utilize public strategic planning meetings to engage stakeholders and create consensus for multibenefit projects.
- Place an emphasis on developing the local workforce as part of the planning and implementation process.
- Include large and small private landowners in the collaborative and work effectively with them.
- Planning and projects include protection measures for salmonids.
- Through the effective work of the facilitators and the collaborative, more groups have been brought to the table to help understand and mitigate the negative effects of the 2021 Dixie Fire. This included new funding streams for watershed and economic development work.

Key Areas of Improvement

- Engaging more active participation by water users.
- Continuing to adjust to recovery from the effects of the Dixie Fire.

North Coast

North Coast Resource Partnership

Watersheds

- Includes19,000 square miles from Modoc County to Marin and is home to more than 30 federally recognized Tribes and seven counties.
- Is a water source region for the state and region.
- Has significant forest-based carbon, aquatic and terrestrial ecosystems, habitats, and an array of plant and animal species, making the region an international hotspot for biological diversity.

Major Risks

- Land-use changes, invasive species, wildfires, floods, and drought.

Governance Structure

- The North Coast Resource Partnership serves the entire North Coast, its many watersheds, and is governed by a leadership council comprised of appointees from the North Coast's Tribes and counties, ensuring the democratic representation of the region's diverse constituents. A technical peer review committee appointed by the region's Tribes and counties reviews and advises on project evaluation and an array of technical issues.

Funding

- Ongoing fiscal support from the Sonoma County Water Authority and Humboldt County provide baseline capacity to provide services.
- Grant funding from federal and State agencies such as California Department of Water Resources (DWR), CAL FIRE, DOC, State Water Resources Control Board, and the Governor's Office of Planning and Research.

Strengths

- True co-leadership between Tribes and counties.
- Serves in a regional coordinating role for State programs for agencies such as DWR, DOC, and CAL FIRE.
- The North Coast Resource Partnership has thousands of partners within and beyond the region; complements and supports its Tribal, NGO, resource conservation district (RCD), and local agency partners; and actively downscales, integrates, and aligns with the priorities of partner State and federal agencies.
- Emphasis on identifying, evaluating, planning, and executing projects that have multiple benefits, including water quality and supply; climate and extreme event resilience, ecosystem health; biodiversity enhancement; greenhouse gas emissions reduction or avoidance; and community health, safety, and economic vitality.
- Planning and prioritized using the best available data, including regional spatial data, remote sensing and modeling, as well as Traditional Ecological Knowledge and other local expertise.
- Comprehensive monitoring and ability to monetize benefits regionally.

Russian River

Sonoma Water Agency

Watershed:

- A 1,500-square-mile watershed that is coastally influenced and rainfall-precipitation dominated.
- Two dams are operated by the U.S. Army Corps of Engineers.
- Supports 700,000 people, including residents of Santa Rosa.

Major Risks

- Wildfire (50 percent of watershed has been burned since 2015).

- Threats to supplies for the Potter Valley Project, which transfers water from the Eel River.
- Threats to sensitive species, especially fisheries.
- Groundwater management.

Governance Structure

- Governance is ad hoc. No one agency or JPA coordinates watershed activities, although Sonoma Water is looked at as a major leader in the watershed.
- Partnerships and collaborations emerge based on common interest on joint projects.

Funding

- State and federal grants for projects.
- Sonoma Water has a dedicated grants group within their agency.
- Sonoma Water's ability to lobby nationally has supported obtaining federal funding.

Strengths

- Wide variety of activities allows many opportunities for partnerships (e.g., wildfire and fuel reduction, regional water supply reliability, critical fish species recovery, seismic risk management, forecast informed reservoir operations).
- Large investments in technical studies, data, and models.
- Forward thinking on climate change with their climate adaptation plan.
- Engaging partners to address their individual and collective goals.
- Integration of flood, water supply, ecosystem, and wastewater made possible by broad jurisdiction of Sonoma Water.

Key Areas of Improvement

- None identified.

Santa Ana

Santa Ana Watershed Project Authority

Watershed

- Regional planning area includes 2,840 square miles.
- Santa Ana River flows more than 100 miles.
- More than 6 million people served in the watershed, including those in Orange, Riverside, and San Bernardino counties.

- Groundwater is a major source of water supply in the watershed.

Major Risks

- Water supply and demand imbalances.
- Water quality.
- Regulatory compliance.
- Climate change.

Governance Structure

- Santa Ana Watershed Project Authority is a regional JPA that has been a leader in promoting regional collaboration since 1972.
- Have had many regional successes such as the Inland Empire Brine Line and the 2002 Integrated Watershed Plan.
- Five member agencies: Eastern Municipal Water District, Inland Empire Utilities Agency, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District.
- Mission: To develop and maintain regional plans, programs, and projects that will protect the Santa Ana River basin water resources to maximize beneficial uses within the watershed in an economically and environmentally responsible manner.

Funding

- Local agency water rates, property taxes, and grants from the federal and State government, and loans from the State revolving fund programs.
- Grants from the U.S. Bureau of Reclamation, DWR, California Department of Fish and Wildlife, and State Water Resources Control Board.

Strengths

- Wide variety of activities and smaller workgroups allows local partners to choose how they want to invest their time (e.g., regulatory compliance task forces, Brine Line, water resources projects, weather modification project, conjunctive use program, water conservation).
- Developing clear goals for collaboration and setting up well-managed workshop venues.
- “Let’s Connect” process allows interested project leads to combine their projects with others that had overlapping benefits.
- Developed a watershed “report card,” known as the sustainability assessment, to report on progress in meeting their goals.

Key Areas of Improvement

- None identified.

Santa Cruz Mountains

Santa Cruz Resource Conservation District

Watershed

- Planning area includes seven major watersheds with additional tributaries.
- The coastal watersheds include a lot of agricultural use and forested lands.
- These watersheds represent the southern extent of salmon habitat south of the Golden Gate Bridge.
- The population includes a high percentage of residents living in the wildland urban interface.

Major Risks

- Water and water availability is one of the watershed's biggest challenges and limitations.
- Increased frequency and severity of drought and high-precipitation events.
- Catastrophic wildfire.

Governance Structure

- Informal governance structure, no MOUs or other formal agreements. Commitment to having the value of the partnership speak for itself. Partners participate because of the ongoing value rather than because they signed an MOU.
- The partnership is under the leadership of three RCDs: RCD of Santa Cruz County, RCD of Monterey County, and San Mateo RCD.
- They focus on coordination between State, local, and federal agencies.
- The partnership works to identify potential areas of conflict and address these areas head on. Because they focus on the shared goal of increasing the pace and scale of conservation, they can exist successfully without a formal governance structure.

Funding

- RCD of Santa Cruz County received $9.3 million from the California State Coastal Conservancy for the Integrated Watershed Restoration Program. They were able to leverage more than $41 million in implementation funding. The funding was key to maintaining momentum.

- Planning funding has come primarily through the Coastal Conservancy. Implementation funding comes from a diverse array of agencies including the State Water Resources Control Board, DWR, California Department of Fish and Wildlife, U.S. Department of Agriculture, and more.

Strengths

- When the partnership formed in the early 2000s, it focused on building trust and relationships among resources agencies to identify the highest priorities and to guide restoration work and investment. Now the extensive coordination is more normal and is the expected way of working.
- Success is based on a strong foundation of trust and investment of many resource agencies. Working through a forum of partners that identifies projects and gets projects permitted and implemented has led to continued demonstrated success. More than 180 projects have been implemented through the partnership.

Challenges

- Permitting restoration projects has been a challenge. They have developed a local partner and restoration permit coordination program to help streamline permitting.

Southern Sierra

Sierra Resource Conservation District

Watershed

- Planning area includes the Upper San Joaquin River Basin and the Upper Kings River watersheds.
- The Upper San Joaquin watershed encompasses approximately 17,000 square miles and includes the headwaters of the north, middle, and south forks of the San Joaquin River.
- The Upper Kings watershed extends above Pine Flat Dam and Millerton Lake and contributes to the Central Valley project.
- Both watersheds extend from elevations of more than 13,000 feet at the headwaters to the valley floor.
- The watersheds serve more than 2 million people encompassing all the communities from Madera to Bakersfield and encompassing all or portions of the southern San Joaquin Valley counties.

- The watersheds support rural forests, agriculture in the southern San Joaquin Valley, and urban users.
- Significant hydropower is generated within the watersheds. Lower-elevation reservoirs also provide flood control.

Major Risks

- Catastrophic wildfire and recovery. More than 380,000 acres of the San Joaquin watershed were burned in the 2020 Creek Fire.
- Bark beetles have caused 40 percent of the green conifer mortality.
- Prolonged drought and loss of snowpack.
- Downstream flooding caused by impacts from climate change and wildfire.
- Sustained cumulative risk in these watersheds, with future danger increasing.

Governance Structure:

- The Sierra RCD has a formal governance structure developed around IRWM.
- This governance structure helps to facilitate successful acquisition of different funding streams.
- The Sierra RCD has a formal long-range plan which is used to guide activities.
- A full-time coordinator facilitates governance and participation.
- Participants include federal, State, and local agencies, representing land management and flood control, large landowners, fire safe councils, NGOs, interest groups, and university researchers.
- They are very inclusive and welcome individual participation.
- A key concept is active engagement with partners and local communities.

Funding

- Larger federal and State agencies, or agencies that benefit more, contribute more than smaller agencies or agencies that benefit less.
- DOC provided funding for watershed coordination.
- Major funding has come from the U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, IRWM, CALFED, and Proposition 1.
- The CALFED Bay-Delta Program provided funding from 2001 to 2010.
- Effectively leveraged funding from water transfers outside of the basin to fund water system improvements that the local customer base likely couldn’t afford.

Strengths

- Formalities, such as a strategic plan, meeting agendas, and meeting summaries have kept the group moving forward.
- A long-range plan with priorities keeps partners engaged.
- Having a long-term coordinator has been key to the successes and longevity of this group and the maintenance of knowledge.
- Involving partners with a wide range of political views and stewardship has helped eliminate conflicts, particularly at the larger project and goal level.
- Climate change is recognized as a major driver of all activities in the watershed including water supply, hydropower, timber management, recreation, and community wellbeing.
- Utilizing a scientific approach to identify issues and solutions for long-term watershed health.
- Utilizing applied research by academic partners has helped guide activities, justify funding, and implement adaptive management.
- Because of the Creek Fire, have adapted to elements of the recovery process.
- Have secured funding specifically for Tribal communities and non-indigenous communities that have been affected by recent fires and current drought.
- Working effectively with Self-Help Enterprises.
- Using the principles of integrated water management to manage hydropower, water supply, flood management, recreation, forest management, and ecosystems.
- A broad range of partnerships and dedicated people have led to successful collaboration.

Key Areas of Improvement

- Engaging more active participation by downstream water users.
- Continuing to adjust to recovery from the effects of the Creek Fire.

Tahoe-Central Sierra

Tahoe Conservancy, Tahoe-Central Sierra Initiative

Watershed

- The Tahoe Central Sierra Initiative (TCSI) landscape encompasses approximately 2.4 million acres of the Tahoe Basin and the watersheds of the American, Bear, Yuba, Truckee, and Carson rivers.

- Three of the four sides of the TCSI boundary were deliberately drawn to include the watershed boundaries.
- The boundaries on the west slope of the Sierra Nevada were based on the western extend of forest ecosystems, extending from the foothills of the central Sierra Nevada, through the Lake Tahoe Basin to the range-crest on the east side of the basin.
- These watersheds serve large populations west of the Sierra Nevada, and for the Truckee River, the populations of Reno and Sparks, Nevada.
- These watersheds also provide water to irrigate farmland outside of the watersheds.
- Hydropower is also produced in some of these watersheds.
- Populations in these watersheds are primarily rural.

Major Risks

- Wildfires caused by unhealthy forest conditions.
- Drought and loss of snowpack because of climate change.
- Resultant bark beetle infestations which have, and are, killing many conifers, increasing wildfire risk.
- Fire risk in the wildland urban interface.
- Increased risk of downstream flooding because of effects from climate change and wildfire.
- Increasing cumulative effects in these watersheds.

Governance Structure:

- The TCSI is led by State, federal, nonprofit, and private partners, and responds to State and federal mandates that call for increasing pace and scale of forest management and restoration and better protection of communities from wildfire.
- Members include the Sierra Nevada Conservancy, USFS Region 5, USFS El Dorado Nation Forest, Tahoe National Forest, USFS Tahoe Basin Management Unit, USFS Pacific Southwest Research Station, California Forestry Association, National Forest Foundation, and the University of California Sagehen Field Station.
- Have a steering committee that is represented by the executives of the organizations that have signed the MOU for TCSI in 2017.
- The MOU can be viewed as a charter.
- The steering committee members meet monthly.

- Smaller work groups meet more frequently.
- Have a *Blueprint for Resilience*, a 10-year regional plan with specific goals and strategies.
    - Goal 1: Restore and maintain social and ecological resilience across 2.4 million acres.
        - Strategy 1: Accelerate forest restoration treatments and protect areas in desired conditions.
        - Strategy 2: Build a portfolio of present and future projects to identify shovel-ready work and foster collaboration across jurisdictions and entities.
        - Strategy 3: Continue developing science-based methodology that informs project management.
    - Goal 2: Build capacity to restore resilience.
        - Strategy 4: Strengthen equitable partnerships and stakeholder engagement through outreach and regional capacity-building.
        - Strategy 5: Secure sustainable funding for stakeholders and long-term project portfolio needs.
        - Strategy 6: Expand the restoration workforce and markets for biomass and small-diameter wood to support rural economies and reduce treatment costs.
- There are three full-time staff, others are part-time from TCSI partners.
- Have a core team consisting of senior staff, a couple of different staff teams, a science coordination team, and communications staff.
- The individual partner organizations that are part of TCSI conduct planning and implementation projects. The TCSI staff serve as coordinators.

Funding

- TCSI staff are primarily funded by the State.
- Partners have been successful in obtaining California Climate Investment (CCI) grants.
- NGOs also request funding from various agencies and entities.
- To date, TCSI partners have secured more than $32 million in CCI grant funds to implement high-priority forest health projects that sequester carbon and reduce the risk of wildfires.

- Projects funded by CCI are currently thinning fuels, removing green tons of biomass, and implementing prescribed fire across private and public ownerships and jurisdictions at the federal, State, and local levels.

Strengths

- Committed partners.
- Designated strategy.
- MOU and 10-year plan.
- Regular meetings.
- Full-time coordinator and designated teams.
- Cooperation between landowners, land managers, and NGOs.
- Addressing issues at a large scale rather than on a small project-by-project basis.

Key Areas of Improvement

- Engaging more active participation by Tribal and local partners.
- Engaging more active participation from downstream water users.

Trinity

Trinity County Resource Conservation District, Trinity River Watershed Council

Watershed

- Watersheds in Trinity County have very steep drainages in the mountainous wilderness headwater areas.
- This watershed serves 16,000 residents and contributes water to the Central Valley Project (CVP).
- Agricultural use is supported including rangeland for cattle, and for cannabis; downstream CVP recipients produce other agricultural crops.
- Fisheries supported, including steelhead and other anadromous fish that benefit from the Trinity River watershed, including in the Sacramento watershed.
- The economy is very tourism-based, relying on Trinity Lake and Ruth Lake, as well as fisheries and guiding. Tourism brought by the watershed supports the economy in Redding, Whiskeytown, and French Gulch.

Major Risks

- The primary risk to this watershed is wildfire and the pollutants contributed by the ash.
- Increase of sediment and decreased survival of juvenile salmonids.
- Standard pollutants such as cars going off the roads into the watersheds and vehicles going across many low-water crossings in the van Duzen and Mad River South Fork Trinity areas.
- Standard sediment erosion and landslides.

Governance Structure

- For the Trinity River Watershed Council, the Trinity County RCD currently shares coordination with the Watershed Research and Training Center. This organization is part of a larger effort with contributions from local Tribes, federal agencies, nonprofits, and local landowners.
- There are three meetings per year to share watershed success stories.
- The partnerships are broad, from the federal to the local level and to the private citizen level, which supports open communication and collaboration between one another.
- There is voting authority for agencies that participate consistently for three meetings to then vote in support of projects moving forward or for letters in support of projects. If they miss two consecutive meetings, they need to attend a meeting before they reclaim their voting rights.
- Informal structure, no chair or vice chair.
- The overall principle across all the partners is to work together to support project implementation throughout the county.

Funding

- Original U.S. Bureau of Reclamation funding through the Water Smart Grant to form the Trinity River Watershed Council.
- Now, funding is a collaboration across partners.
    - Grants pay for the development, planning and design of any of the projects.
    - Because it is a small watershed, it is a low effort to attend three meetings per year, each about two hours. It's not a large burden to send a member of staff to meetings.

    - Larger effort to work across boundaries to be eligible for grants to provide for beneficial project implementation and outcomes; but unique to have a smaller watershed with fewer stakeholders.

Strengths

- Working across boundaries in a small watershed is simpler to identify partners and bring them into the conversation. The collaboration has developed from working primarily on federal lands to including private lands and industrial timberlands.
- The approach is to connect with communities and find out what is important to them. Working with landowners and working with communities to develop successful projects together. Residents are engaged to protect the area, as are the partners.
- Engagement of local landowner interest in fishing to catch and deliver steelhead to the hatchery.
- Collaboration among The Watershed Center, the Yurok Tribe, and USFS led to success in the Heli-wood project on the South Fork Trinity River.
- The partnership can help community service districts with grant experience and networking connections.
- The Trinity County RCD uses a lot of geographic information system (GIS) data and is starting to work with light detection and ranging (LIDAR).
- Looking at the larger picture for long-term success made up of projects by partners.

Key Areas of Improvement

- Some water managers of small districts are not interested in working with various partners.
- Looking at how to work with landowners who use large amounts of agricultural or domestic water.

Tuolumne and Stanislaus

Yosemite Stanislaus Solutions

Watershed

- The Tuolumne and Stanislaus watersheds combine to cover 2,700 square miles.
- Highest recreation, water supply, and habitat values.

- Approximately 70,000 residents are directly served by the watershed with many millions of people and agricultural users supported by water from the watersheds.

Major Risks

- Catastrophic wildfire.
- Water rights demands that exceed water supply.

Governance Structure

- Joint powers association provides broad governance.
- IRWM group leads efforts for water.
- Yosemite Sequoia Solutions group is the main partner to the USFS and holds a stewardship agreement for forest management.
- Consensus-seeking approach.

Funding

- Self-funded baseline, each organization in partnership contributes annually.
- Grant funding from State and federal agencies for water and wildfire resilience.

Strengths

- Stable funding for water and forest management projects.
- Collaborative and very diverse membership.
- Consensus driven.
- Strong planning frameworks help build consensus.
- Very active participation because of need; there is trust that results will be achieved.
- Ability to complete projects more cost effectively than government agencies.
- Able to move quickly and increase scales of forest projects delivery to 100,000+ acres.
- Strong partnerships with USFS.
- Monitoring.

Upper Los Angeles River

Council for Watershed Health

Watershed

- Located within Los Angeles County, the watershed includes multiple mountain ranges, two major rivers, and multiple tributaries.
- Rivers are both in natural state and channeled with concrete.
- More than 4 million residents reside in the watershed. Watershed serves a larger county population of 12 million residents, 1 in 4 living in a State-defined disadvantaged community.

Major Risks

- Water supply for region affects outflows to river.
- Flooding and water quality from water collection on, and washing from, impervious surfaces.

Governance Structure

- Council for Watershed Health is a nonprofit that leads watershed coordination through funding from local parcel-tax revenue.
- The council coordinates with larger governance model at the county level to implement watershed programs funded by the local parcel-tax revenue.
- Shared governance with the community through mentoring program.

Funding

- Local initiative funded through parcel-tax revenue.
- Local, State, federal grants.

Strengths

- Stable funding through local initiative funded parcel tax.
- Strong mentoring programs to build community capacity to identify priorities and lead projects.
- Deep community partnerships.
- Focus on how watershed benefits benefit communities and how public health, and other community needs, can be integrated into watershed projects.
- Focus on water capture and groundwater recharge.
- Develops leaders from communities and helps them play key roles in project decisions, management, and oversight.

- Strong partnerships with municipalities help identify opportunities to leverage watershed benefits from infrastructure projects.
- Comprehensive monitoring and ability to monetize benefits regionally.
- Programs to engage with schools and build next generation of leaders.

Ventura

Ventura County Watershed Council

Watershed

- Small watershed, no imported water, needs to live within its means.
- History of drastic swings in conditions resulting in severe flooding and large wildfires.
- Lots of national forest ownership.
- Serves significant agriculture production and urban population of 855,000 in the county.
- Significant groundwater, surface water interactions and conflict.

Major Risks

- Wildfire, flooding, and water quality.
- Anadromous fish habitat loss.
- Water supply for multiple uses (e.g., agriculture, urban, habitat).
- Invasive plants.

Governance Structure

- Multiple agencies formed coordinated work under the IRWM program and the Watershed Coordinator program at DOC.
- RCD coordinates watershed activities with partners in local water agencies, land conservancies, NGOs, and Ventura County.
- Charter guides the governance; watershed plan guides the work.
- Public meetings with high turnout, very grassroots.
- Bottom-up organization.

Funding

- Self-funded baseline through stakeholder contributions.
- Local, State, and federal grants for water supply, water quality, and natural resources stewardship.
- IRWM has been a central funding source and organizer of the effort.

Strengths

- Strong community participation and grass roots approach. Easy to receive and respond to participants' interests.
- Sophisticated long-term watershed planning guides work and build consensus. It is the center of all the work of the council.
- Stable baseline funding.
- Stakeholder culture of participating for broader health of watershed, rather than individual interests.
- Active participation enables ability to withstand leadership changes.

Western Klamath

Western Klamath Restoration Partnerships

Watershed

- Watersheds served by the Western Klamath Restoration Partnership (WKRP) include the entire Salmon River Basin, the Middle Klamath River, and the mouth of the Trinity River to the mouth of the Scott River.
- Entirely within the ancestral territory of the Karuk Tribe to the west and the Hoopa Valley Tribe to the southwest, with 95 percent of the area in national forest.
- The two main communities served by the watershed include Happy Camp (Siskiyou County) and Orleans (Humboldt County). These towns are in decline because of loss of jobs and the effects of wildfire smoke.
- Agricultural use is limited because of the mountainous nature of the terrain, but there is some agriculture in the floodplain.
- The predominant job center is natural resource stewardship followed by logging, service industry jobs, river-based recreation, and some hunting and fishing.

Major Risks

- The primary risk to this watershed is wildfire. Large portions of the landscape are destroyed in single-day events affecting water holding and causing other damage.

Governance Structure

- WKRP is governed by a core team including representatives from:
    - Karuk Tribe.

    - Mid Klamath Watershed Council.
    - Salmon River Restoration Council.
    - Klamath National Forest.
    - USFS.
    - Klamath Forest Alliance.
    - Happy Camp Fire Safe Council.
- They realized 20 years ago that they had to stop infighting. After several attempts and some negotiation, they secured facilitators and built a durable partnership. They used the power of the Open Standards Process for Conservation Process (TNC and others) and transformed the process to basically a build shared leadership.
- The durable partnership is between the leadership council and the Karuk Tribe. The leadership has been in place for 15 years. Adding the forest supervisor from Hoopa Valley Tribe has been key. Through WKRP, they set a foundational belief that all parties agree on, and no one has to sacrifice their core values to complete projects.
- They do not have a formal structure and come to the table as equals which allows them greater flexibility.

Funding

- Their key to lasting funding is to diversify funding so that no one entity can shut the organization down.
- The USFS cut funding to organizations for three years but because they had a foundation and State funding, they were able to keep going. They try to maintain 1/3 federal funding, 1/3 State funding, and 1/3 foundation funding.

Strengths

- Trusting relationships have resulted in a unique, lasting, and effective organizational structure.
- WKRP has strong ties with Tribes and others in their region.
- Created a complete plan in which everyone was able to see their priorities.
- Demonstrated longevity and commitment from the partners.
- Diversified funding has helped WKRP sustain operations.

Yuba

North Yuba Forest Partnership

Watershed

- Sierra Nevada watershed and three sub-watersheds covering 800,000 acres.
- Diverse mix of private and public land ownership in lower watershed, primarily USFS in upper watershed.
- High-quality soils for agriculture.
- Southern fork and main stem are heavily populated, with high tourism and large retiree communities.

Major Risks

- Wildfire, drought, illegal cannabis irrigation, and water contamination.

Governance

- The Yuba Watershed Network covers all three sub-watersheds and has expansive participation, serving as a central connection point for updates, information, and some project planning or implementation leadership.
- The North Yuba Partnership manages its sub-watershed and is governed by a nine-party MOU that identifies areas of agreement with a governing document that establishes structure, roles, responsibility, and expectations for participation.
- The Yuba Water Agency has specific fiscal and administrative roles that are administered through their own processes.

Funding

- Stable local funding through Yuba Water Agency New Bullard's Bar Reservoir revenue.
- Diverse funding from State and federal governments and philanthropic sources.
- Stable cashflow through financing mechanisms tied to benefits from projects.

Strengths

- Backbone support from Yuba Water Agency.
- Stable and diverse funding enables long-term planning horizon.
- Efficient North Yuba governance model with limited membership, clear focus and roles, and areas of agreement to work together on.
- Good meeting facilitation.

- Established expertise in water quality, habitat restoration, forest health, and permitting.
- Sophisticated metrics of success and robust citizen science monitoring program.
- Diverse research partnerships with University of California, National Oceanic and Atmospheric Administration (NOAA) and Scripps Research.

11. References

Red Deer River Watershed Alliance. 2015. *What is watershed management?* [Website] Viewed online at: https://rdrwa.ca/resources/. Accessed May 2024.

Wang G., Mang S., Cai H., Liu S., Zhang Z., Wang L., & Innes Jl. 2016. *Integrated watershed management: evolution, development and emerging trends.* Journal of Forestry Research Volume 27, pages 967-994. [Website] Viewed online at: https://link.springer.com/article/10.1007/s11676-016-0293-3. Accessed May 2024.

12. Useful Web Links

California Water Plan Update 2023
https://water.ca.gov/Programs/California-Water-Plan/Update-2023

California Wildfire and Forest Resilience Task Force
https://wildfiretaskforce.org/

California Wildfire and Forest Resilience Task Force Regional Resource Kits
https://wildfiretaskforce.org/regional-resource-kits-page/

High Roads to Resilience: Building equitable forest restoration economies in California and beyond
https://www.climateandcommunity.org/high-roads-to-resilience

Increasing Collaborative Capacity and Infrastructure for Landscape Stewardship
https://calandscapestewardshipnetwork.org/sites/default/files/2022-08/CollabCapacity_and_Infrastructure_Final_August_2022_0.pdf

Integrated Regional Water Management program
https://water.ca.gov/Programs/Integrated-Regional-Water-Management

Sierra Nevada Landscape Investment Strategy
https://sierranevada.ca.gov/wp-content/uploads/sites/326/2022/09/SierraNevadaLandscapeInvestmentStrategy.pdf

Sierra Nevada Landscape Investment Strategy: Landscape Grant Pilot Program
https://sierranevada.ca.gov/wp-content/uploads/sites/326/2022/09/SierraNevadaLandscapeInvestmentStrategy.pdf#page=7

The Socioeconomic Value of Urban Stormwater Capture
https://www.casqa.org/wp-content/uploads/2024/02/FINAL-The-Socioeconomic-Value-of-Urban-Stormwater-Capture-02-03-2024.pdf

Tahoe-Central Sierra Initiative's Blueprint for Resilience
https://www.fs.usda.gov/research/treesearch/66572

Water Resilience Portfolio
https://resources.ca.gov/Initiatives/Building-Water-Resilience/portfolio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