

Resource Management Strategy Introduction

CALIFORNIA WATER PLAN UPDATE 2023

November 2024



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Acronyms and Abbreviations

RMS	resource management strategy
Update 2023	<i>California Water Plan Update 2023</i>
Water Plan	California Water Plan
Water Supply Strategy	<i>California's Water Supply Strategy: Adapting to a Hotter, Drier Future</i>

Introduction

The [California Water Plan](#) (Water Plan) includes a broad set of resource management strategies (RMSes) – water-related management techniques, programs, or policies – to help local and Tribal agencies and governments improve their watershed and regional sustainability and resilience. The Water Plan has more than 30 RMSes that provide a comprehensive suite of tools that can be mixed and matched in a diverse portfolio to achieve multiple benefits across water sectors. In Table 1, the RMSes are organized under eight primary water management objectives. The 11 RMSes in bold text and designated with an asterisk in Table 1 were updated for [California Water Plan Update 2023](#) (Update 2023). These strategies are essential for implementing [California’s Water Supply Strategy: Adapting to a Hotter, Drier Future](#) (Water Supply Strategy).

While the Water and Culture RMS, that is centered around California Tribal voices, was not updated, Update 2023 includes Chapter 7, “Strengths and Resources of California Tribes,” written by members of the Tribal Advisory Committee. The chapter describes Tribal concerns, strengths, resources, and the collaboration and strong partnerships with California Tribes within watersheds, county jurisdictions, and throughout each of California’s hydrologic regions.

Table 1 Resource Management Strategies and Management Objectives

Objective	Resource Management Strategies
Reduce Water Demand	<ul style="list-style-type: none"> ● Agricultural Water Use Efficiency.* ● Urban Water Use Efficiency.*
Improve Operational Efficiency and Transfers	<ul style="list-style-type: none"> ● Conveyance — Delta. ● Conveyance — Regional/Local. ● Reservoir Reoperation.* ● Water Transfers.
Increase Water Supply	<ul style="list-style-type: none"> ● Conjunctive Water Management.* ● Desalination (Brackish and Seawater).* ● Precipitation Enhancement.* ● Municipal Recycled Water.* ● Surface Storage — CALFED. ● Surface Storage — Regional/Local.
Improve Flood Management	<ul style="list-style-type: none"> ● Flood Management.*

Objective	Resource Management Strategies
Improve Water Quality	<ul style="list-style-type: none"> • Drinking Water Treatment and Distribution. • Groundwater/Aquifer Remediation. • Matching Water Quality to Use. • Pollution Prevention. • Salt and Salinity Management. • Urban Stormwater Capture and Management.*
Practice Resource Stewardship	<ul style="list-style-type: none"> • Agricultural Land Stewardship. • Ecosystem Restoration. • Forest Management. • Land Use Planning and Management. • Recharge Area Identification, Utilization, and Protection.* • Sediment Management. • Watershed Management.*
People and Water	<ul style="list-style-type: none"> • Economic Incentives — Loans, Grants, and Water Pricing • Outreach and Education • Water and Culture • Water-Dependent Recreation
Other Strategies	<ul style="list-style-type: none"> • Crop Idling. • Dewvaporation. • Fog Collection. • Irrigated Land Retirement. • Rainfed Agriculture. • Waterbag Transport.

Table 1 Note: *Resource management strategies updated for *California Water Plan Update 2023*.

Just as the mix of tools in any given kit depends on the job to be accomplished, the combination of strategies will vary by watershed and region depending on climate, projected growth, existing water systems, environmental and social conditions, and local goals. At the local level, it is important that the proposed strategies complement the operation of existing water systems. Some strategies may have little application in certain regions. For example, because of geology, the opportunity for groundwater development in the Sierra Nevada is not nearly as significant as in the Central Valley. Other strategies may have little value under certain conditions. For example, precipitation enhancement may not be as effective during droughts as there needs to be clouds to seed. Water managers at different geographical scales will have

different perspectives on the assortment and cost-effectiveness of RMSes for meeting the needs and priorities of the locality, region, or state.

RMSes, individually or in combination, can have multiple potential benefits. This means each area of California needs to select a mix of strategies suited to achieving its intended outcomes. Actual RMS benefits depend on how the strategies are implemented. It is important to note that the water supply benefits of the RMSes are not additive. Although presented individually, the RMSes are alternatives that can complement each other or compete for limited system capacity, funding, water supplies, or other components necessary for implementation. Assumptions, methods, data, and local conditions vary for each strategy. For this reason, the estimated benefits and costs should not be used to prioritize actions, policies, or the proportion of State investment.

California Water Plan Update 2023: A Decade of Change

Reviewing the 2013 RMSes reveals the progress made in California water management since 2013. New legislation, climate change, weather whiplash between droughts and floods, and technological advancements brought new attention and urgency to many of these strategies. Update 2023 was shaped by the 2020 [Water Resilience Portfolio](#), the 2022 Water Supply Strategy, input from State agencies and interested parties, state needs and priorities, and the administration's commitment to climate action. All of this is reflected in the RMSes.

- The [Sustainable Groundwater Management Act](#) of 2014 created impetus for extensive advancement in the *Conjunctive Water Management RMS*. The legal requirement to balance groundwater basins has also driven new interest in managed aquifer recharge, which has led to more focus on flood-managed aquifer recharge (Flood-MAR), the *Urban Stormwater Runoff Capture and Management RMS*; and finding, using, and protecting recharge areas.
- New legislation on water use efficiency and drought contingency planning set up processes for State agencies to develop water use efficiency targets that made much of the 2013 water use efficiency RMS updates outdated.
- California's climate is warming, and the state is experiencing weather whiplash, hotter and drier conditions, and more extended and extreme droughts. Less runoff from precipitation events is reducing available water supplies, affecting communities, the economy, environment, and most notably, vulnerable and underserved communities. As reported in the Water Supply Strategy, the warming climate could reduce California's available water supplies by as much as 10 percent by 2040 (between 6 million and 9 million acre-feet per year).

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- Extreme events have accelerated changes in water policy and management strategies. Drought and heatwaves led to water use efficiency legislation. More intense storms brought more urgency to flood and stormwater management. Wildfire has brought a new set of concerns to water managers and has become the predominant focus of watershed management.
- Technological advancement, such as improved weather and atmospheric river forecasting, has enabled more refined management of some strategies. For example, the *Reservoir Reoperation RMS* now showcases much more extensive use of forecast informed reservoir operation.

The core purpose of the RMS documents has remained the same as when they were introduced in *California Water Plan Update 2005*; namely, to provide a discussion of techniques that water managers can use to meet their management goals. The 2023 RMS updates reflect that climate change has driven water managers to develop and extend resource management for sustainability and resilience, and that social change has brought new focus to equity issues and community resilience. Updating the RMSes for Update 2023 illustrates how every strategy for managing water requires more consideration, skill, and sophistication to meet the demands of a decade of climate and social change.

The RMS outline was revised accordingly because Update 2023 focuses on three intersecting themes: addressing climate urgency, strengthening watershed resilience, and achieving equity in water management. While a few of the 2013 RMSes addressed resilience and equity, the authors of the 2023 RMSes were prompted to consider resilience and equity challenges and opportunities throughout the RMS.

The 11 updated RMSes were written by subject matter experts at the California Department of Water Resources, the Department of Conservation, and the State Water Resources Control Board. The Water Plan team held workshops for each RMS to solicit public comment from any interested party and practitioners in the field.

Planning a Diversified Portfolio

The new and continuing challenges of California's diverse and extreme conditions require local agencies to use new and different methods of managing water. Climate change, growing population, urban development patterns, global crop markets, changing regulations, and evolving public attitudes and values are some of the conditions that water managers must navigate. Integrated watershed management (IWM) relies on investing in a diversified portfolio of water strategies to achieve multiple and sustainable benefits while balancing the risks of an uncertain future.

Adapting to and mitigating climate change impacts are important factors in selecting and implementing a package of RMSes.

RMSes are the tools that local and Tribal agencies and governments should consider as they prepare integrated regional water management (IRWM) and watershed resilience plans. The goal is to prepare plans that are diversified and resilient; satisfy regional and state needs; meet multiple economic, environmental, and societal objectives; include public input; address environmental justice; mitigate impacts; protect public trust assets; and are affordable.

Although the RMSes are presented individually, they can complement each other or accomplish different goals. For instance, water from a recycling project could contribute to ecosystem restoration and groundwater recharge, while water use efficiency might reduce the opportunity for recycling and reuse. In some cases, implementation of an RMS may conflict with other resource management goals. Some of the strategies may reduce energy demand, while others may increase energy demand.

Potential Benefits of Resource Management Strategies

Each RMS narrative describes the potential benefits of the strategy. While most of the RMSes have multiple potential benefits and span multiple water management sectors, any individual site-specific project or program within an RMS may contribute only one, or perhaps a few, of the benefits. For example, it is unlikely that stewardship practices on the agricultural lands of a single farm will contribute to all the potential benefits. But, in aggregate, the combined agricultural lands stewardship practices on many farms can contribute to multiple water management objectives.

The costs, benefits, and impacts of implementing RMSes in project-specific locations can vary significantly, depending on local objectives and project-level complexities. Project-level considerations include the extent of the management strategies already incorporated into the existing system; proposed locations of new strategies, operations, mitigation, and system integration; and the presence of cultural or environmental resources. Accordingly, local and regional water management efforts should develop their own estimate of costs and potential benefits, as well as other trade-offs associated with the application of any strategy or package of strategies.

Actual RMS benefits will depend on the way strategies are implemented. The water supply benefits are not additive. Although described individually, the RMSes are alternatives that can complement each other or compete for limited system capacity,

funding, water supplies, or other components necessary for implementation. Assumptions, methods, data, and local conditions vary for each strategy.

Organization of Resource Management Strategy Narratives

Although the RMS narratives were written by different subject matter experts, the narrative for each strategy is organized similarly. Each includes the following elements and sections:

- Short definition of the strategy. Compared to the 2013 RMSes, Update 2023 has more emphasis on resilience and equity.
- RMS connections to the *Water Resilience Portfolio* and Water Supply Strategy.
- The current use of the strategy in California, including an overview of what is happening today and background on the strategy. In addition, the strategy narratives recognize the relationship of water, energy, and other resources; consider climate change scenarios; and, as appropriate, articulate related resource policies, programs, and legislation.
- A section on potential benefits, which includes a discussion on how strategy implementation will benefit water supply, drought preparedness, flood management, water quality, energy, environmental and resource stewardship, and other water management objectives, regionally and statewide, by 2030. Because the application of these strategies can vary widely among regions, as described in the Water Plan's regional reports, the strategy descriptions are from a broader, statewide perspective.
- A potential costs section which includes estimates of implementation costs statewide by 2030 and unit cost information, when available. In most cases, costs depend greatly on where they are incurred and can only be estimated broadly in these brief narratives.
- A barriers to implementation section which discusses the tradeoffs, challenges, and considerations associated with implementing each strategy. For instance, ocean water desalination involves issues related to water intake and brine disposal.
- Each RMS discusses mitigation for, and adaptation to, climate change.
- A recommendations section which discusses how the strategy could be implemented more effectively and efficiently over the next 30 to 40 years to address the implementation issues and promote additional implementation. Many of the recommendations are for State government to provide technical support to help regional groups make better decisions on the use of the

strategies. The individual strategy narratives generally do not include specific recommendations for funding individual strategies

- A list of cited and additional references, including web sites, where some of the source materials can be found. In other cases, the sources involve documented personal communications.

Useful Web Links

California Water Plan

<https://water.ca.gov/Programs/California-Water-Plan>

California Water Plan Update 2023

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

California's Water Supply Strategy: Adapting to a Hotter, Drier Future

<https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Water-Resilience/CA-Water-Supply-Strategy.pdf>

Sustainable Groundwater Management Act

<https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management>

Water Resilience Portfolio

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

