

Resource Management Strategies
Introduction
Updated for California Water Plan
Update 2023
Draft Memorandum

April 2024



Reviewer's Guide

Comments received by May 31, 2024, on the public review draft of the California Water Plan's resource management strategies will be used to inform the final versions of the strategies.

Where to Find the Draft Resource Management Strategies

The [public review drafts](#) of the California Water Plan resource management strategies are posted online.

How to Comment

Comments can be submitted by using the [online comment form](#) or by email: cwpc@water.ca.gov.

By postal mail:

Attn: Hoa Ly
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What to Consider

The following are considerations during your review:

- **Completeness of information:** In general, does the text say all it should say?
- **Organization of information:** Is any portion of the text presented in a confusing sequence? Is it apparent that all sections and subsections relate to one another?
- **Factual accuracy:** Is any text factually incorrect? Does any information need additional attribution to a specific source?
- **Relevance to you or your organization:** The resource management strategies can help local agencies and governments manage their water and related resources. Regarding your planning and decision-making processes, what would you add, remove, or change to make these strategies more useful to you or your organization?

Resource Management Strategies Introduction Updated for California Water Plan Update 2023

Draft Memorandum

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Acronyms and Abbreviations

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

Resource Management Strategies

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 agencies Tribal governments improve their watershed and regional sustainability and resilience. The Water Plan's collection of more than 30 RMSes is a comprehensive suite of tools that can be mixed and matched in a diverse portfolio to achieve multiple benefits across water sectors. The following RMSes were updated for *California Water Plan Update 2023* (Update 2023).

- Agricultural Water Use Efficiency.
- Urban Water Use Efficiency.
- Reservoir Reoperation.
- Conjunctive Water Management.
- Desalination (Brackish and Seawater).
- Precipitation Enhancement.
- Municipal Recycled Water.
- Flood Management.
- Urban Stormwater Runoff Capture and Management.
- Recharge Area Identification, Utilization, and Protection.
- Watershed Management.

In Table 1, all RMSes are listed with their primary water management objectives, while recognizing the interdependencies among many of the strategies.

The *Water and Culture RMS*, which is centered around California Tribal voices, was not updated, but 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 Tribes within watersheds, county jurisdictions, and throughout each of California's hydrologic regions.

Table 1 Resource Management Strategies and Management Objectives

Resource Management Strategy	Management Objective
Agricultural Water Use Efficiency	Reduce water demand
Urban Water Use Efficiency	Reduce water demand
Conveyance — Delta	Improve operational efficiency and transfers
Conveyance — Regional/Local	Improve operational efficiency and transfers
Reservoir Reoperation	Improve operational efficiency and transfers
Water Transfers	Improve operational efficiency and transfers
Conjunctive Water Management	Increase water supply
Desalination (Brackish and Seawater)	Increase water supply
Precipitation Enhancement	Increase water supply
Municipal Recycled Water	Increase water supply
Surface Storage — CALFED	Increase water supply
Surface Storage — Regional/Local	Increase water supply
Flood Management	Improve flood management
Drinking Water Treatment and Distribution	Improve water quality
Groundwater/Aquifer Remediation	Improve water quality
Matching Water Quality to Use	Improve water quality
Pollution Prevention	Improve water quality
Salt and Salinity Management	Improve water quality
Urban Stormwater Runoff Capture and Management	Improve water quality
Agricultural Land Stewardship	Practice resource stewardship
Ecosystem Restoration	Practice resource stewardship
Forest Management	Practice resource stewardship
Land Use Planning and Management	Practice resource stewardship
Recharge Area Identification, Utilization, and Protection	Practice resource stewardship
Sediment Management	Practice resource stewardship
Watershed Management	Practice resource stewardship
Economic Incentives — Loans, Grants, and Water Pricing	People and water
Outreach and Education	People and water
Water and Culture	People and water
Water-Dependent Recreation	People and water

Table 1 Note: Other resource management strategies include Crop Idling, Dewvaporation, Fog Collection, Irrigated Land Retirement, Rainfed Agriculture, and Waterbag Transport.

Just as the mix of tools in any given kit depends on the job to be accomplished, the combination of strategies will vary from watershed to watershed and regionally, 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 effective during droughts. 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. As a result, 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 proportion of State investment.

California Water Plan Update 2023 – A Decade of Change

Reviewing the 2013 RMSes revealed the progress that has been 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: Adapting to a Hotter, Drier Future*, (Water Supply Strategy), input from State agencies and interested parties, state needs and priorities, and the administration's commitment to climate action. All this information is reflected in the RMSes.

- The Sustainable Groundwater Management Act of 2014 created impetus for extensive advancement in conjunctive water management. 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

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aquifer recharge (Flood-MAR) and urban stormwater runoff capture and management; 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).
- 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 showcases much more extensive use of forecast informed reservoir operation (FIRO).

The core purpose of the RMS documents has remained the same as when they were introduced in Water Plan updates since 2005; 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 to reflect Update 2023's focus 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 at least one workshop for each RMS to solicit public comment from interested parties and practitioners in the field.

Planning a Diversified Portfolio

The new and continuing challenges of California’s diverse and extreme conditions require local agencies throughout the state to use novel and diverse 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 relies on investing in a diversified portfolio of water strategies to achieve multiple and sustainable and 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 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 multiple management objectives. 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.

Strategy Summary Table

Table 2 provides a summary of the potential benefits of the RMSes as described in the RMS narratives. The center columns show potential strategy benefits that can be achieved by implementing a particular strategy. The table shows icons where the RMS narratives indicate that the strategies could have direct and significant benefits for water management objectives. Benefit check marks in the center columns can be

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viewed either horizontally for a given RMS or vertically for a given water management objective. Note that most RMSes can help achieve multiple benefits and across multiple water management sectors.

While most of the RMSes have multiple potential benefits, 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 the agricultural lands stewardship practices on a single farm will contribute to all the potential benefits (as indicated in Table 2; updated RMSes are highlighted). But, in aggregate, the combined agricultural lands stewardship practices on many farms can contribute to water management objectives, as shown in Table 2.

The costs, benefits, and effects of implementing these strategies in project-specific locations could 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 estimates of cost and potential benefits, as well as other trade-offs associated with the application of any particular strategy or package of strategies.

Table 2 Resource Management Strategy Summary (PLACEHOLDER)

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 with the following elements and sections:

- Short definition of the strategy and whether it is cited in the *Water Resilience Portfolio* or the Water Supply Strategy. Compared to the 2013 RMSes, Update 2023 has more emphasis on resilience and equity.
- 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;

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consider climate change scenarios; and, as appropriate, articulate related resource policies, programs, and legislation.

- The “Potential Benefits” section 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. More detailed information on some of the strategies is also presented in the Water Plan’s Reference Guide.
- The “Potential Costs” section 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.
- The “Barriers to Implementation” section 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.
- The “Recommendations” section 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 of individual strategies.
- Cited and additional references, including websites where some of the source materials can be found. In other cases, the sources involve documented personal communications.

