

Introduction



A Resource Management Strategy of the California Water Plan

California Department of Water Resources

July 29, 2016



Table of Contents

Introduction	1
Planning a Diversified Portfolio	2
Strategy Summary Table.....	2
Organization of Resource Management Strategy Narratives.....	5

Tables

Table 1 Resource Management Strategies and Management Objectives	1
Table 2 Resource Management Strategy Summary	3

Acronyms and Abbreviations

IRWM	integrated regional water management
IWM	integrated water management
RMS	resource management strategy
Water Plan	California Water Plan

Introduction

The California Water Plan (Water Plan) provides a broad set of resource management strategies (RMSs) that can help local agencies and governments manage their water and related resources. The RMSs can be a technique, program, or policy that can be used to meet water-related management needs of a region and the state as a whole. The Water Plan’s 30-plus RMSs provide a comprehensive suite of tools that can be used to achieve a variety of intended outcomes by utilizing a diverse mix of strategies. In Table 1, the RMSs are organized alphabetically under eight water management objectives, which describe their primary objective and emphasis while recognizing interdependencies among many of the strategies.

Table 1 Resource Management Strategies and Management Objectives

Reduce Water Demand	Improve Water Quality
Agricultural Water Use Efficiency	Drinking Water Treatment and Distribution
Urban Water Use Efficiency	Groundwater/Aquifer Remediation
Improve Operational Efficiency & Transfers	Matching Water Quality to Use
Conveyance — Delta	Pollution Prevention
Conveyance — Regional/Local	Salt and Salinity Management
System Reoperation	Urban Stormwater Runoff Management
Water Transfers	Practice Resource Stewardship
Increase Water Supply	Agricultural Land Stewardship
Conjunctive Management and Groundwater Storage	Ecosystem Restoration
Desalination (Brackish and Sea Water)	Forest Management
Precipitation Enhancement	Land Use Planning and Management
Municipal Recycled Water	Recharge Area Protection
Surface Storage — CALFED	Sediment Management
Surface Storage — Regional/Local	Watershed Management
Improve Flood Management	People & Water
Flood Management	Economic Incentives — Loans, Grants, and Water Pricing
Other Strategies	Outreach and Education
Crop idling, dewvaporation, fog collection, irrigated land retirement, rainfed agriculture, and waterbag transport	Water and Culture
	Water-Dependent Recreation

Just as the mix of tools in any given kit depend on the job to be accomplished, the combination of strategies will vary from region to region, depending on climate, projected growth, existing water system, environmental and social conditions, and regional goals. At the local level, it is important that the proposed strategies complement the operation of existing water systems. Some strategies may have little value 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 Sacramento Valley. Other strategies may have little value under particular 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 RMSs for meeting the needs and priorities of the locality, region, or state.

RMSs have multiple potential benefits and each area of California needs to select the right mix of strategies to achieve their intended outcomes. Actual RMS benefits depend on how the strategies are implemented. It is important to note that the water supply benefits of the RMSs are not additive. Although presented individually, the RMSs 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 per strategy. For this reason, the estimated benefits and costs should not be used to prioritize actions, policies, or proportion of State investment.

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. Growing population, urban development patterns, global crop markets, changing regulations, and evolving public attitudes and values are a few of the conditions that water managers must navigate. Integrated water management (IWM) relies on a diversified portfolio of water strategies to achieve multiple and sustainable uses and benefits while balancing the risks of an uncertain future. Adapting to and mitigating climate change impacts have become increasingly important factors in selecting and implementing a package of RMSs.

RMSs are the tools that local agencies and governments should consider as they prepare their integrated regional water management (IRWM) plans. The intent 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 RMSs 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.

Strategy Summary Table

Table 2 provides a summary of the potential benefits of the RMSs 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. Note that most RMSs can help achieve multiple benefits.

Benefit dots in the center columns can be viewed either horizontally for a given RMS or vertically for a given water management objective.

While most of the RMSs 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). In aggregate, however, the combined agricultural lands stewardship practices on many farms can contribute to all of the water management objectives, as shown in Table 2.

The costs, benefits, and impacts of actually 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 estimate of costs 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

	Potential Strategy Benefits ^a									
	Reduce Drought Impacts	Improve Water Quality	Higher Operational Flexibility & Efficiency	Reduce Flood Impacts	Environmental Benefits	Energy Benefits	More Recreational Opportunities	Reduce Groundwater Overdraft	Improve Food Security	Public Safety & Emergency Response
Reduce Water Demand										
Agricultural Water Use Efficiency		√	√		√				√	
Urban Water Use Efficiency	√	√	√		√	√				
Improve Operational Efficiency & Transfers										
Conveyance — Delta	√	√	√	√	√		√	√	√	√
Conveyance — Regional/Local	√	√	√	√	√			√	√	
System Reoperation	√	√	√	√	√	√		√		√
Water Transfers	√		√		√				√	
Increase Water Supply										
Conjunctive Management and Groundwater Storage	√	√	√	√	√			√	√	
Desalination (Brackish and Sea Water)	√	√		√				√		
Precipitation Enhancement						√				
Municipal Recycled Water	√		√			√				
Surface Storage — CALFED	√		√	√			√	√	√	
Surface Storage — Regional/Local	√	√	√	√		√	√	√	√	

	Potential Strategy Benefits ^a									
	Reduce Drought Impacts	Improve Water Quality	Higher Operational Flexibility & Efficiency	Reduce Flood Impacts	Environmental Benefits	Energy Benefits	More Recreational Opportunities	Reduce Groundwater Overdraft	Improve Food Security	Public Safety & Emergency Response
Improve Flood Management										
Flood Management	√	√		√	√			√		√
Improve Water Quality										
Drinking Water Treatment and Distribution	√	√								
Groundwater/Aquifer Remediation		√							√	
Matching Water Quality to Use	√	√	√		√				√	
Pollution Prevention		√		√	√	√	√	√		√
Salt and Salinity Management		√	√		√	√				
Urban Stormwater Runoff Management	√	√	√	√	√	√	√	√		√
Practice Resource Stewardship										
Agricultural Land Stewardship	√	√		√	√	√	√	√	√	
Ecosystem Restoration	√	√	√	√	√	√	√	√		√
Forest Management	√	√		√	√	√	√	√		√
Land Use Planning and Management	√	√		√	√	√		√	√	√
Recharge Area Protection	√	√	√	√				√	√	
Sediment Management		√	√	√	√				√	
Watershed Management	√	√	√	√	√	√	√	√	√	

	Potential Strategy Benefits ^a									
	Reduce Drought Impacts	Improve Water Quality	Higher Operational Flexibility & Efficiency	Reduce Flood Impacts	Environmental Benefits	Energy Benefits	More Recreational Opportunities	Reduce Groundwater Overdraft	Improve Food Security	Public Safety & Emergency Response
People and Water										
Economic Incentives — Loans, Grants and Water Pricing	√		√		√					
Outreach and Education	√			√	√	√			√	√
Water and Culture					√			√		
Water-Dependent Recreation				√	√			√		
Other — subsidiary or emerging										
Various strategies	Objectives vary by strategy.									
<p>Note:</p> <p>^a Actual resource management strategy (RMS) benefits will depend on how strategies are implemented. The water supply benefits are not additive. Although presented individually, the RMSs 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 per strategy.</p>										

Organization of Resource Management Strategy Narratives

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

- Short definition of the 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.
- “Potential Benefits,” which includes a discussion on how strategy implementation will benefit water supply; drought preparedness; flood management; water quality; energy; environmental/resource stewardship; and other water management objectives, regionally and statewide, by 2030. Since 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.
- “Potential Costs,” 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.

- “Major Implementation Issues,” 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.
- “Recommendations,” 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 of individual strategies, though that discussion has been incorporated into *California Water Plan Update 2013*, Volume 1, Chapter 7, “Finance Planning Framework.”
- 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.