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Chapter 1 Introduction

A resource management strategy is a project, program, or policy that helps local agencies and governments manage their water and related resources. For example, urban water use efficiency is a strategy to reduce urban water use. A pricing policy or incentive for customers to reduce water use also is a strategy. New water storage to improve water supply, reliability, and quality is another strategy.

Think of these strategies as tools in a tool kit. Just as the mix of tools in the kit will depend on the job, the combination of strategies will vary from region to region depending on climate, projected growth, existing water system, and environmental and social conditions. At the local level, it is important that the proposed strategies complement the operation of the existing water system. Some strategies may have little value in some 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 at certain times. For example, precipitation enhancement may not be effective during droughts.

A key objective of the California Water Plan Update 2009 is to present a diverse set of resource management strategies to meet the water-related resource management needs of each region and statewide. Chapter 2 of Volume 1 describes the importance of regional planning and presents general considerations for preparing sustainable integrated regional water management plans and integrated flood management plans suitable for each region’s unique character. Volume 2 describes resource management strategies (listed alphabetically in Box 1-1) that can be combined in various ways to meet the water management objectives and goals of different regions and to achieve multiple benefits.

Box 1-1 Resource Management Strategies

Chapter No.	Chapter	Management Objective
20	Agricultural Lands Stewardship	Practice Resource Stewardship
2	Agricultural Water Use Efficiency	Reduce Water Demand
8	Conjunctive Management and Groundwater Storage	Increase Water Supply
4	Conveyance—Delta	Improve Operational Efficiency and Transfers Of Water
5	Conveyance—Regional/local	Improve Operational Efficiency and Transfers Of Water
9	Desalination	Increase Water Supply
14	Drinking Water Treatment and Distribution	Improve Water Quality
21	Economic Incentives (Loans, Grants, Water Pricing)	Practice Resource Stewardship
22	Ecosystem Restoration	Practice Resource Stewardship
28	Flood Risk Management	Improve Flood Management
23	Forest Management	Practice Resource Stewardship
15	Groundwater Remediation/Aquifer Remediation	Improve Water Quality
1	Introduction	

24	Land Use Planning and Management	Practice Resource Stewardship
16	Matching Water Quality to Use	Improve Water Quality
29	Other Strategies	
17	Pollution Prevention	Improve Water Quality
10	Precipitation Enhancement	Increase Water Supply
25	Recharge Area Protection	Practice Resource Stewardship
11	Recycled Municipal Water	Increase Water Supply
18	Salt and Salinity Management	Improve Water Quality
12	Surface Storage—CALFED	Increase Water Supply
13	Surface Storage—Regional/Local	Increase Water Supply
6	System Reoperation	Improve Operational Efficiency and Transfers Of Water
19	Urban Runoff Management	Improve Water Quality
3	Urban Water Use Efficiency	Reduce Water Demand
7	Water Transfers	Improve Operational Efficiency and Transfers Of Water
26	Water-dependent Recreation	Practice Resource Stewardship
27	Watershed Management	Practice Resource Stewardship

Planning a Diversified Portfolio

As California changes, local agencies and governments continue to use different methods of managing water. Growing population, changing regulations, and evolving public attitudes and values are a few conditions that have influenced recent decisions about water.

Resource management strategies are the tools that local agencies and governments should consider when they plan. The basic intent is to prepare good plans that are diversified, satisfy regional and state needs, meet multiple objectives, include public input, address environmental justice, mitigate impacts, protect public trust assets, and are affordable. Additional recommendations for planning and implementation can be found in Chapter 7 of Volume 1.

While the strategies are based on the best available information, the Department of Water Resources (DWR) has not conducted detailed studies to verify this information on a statewide basis because the performance of individual strategies will depend on how they are combined and used in each region.

Additional analyses (described in Chapter 6 of Volume 1) will provide policymakers and resource managers more quantitative information on the performance of various strategies, interactions between strategies, tradeoffs, and potential groupings of strategies. DWR considers several different future scenarios that can be used by planners to test the performance of alternative strategy mixes (see Chapter 6 of Volume 1).

Organization of Resource Management Strategy Chapters

Although the chapters were written by different experts, the narrative for each strategy is organized similarly. Each includes:

- A short definition and background material on the strategy.
- A section on the current use of the strategy in California that provides an overview of what is happening today.
- A section on benefits that includes a discussion on how much water, demand reduction, ecosystem restoration, or other benefits could be achieved statewide by 2050. Since the application of these strategies can vary widely among regions, the strategy descriptions are from a broader, statewide perspective. More detailed information on some of the strategies is also presented in the Reference Guide (Volume 4). I don't know if this is true for this update. I have not seen a table of contents for Update 2009's Volume 4.-Jennifer
- Estimates on implementation costs when available. In most cases, costs are highly dependent on where they are incurred and can only be estimated broadly in these brief narratives.
- The tradeoffs and challenges associated with implementing each strategy. Each strategy narrative includes a summary of major implementation issues. For instance, with ocean water desalination there are issues with water intake and brine disposal. In addition, the strategy narratives recognize the relationship of water and other resources; and as appropriate, articulate related resource policies and programs.
- Recommendations on how the strategy could be implemented over the next 30 to 40 years to minimize its impacts, as well as how to promote additional implementation. Many of the recommendations are for State government to enact technical support to help regional groups make better decisions on the use of the strategies. The narratives do not include specific recommendations for funding of individual strategies since local and regional efforts will need to complete additional analysis before deciding to proceed with strategies. General recommendations that would apply to all strategies are presented in Chapter 7 of Volume 1 rather than in the individual strategy narratives. Common recommendations include the need for monetary investment and consideration of public trust, environmental justice, and environmental impacts. The bullet on recommendations may need updating based on Vol.1, Ch. 7 and/or changes to strategies. -Jennifer

Although the resource management strategies are presented individually, they can complement each other, or trade-offs between strategies may have to be considered. 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 addition, the strategy narratives recognize the relationship between water and other resources. However, DWR does not have authority over some of these resources. As appropriate, these policies and programs are articulated in the various resource management strategy narratives.

Strategy Summary Table

The Strategy summary table is a one-page overview of about 30 resource management strategy chapters. The information presented in Table 1-1 and the Volume 2 strategy narratives were developed by DWR in consultation with other experts and stakeholders. The actions in the table are grouped by resource management strategy and management objective:

- Reduce Water Demand
- Improve Operational Efficiency and Transfers of Water
- Increase Water Supply
- Improve Water Quality
- Practice Resource Stewardship
- Improve Flood Management

Table columns include:

- Left column – shows the resource management strategies that are available to regions to achieve various water management objectives.
- Center columns – shows potential strategy benefits that could be achieved by implementing a particular strategy. The table shows dots (•) where the resource management strategy articles indicate that the strategies could have direct and significant benefits for various water management objectives. Note that most resource management strategies can help achieve multiple benefits

The dot placement can be viewed either horizontally for a given resource management strategy or vertically for a given water management objective. As shown (vertically) in the table, most of the resource management strategies can provide water supply benefits. Likewise, many strategies can contribute to improved water quality, environmental benefits and others.

PLACEHOLDER Table 1-1 Strategy summary table











While most of the resource management strategies have multiple potential benefits, any individual site-specific project or program within a resource management strategy may contribute only one, or 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 1-1). In aggregate, however, the combined agricultural lands stewardship practices on many farms can contribute to most of the water management objectives as shown in the table.

As part of the strategy narratives, DWR prepared preliminary estimates of water supply benefits, which can include water supply increases and water demand reductions. Those estimates are shown as ranges in Table 1-1 for some of the management strategies. The table shows that there is considerable capacity to provide water supply benefits between the nine strategies with quantified water benefits. In some cases, the values represent a local or regional benefit and may not provide statewide benefits. In addition, implementing some strategies, like water dependent recreation or ecosystem restoration, may increase total water demands. The water benefits of many strategies were not quantified because their potential for additional water supply is either incidental (small), or has not yet been estimated statewide. Supply












benefits will be better quantified during a subsequent water plan update. Also, some strategies do not produce water supply benefits.

The information and data in Table 1-1 and the Volume 2 strategy narratives should be treated as preliminary indicators of the scale and type of potential benefits and associated costs. In most cases, assumptions and methodologies are unique to given strategies and neither benefits nor costs are additive among different strategies. The costs, benefits, and impacts of actually implementing these strategies in real-world locations could vary significantly depending upon local factors and project-level complexities. Project-level considerations include the extent of the management strategies already incorporated into the existing system, proposed location of new strategies, operations, mitigation, system integration, and presence of cultural or environmental resources. Therefore, local and regional water management efforts should develop their own estimate of costs and potential benefits, as well as other tradeoffs associated with the application of any particular strategy.


























The table can help guide selective reading of the following chapters.

Potential Strategy Benefits										
 Provide Water Supply Benefit MAF/year - Applied Water	 Improve Drought Preparedness	 Improve Water Quality	 Operational Flex & Efficient	 Reduce Flood Impacts	 Environmental Benefits	 Energy Benefits	 Recreational Opportunities	 Reduce GW Overdraft	 Accumulated Cost by 2030 (\$ Billions)	



































Reduce Water Demand

Strategy	MAF/year ¹	Potential Strategy Benefits								Accumulated Cost by 2030 \$ Billions ¹
Agricultural Water Use Efficiency	 0.1 - 0.6 ²									0.3 - 4.0
Urban Water Use Efficiency	 1.2 - 3.1									2.5 - 6.0































Improve Operational Efficiency & Transfers

Strategy	MAF/year ¹	Potential Strategy Benefits								Accumulated Cost by 2030 \$ Billions ¹
Conveyance—Delta	 0.1 - 0.6									1.2 - 17.2
Conveyance—Regional/Local										
System Reoperation										
Water Transfers										

Increase Water Supply

Strategy	MAF/year ¹	Potential Strategy Benefits								Accumulated Cost by 2030 \$ Billions ¹
Conjunctive Management & Groundwater Storage	 0.5 - 2.0									
Desalination – Brackish & Seawater	 0.3 - 0.4									0.9 - 2.9
Precipitation Enhancement	 0.3 - 0.6									0.2
Recycled Municipal Water	 0.9 - 1.4									6.0 - 9.0
Surface Storage—CALFED ³	 0.1 - 1.0									0.7 - 9.2
Surface Storage—Regional/Local (under development)										





























































Improve Water Quality

Strategy	MAF/year ¹	Potential Strategy Benefits								Accumulated Cost by 2030 \$ Billions ¹
Drinking Water Treatment and Distribution										1.4/year
Groundwater/Aquifer Remediation										20.0
Matching Quality to Use										0.1
Pollution Prevention										21.0
Salt and Salinity Management										>10.0
Urban Runoff Management										













The resource management strategy estimates are not additive. Although presented individually, they are in most cases alternatives that will either complement each other or compete for limited system capacity, funding, water supplies or other component necessary for implementation.

1. Additional information is found in narrative and Volume 5 Technical Guide.
2. Value is Net Water to account for water reuse among agricultural water users.
3. Reflects cost allocation of annual water benefit which is not the total cost of the project.

Practice Resource Stewardship

Strategy	Potential Strategy Benefits									Accumulated Cost by 2030 \$ Billions ¹	
	MAF/year ¹										
Agricultural Lands Stewardship											5.3
Economic Incentives (Loans, Grants, Water Pricing)											
Ecosystem Restoration											
Forest Management ³	0.1 - 0.4										0.3 - 0.8
Land Use Planning and Management											
Recharge Area Protection											
Water-dependent Recreation											
Watershed Management											0.5 - 3.6

Improve Flood Management

Strategy	Potential Strategy Benefits									Accumulated Cost by 2030 \$ Billions ¹	
	MAF/year ¹										
Flood Risk Management											

Other Resource Management Strategies

Objectives vary by strategy (see narratives in remainder of Volume 2)

Essential Support Activities to Integrate Strategies and Reduce Uncertainty

The following support activities are essential for successfully integrating packages of these resource management strategies. Compared with the costs of implementing the resource management strategies, the costs are relatively small for the essential support activities shown below (see Chapters 2 and 4 of Volume 1).

	Accumulated Cost by 2030 \$ Billions ¹
Regional Integrated Resource Planning & Management	0.25
Statewide Water Planning	0.17
Data & Tool Improvement	0.25
Research & Development	0.25
Science	3 - 5% of total

The resource management strategy estimates are not additive. Although presented individually, they are in most cases alternatives that will either complement each other or compete for limited system capacity, funding, water supplies or other component necessary for implementation.

4. Numbers are for Meadow Restoration only.