

## Section 7: Resource Management Strategies

The goals and objectives presented in Section 6 of the *Integrated Regional Water Management Plan* (IRWM Plan) for the Westside Sacramento Region (Region) describe the foundational intent of the Plan. The goals represent broad focus areas for water management actions in the Region, and the objectives describe specific outcomes that will improve water-related conditions. These water management actions, which will need to be taken by resource managers and other stakeholders, could include projects, programs, and policies designed to help agencies and local governments manage water and related resources. The California Department of Water Resources (DWR) refers to these types of projects, programs, and policies as resource management strategies (RMSs). A broad list of RMSs was identified in the *California Water Plan Update 2013* (DWR 2013) and must be considered for applicability in an IRWM Plan.

This section introduces the 30 RMSs from the California Water Plan that were reviewed by the project team to determine which were applicable to help meet the goals and objectives of the Plan. The applicable RMSs were then considered during the project development phase of the planning process.

### 7.1 Resource Management Strategy Summary

The *California Water Plan Update 2013* groups the RMSs into seven management outcomes, which are summarized in Table 7-1. RMSs determined to be applicable to the Region are followed by a ✓, and those not applicable to the Region are followed by an ✗. Applicable RMSs are those which could help address the major water-related challenges and opportunities summarized in Section 5 and could contribute to achieving the Plan goals and objectives discussed in Section 6.

**Table 7-1: Summary of Management Outcomes and RMS**

CWP Management Outcome	Resource Management Strategies
Reduce Water Demand	Agricultural Water Use Efficiency ✓ Urban Water Use Efficiency ✓
Improve Operational Efficiency and Transfers	Conveyance – Delta ✓ Conveyance – Regional/Local ✓ System Reoperation ✓ Water Transfers ✓
Increase Water Supply	Conjunctive Management & Groundwater Storage ✓ Desalination – Brackish & Seawater ✗ Precipitation Enhancement ✗ Recycled Municipal Water ✓ Surface Storage – CALFED/State ✗ Surface Storage – Regional/local ✓
Improve Water Quality	Drinking Water Treatment and Distribution ✓ Groundwater Remediation/Aquifer Remediation ✓ Matching Quality to Use ✓ Pollution Prevention ✓ Salt and Salinity Management ✓ Urban Runoff Management ✓

CWP Management Outcome	Resource Management Strategies
Practice Resources Stewardship	Agricultural Lands Stewardship ✓ Ecosystem Restoration ✓ Forest Management ✓ Land Use Planning and Management ✓ Recharge Area Protection ✓ Sediment Management ✓ Watershed Management ✓
Improve Flood Management	Flood Risk Management ✓
People and Water	Economic Incentives ✓ Outreach and Engagement ✓ Water and Culture ✓ Water Dependent Recreation ✓

✓ RMS potentially applicable to Westside Region.

\* RMS not applicable to Westside Region.

Each RMS is described below, with discussion of how it could contribute to meeting specific plan goals and objectives and whether the strategy is applicable to the Region.

## 7.2 Reduce Water Demand

### 7.2.1 Agricultural Water Use Efficiency (Applicable)

The agricultural water use efficiency strategy involves measures that reduce the amount of water used for agricultural irrigation while maintaining agricultural productivity. This strategy includes improvements in irrigation technology and water management that directly increase water use efficiency as well as education and training efforts that lead to improved water management.

This strategy aligns with plan goals 2, 8, 10, and 13; the reasonable use focus objective 12 of increasing the adoption of agricultural best management practices (BMPs); the water supply focus objective 24 of providing water supply reliability to agricultural users; and Climate Change Vulnerability Sub-topic 1.5. The strategy could be implemented in the Region through irrigation audits to identify ways to promote efficient water use and improvement of irrigation systems, among other approaches. This strategy is a key component of the Water Conservation Act of 2009 (SB x7-7), which requires agencies providing water to more than 25,000 irrigated acres to prepare Agricultural Water Management Plans (AWM Plans). One of the components of AWM Plans is identification of Efficient Water Management

Practices to encourage measures involving better irrigation systems and on-farm reasonable water use.

### 7.2.2 Urban Water Use Efficiency (Applicable)

The strategy for improved urban water use efficiency addresses indoor and outdoor residential, commercial, industrial, and institutional water uses. It is a key component of SBx7-7, which requires all urban water suppliers (with more than 3,000 connections or supplying more than 3,000 acre-feet per year [AFY]) to increase water use efficiency in an effort to meet the statewide goal of a 20% reduction in per capita water use by 2020. This strategy includes improvements in technology or water management that lower water use or increase beneficial uses from existing water quantities. This strategy also includes educational programs and other measures that cause adoption of technological improvements or behavioral changes that reduce water demand.

This strategy aligns with plan goals 8, 10, and 13; education and awareness focus objectives 1 and 2; the reasonable use focus objective 11 of increasing adoption of water conservation measures by municipal and industrial users; the water supply focus objective 23 of providing 100% reliability of municipal and industrial supplies; and Climate Change Vulnerability Sub-topic 1.5. Compliance with SBx7-7 will be required of urban water suppliers as part of urban water management planning, while smaller water suppliers will likely coordinate their efforts, as they are subject to no specific requirements.

## 7.3 Improve Operational Efficiency and Transfers

### 7.3.1 Delta Conveyance (Applicable)

Delta conveyance refers to the movement of water within the network of streams, sloughs, and channels of the Sacramento-San Joaquin Delta and out of the Delta through constructed water conveyance systems. This strategy deals with the management of Delta inflows and exports to meet various demands, including municipal, industrial, and agricultural water supply, navigation, recreation, habitat, and flood conveyance. This RMS is relevant to the Westside Region because it includes both entities that divert water from the Delta and entities that use and convey upstream water in tributaries flowing to the Delta. Stream flow in the Delta and its tributaries is important for the life-cycle of several species of native fish, for water quality, for recreation, and for other uses. This RMS is aligned with plan goals 1, 2, 4, 6, 9, 10, 11, and 13; habitat focus objectives 3, 5, and 6; understand watershed function focus objectives 16 and 18; and water supply focus objectives 23 and 24.

### 7.3.2 Regional/Local Conveyance (Applicable)

Regional/local conveyance means the use of both natural waterways and built infrastructure to move water to areas where it is needed or away from areas to protect existing resources. This strategy covers the distribution and conveyance of local sources of water and imported water to improve water supply, water quality, recreation, habitat, and flood management. For the Westside Region, this RMS addresses conveyance activities outside the Delta, including conveyance from the Upper Cache and Upper Putah watersheds through the valley floor. It is related to the conjunctive management and groundwater storage RMS. It aligns with plan goals 4, 6, 9, 10, 11, and 12; infrastructure focus objective 10; risk management focus objective 14; habitat focus objectives 3, 5, and 6; recreation focus objective 13, and water supply focus objectives 23 and 24.

### 7.3.3 System Reoperation (Applicable)

System reoperation involves changes to the operation of water systems to address existing problems, increase water supply reliability, or adapt to future changes. The strategy includes reoperation of surface water storage facilities, groundwater systems, and associated conveyance infrastructures, which is directly related to the conjunctive management and groundwater storage RMS. In the Westside Region, this RMS aligns with plan goals 1, 5, 6, 7, 8, 9, 10, 11, and 13; and likely will be integral to meeting the water supply focus objectives 23 and 24. This RMS is also aligned with infrastructure focus objective 10 to create an asset management plan.



### 7.3.4 Water Transfers (Applicable)

Water transfers are voluntary exchanges of water or water rights among water users. A water transfer can be a change in point of diversion, place of use, or type of use. Water transfers typically occur using one of the following: transfer of water from reservoirs that would otherwise have been carried over to the following year, use of groundwater instead of surface water deliveries and transfer of the surface water rights, transfer of previously banked groundwater, reduction of existing consumptive use and transfer of the resulting water savings, and reduction of water losses and transfer of the recovered water. This RMS aligns with plan goals 7, 9, and 12; Climate Change Vulnerability Sub-topic 1.4; and could help achieve water supply focus objectives 23 and 24.

## 7.4 Increase Water Supply

### 7.4.1 Conjunctive Management and Groundwater Storage (Applicable)

Conjunctive management is the coordinated use of surface water and groundwater to maximize the water available to a region. This strategy involves recharge of groundwater basins when excess surface water is available. In some areas of the Region, the conjunctive management and groundwater storage RMS is already actively practiced because of the availability of surface water supplies. This RMS aligns with plan goals 8, 10, 11, and 13; Climate Change Vulnerability Sub-topics 1.4, 2.1 and 2.5; and likely will be an important element of achieving water supply focus objectives 23 and 24.

### 7.4.2 Desalination (Not Applicable)

Desalination refers to treatment processes that remove salts from water to achieve salinity concentrations that are acceptable for municipal and agricultural uses. The desalination strategy covers treatment of seawater, brackish water, and wastewater. This RMS may eventually become viable in portions of the Region where groundwater has high salinity concentrations to achieve the objectives under the water supply focus and water quality focus. However, the use of desalination within the Region likely will present significant challenges, such as how to dispose of the resulting brine. Another drawback is that desalination tends to require significant energy use and could contribute to greenhouse gas emissions. While this strategy could reduce negative impacts during drought conditions in drier parts of the Region, this RMS is not being considered for Region implementation at this time because of the factors described above.

### 7.4.3 Precipitation Enhancement (Not Applicable)

Precipitation enhancement, commonly called "cloud seeding," artificially stimulates clouds to produce more rainfall or snowfall than they would naturally. Cloud seeding injects special substances into the clouds that enable snowflakes and raindrops to form more easily. This RMS is not being considered at this time, as the feasibility of precipitation enhancement

activities in the Region is not known and funding for research and implementation of such projects has been largely unavailable. Precipitation enhancement has been attempted in the past by Lake County Watershed Protection District and YCFCWCD in February 1986. The attempt was disrupted by a flood event and did not provide results in the watershed.

### 7.4.4 Recycled Municipal Water (Applicable)

Water recycling is the treatment and reuse of wastewater. The recycled municipal water strategy applies specifically to the application of municipal wastewater with the intention of putting the water to a beneficial use that would not occur through discharge of the wastewater. As discussed in Section 3, this RMS is implemented to a limited extent in the Region, largely as a means of wastewater disposal. In select instances where wastewater discharge requirements result in highly treated wastewater, this RMS could be expanded to help meet water supply focus objectives 23 and 24; and Climate Change Vulnerability Sub-topics 2.1 and 2.5.

### 7.4.5 CALFED/State Surface Storage (Not Applicable)

The *Record of Decision* (2000) by Collaboration Among State and Federal Agencies to Improve California's Water Supply (CALFED, now called the Delta Stewardship Council) identified five potential surface storage reservoirs that are being investigated by DWR, the U.S. Bureau of Reclamation, and local water interests. Building one or more of the reservoirs would be part of the agency's long-term comprehensive plan to restore ecological health and improve water management of the Bay-Delta. The five surface storage investigations are Shasta Lake Water Resources Investigation, In-Delta Storage Project, Upper San Joaquin River Basin Storage Investigation, North-of-the-Delta Offstream Storage, and Los Vaqueros Reservoir Expansion. These potential projects are not located in the Westside Region and will not directly affect it.

### 7.4.6 Regional/Local Surface Storage (Applicable)

Surface storage consists of the collection and storage of water within on-stream or off-stream reservoirs for

later release. This strategy includes the use of surface storage for water supply as well as flood management. The Region already implements this RMS through the water stored at Clear Lake, Indian Valley Reservoir, and Lake Berryessa. Surface water will continue to be an important component of the Region's water supply, and at least one additional surface water storage project is proposed (the Adobe Creek Conjunctive Use Project); other off-stream storage projects have also been considered. This RMS aligns with plan goals 6, 7, 9, 10, 11, and 13; Climate Change Vulnerability Sub-topic 5.4. It is critical to meeting water supply focus objectives 23 and 24; recreation focus objective 13; and to a more limited extent, habitat focus objectives 3 and 6.



Indian Valley Reservoir

## 7.5 Improve Water Quality

### 7.5.1 Drinking Water Treatment and Distribution (Applicable)

This strategy focuses on ensuring that water provided for human consumption is safe for drinking. Drinking water treatment includes processes that treat, blend, or condition water to meet potable standards; drinking water distribution includes the storage, pumping, and delivery of potable water to customers. This strategy includes measures within both the treatment processes and distribution system that are necessary to produce and maintain safe drinking quality. One of the significant challenges discussed in Section 5 relates to providing drinking water treatment and distribution, particularly in the more rural areas. This RMS aligns with plan goals 5, 10, and 13; and can help achieve water quality focus objective

22 to provide high-quality source water, which is one of the highest-priority objectives for the Region.

### 7.5.2 Groundwater and Aquifer Remediation (Applicable)

Groundwater and aquifer remediation is the improvement of groundwater quality to meet intended beneficial uses. Groundwater impairment may be the result of naturally occurring constituents or anthropogenic contamination. The groundwater and aquifer remediation strategy includes both passive techniques, which allow for *in situ* degradation, and dispersion of contaminants and active treatment, which remove the contaminants through chemical, biological, or physical processes. Groundwater in some parts of the region has high levels of naturally occurring chromium, which are being evaluated for treatability to implement this RMS. If successful, this RMS could contribute to achieving the water quality focus objectives 21 and 22; and water supply focus objectives 23 and 24.

### 7.5.3 Matching Water Quality to Use (Applicable)

This strategy aims to optimize water resources by directing higher-quality sources of water to end uses that require that higher quality, such as drinking water or certain industrial processes, and sources of lower-quality water to applications where the lower quality is adequate to the use. This strategy reduces the treatment costs associated with water supply. This RMS is not formally used within the Region at this time, but it could be more fully explored to achieve water quality focus objectives 21 and 22; Climate Change Vulnerability Sub-topic 3.4; and water supply focus objectives 23 and 24, in conjunction with the recycled water RMS.

### 7.5.4 Pollution Prevention (Applicable)

The pollution prevention strategy addresses wastewater treatment plants, stormwater discharges, agricultural runoff, and unauthorized land uses. This strategy includes efforts to identify sources of pollutant load, reduce pollution-causing activities, and capture pollutants before they enter waterways. This RMS aligns with plan goals 1, 5, 6, 7, 8, 9, 10, and 13; and Climate Change Vulnerability Sub-topics 3.1, 3.2, 3.4 and 3.5. It is important for the Region, as it is relevant to multiple objectives, including water

quality focus objectives 19 and 20, particularly as they relate to meeting TMDLs for mercury and other contaminants, and all the habitat focus, recreation focus, and water supply focus objectives.

### 7.5.5 Salt and Salinity Management (Applicable)

Salt and salinity management requires an understanding of how salts enter a region and are diluted and displaced within the region; as such, the salt and salinity management strategy includes studies on regional salt loading and the extent and magnitude of a region’s salt problems. It also includes steps that reduce salt inputs and sequester or dispose of salts. The highly agricultural nature of the Region may present a future challenge to salt and salinity management. Achieving the groundwater aspect of the Understand Watershed Function Focus objective 17 will contribute to applying this RMS successfully in ways that could help provide water supplies of appropriate quality, as described in water supply focus objectives 23 and 24.

### 7.5.6 Urban Runoff Management (Applicable)

The urban runoff management strategy involves the capture, conveyance, and treatment of stormwater and dry weather runoff to improve flood management, water quality, or water supply. This RMS aligns with goals 5, 6, 7, 8, 9, 10, and 13; and Climate Change Vulnerability Sub-topic 3.5. The IRWM Plan acknowledges the importance of this RMS, particularly as it relates to the pollution prevention RMS. This strategy aligns with the several water quality focus objectives to improve the quality of urban runoff (objectives 19 and 22).

## 7.6 Practice Resources Stewardship

### 7.6.1 Agricultural Lands Stewardship (Applicable)

The agricultural lands stewardship strategy includes measures that promote the continued use of agricultural lands and protect natural resources through the maintenance of agricultural lands. Erosion control measures are an example of agricultural land stewardship practices that support

the viability of croplands while offering water resource benefits. This is an important RMS for the Region because of the agricultural cultural values held throughout it. This RMS aligns with plan goals 1, 9, and 13. There are several organizations active in applying this RMS that will facilitate meeting the education and awareness focus objective 2, and water quality focus objectives 19 and 22.

### 7.6.2 Ecosystem Restoration (Applicable)

Ecosystem restoration addresses natural landscapes and biological communities that have been modified by past activities. This strategy aims to increase the diversity of native species and biological communities and the abundance and connectivity of habitats, particularly in aquatic, riparian, and floodplain ecosystems. The strategy includes protection and recovery of at-risk species, wetlands restoration and construction, floodplain reconnection, and invasive species removal. This RMS aligns with plan goals 4, 6, 7, 8, 9, and 11; Climate Change Vulnerability Sub-topics 6.1, 6.4, 6.5, 6.6 and 6.7; and is a high priority to the Westside Region, especially because it helps meet invasive species focus objectives 7 through 9, and habitat focus objectives 3 through 6. This RMS also supports watershed management, decreasing pollution, and promoting water quality improvements.



### 7.6.3 Forest Management (Applicable)

The forest management strategy focuses on activities on both publicly and privately owned forest lands aimed at improving the availability and quality of water for downstream users. This RMS aligns with plan goals 7, 8, 9, 10, 11, and 13; Climate Change Vulnerability Sub-topics 5.5, 6.5 and 6.6; and risk management focus objective 15 to reduce the risk of large erosion events. Ecosystem restoration, erosion control for pollution prevention, and watershed management preserve the productivity of fresh water resources in forested elevations and work toward meeting water quality objectives throughout the upper watersheds.

### 7.6.4 Land Use Planning and Management (Applicable)

The land use planning and management strategy incorporates consideration of water supply availability, water quality requirements, and flooding and drainage into land use decisions. This RMS aligns with plan goals 1, 2, 8, 12, and 13; Climate Change Vulnerability Sub-topics 5.2 and 5.4; education and awareness focus objective 2; and reasonable use focus objectives 11 and 12.

### 7.6.5 Recharge Area Protection (Applicable)

The recharge area protection strategy includes the protection and enhancement of groundwater recharge areas. Since much of the Region is not urbanized, access to recharge areas is often retained, and some agricultural areas are used, in part, for groundwater recharge. This strategy includes methods such as low-impact development and land conservation to help areas suitable for recharge remain accessible. It also includes measures to protect groundwater recharge areas from contamination. This RMS aligns with plan goals 7, 8, 10, 11, and 13; and Climate Change Vulnerability Sub-topics 1.4 and 5.4. Further, as many portions of the Region are solely dependent on groundwater, this RMS aligns particularly well with the groundwater objective 17 within the Understand Watershed Function Focus, which is of high importance to the Region.

### 7.6.6 Sediment Management (Applicable)

While sediment can cause a nuisance to rivers and dams, sediment can also be a valuable resource when it is properly managed, resulting in multiple water benefits, environmental health, economic stability, and coastal safety.

The sediment management strategy acknowledges both the benefits and impacts of sediments. Sediments are beneficial when of appropriate size and in the correct location such as for spawning gravels as well as flood plain and beach replenishment. The negative attributes of sediment are seen when it accumulates in reservoirs and flood channels, causes clouding in water with associated impacts to fish and invertebrate life or carries contaminants such as mercury downstream.

The most significant sediment impacts in the Region occur after a wildfire event as discussed in Section 3. RMS aligns with Plan goals 3, 4, 7 and 9; Climate Change Vulnerability Sub-topics 3.5, 5.4 and 6.1; restoring natural habitat focus objective 3; understanding watershed focus objective 18; and improving/protecting water quality focus objective 21.

### 7.6.7 Watershed Management (Applicable)

The watershed management strategy uses watershed boundaries as the basis for managing natural resources. Watershed management is the process of creating and implementing plans, programs, projects, and activities to restore, sustain, and enhance watershed functions. This RMS aligns with all 13 plan goals; Climate Change Vulnerability Sub-topics 1.4, 1.5, 2.1, 2.5, 3.2, 4.5, 5.2, 5.4, 6.1, 6.2, 6.5 and 6.6; and several of the objectives, including education and awareness focus objectives 1 and 2, understand watershed function objective 18, and risk management focus objective 15. The IRWM planning process has established and enhanced relationships that seek to improve the sustainability and benefits derived from resources of the Region watersheds, particularly as they relate to meeting habitat and invasive species focus objectives 3 through 9.

## 7.7 Improve Flood Management

### 7.7.1 Flood Risk Management (Applicable)

The flood risk management strategy involves both structural and non-structural measures to manage flood flows as well as programs that improve flood preparedness, response, and recovery. Structural approaches to flood management include dams, detention basins, reservoirs, levees, channel modifications, and diversions. Non-structural measures focus on land use management such as floodplain restoration and development policies. This RMS aligns with plan goals 4, 9, 10, 11, and 13; Climate Change Vulnerability Sub-topics 5.1, 5.2, 5.3 and 5.4; and objective 14 of the high-priority risk management focus, which specifically addresses flood risk and reflects the fact that, as discussed in Section 3, key areas in the Region are prone to flood damage. Implementation of this strategy involves the recognition that flood risk management is a complex topic requiring significant interaction with state and federal agencies, and that not all flooding is harmful, as there is a discrete relationship between natural floodplain operations related to groundwater recharge and ecosystem habitat restoration.

## 7.8 People and Water

### 7.8.1 Economic Incentives (Applicable)

Economic incentives are financial tools such as grants, loans, rebates, and water pricing to influence water management. Such incentives can promote implementation of projects that improve water management and protect water resources. In addition, water rate incentives can be used to promote more efficient use of water. This RMS aligns with plan goals 2, 7, and 8. Resource managers within the Region are evaluating opportunities to more fully develop this RMS to achieve reasonable use focus objectives 11 and 12, as well as water quality focus objectives 19 and 20.

### 7.8.2 Outreach and Engagement (Applicable)

The outreach and engagement strategy describes the shifts in early water management decision making from strictly technically-based decisions that over time have resulted in unintended consequences such as degraded ecosystems and/or social injustices. The strategy acknowledges the need for improved outreach and engagement so that citizens can be more knowledgeable and participate more effectively in debates regarding water which can, in turn, gain valuable support for a range of water management programs.

The targeted outreach to the citizenry of the Region for the preparation of the Plan included a brochure that was mailed to all residents within the Region, attendance at local meetings throughout the Region (including meetings targeted at the tribal communities) to inform the public regarding the Plan goals and communication process, and hosting and updating of the IRWM website. These outreach and engagement activities occurred throughout the Plan preparation process consistent with Plan goals 1, 2, 3 and 8; and education and awareness focus objective 2.

### 7.8.3 Water and Culture (Applicable)

Incorporating culture into water management increases awareness of how cultural values, uses, and practices are affected by water management, and how they affect water management. Water and water-dependent resources shape individual and collective experiences that contribute to individual and community well-being, sense of identity, and connection with the natural world. These experiences are inextricably linked to values, traditions, and lifestyles, which in turn inform perspectives and expectations regarding water resources and conditions. Understanding these connections, and how these relationships may change because of climate change, can help communities prepare for impacts and protect or adapt cultural values. Cultural considerations by their nature are inherently linked to every resource management strategy. Expressions of cultural connections to water and water-dependent resources can involve a wide range of activities and material objects, including subsistence activities such as traditional hunting, fishing and plant collecting; recreation activities such as swimming, boating, wildlife viewing or hiking; spiritual activities that

acknowledge the cleansing and renewing properties of water; and historic preservation of artifacts, buildings, flumes, mills, and other significant sites.

From a tribal perspective, as described in Chapter 2, the Region is part of the historic range of the Pomo (Clear Lake) and Wintun (Cache Creek, Putah Creek, and valley floor areas) Peoples. Communities of Wappo and Miwok also lived around Clear Lake. In addition, contact with other Tribes whose cultures may include the Region was also made. Other cultures of significance in the Region are the recreation culture represented by the extensive public lands as well as agricultural and ranching culture, particularly in the western part of the Region, and the active, long-term participation of the environmental community in the IRWM process. This RMS aligns with Plan goals 1, 2, 3, 6, 7 and 10; Climate Change Vulnerability Sub-topics 3.1, 3.2, 3.4, 3.5, 5.5, 6.5 and 6.6; and education and awareness focus objectives 1 and 2, habitat focus objective 3, and recreation focus objective 13.

#### 7.8.4 Water-Dependent Recreation (Applicable)

This strategy seeks to maintain and increase recreational activities dependent on water, including fishing, swimming, waterfowl hunting and birding, boating, canoeing, and kayaking, as well as activities that do not require water but are enhanced by it, including wildlife viewing, picnicking, camping, hiking, biking, and riding on trails. This RMS aligns with plan goals 6 and 13; Climate Change Vulnerability Sub-topics 3.1, 3.2, 3.4, 3.5, 5.5, 6.5 and 6.6; and meets recreation focus objective 13.

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