5.10 Operational Efficiency and Water Transfer

Introduction

The water management in California has always been a critical element for the State's economic growth over the last two decades. California Department of Water Resources (DWR) has worked extensively on the concept of Integrated Regional Water Management (IRWM) planning to encourage the development of comprehensive water resources management plans throughout the state. Using water efficiently, improving water quality and reliability, and integrating environmental stewardship are not new concepts to the regional water agencies within the Santa Ana River (SAR) Watershed and the Santa Ana Watershed Project Authority (SAWPA). Within the SAR Watershed there are over 100 large and small water districts: local, regional, state and federal agencies, and public/private stakeholders. These agencies have developed strategies such as water use efficiency, water recycling, groundwater storage and conjunctive use, urban runoff management, and water budget based rate billing structures to enhance their comprehensive water resources management plans. Through One Water One Watershed (OWOW) planning process, the Operational Efficiency and Water Transfers Pillar worked together to discuss the integrated regional projects that could be implemented for the future.

The purpose of this report is to explore the strategies that have already been defined within the SAR watershed, and ascertain potential region-wide operational efficiency and water transfer concepts that can be developed by cooperative strategic planning effort among different agencies. Such concepts can benefit from integration of different resources, facilities, and capabilities that currently exist to achieve a higher operational efficiency within the SAR Watershed. The goal of the report is to provide operational efficiency and water transfer concepts that can be developed utilizing elements within

different water resources plans prepared by various agencies and others in support of the OWOW program. To achieve this goal, the report provides an overview of water resources conditions at the State and regional level and offers assessment matrixes based on different strategic documents prepared by stakeholders within different geographical regions of the SAR Watershed. In addition, the report provides preliminary water transfer concepts, and potential implementation procedures that can be used to enhance the water resources reliability and operational efficiency within the SAR Watershed.

The report provides a common foundation that frames the potential imbalances that may be faced in the future and potential concepts that may be considered to resolve those imbalances.

Water Resources Management Activities at the State Level

This section reviews major planning activities and goals that are being implemented and/or considered at the state level. These goals play an important role in the objectives set by the regional and local water resources leaders in the SAR Watershed area.

California Water Plan

The California Water Plan (CWP) has always been a valuable source of information for water planners since 1957. In the early years, these plans were primarily produced by DWR. However, for the 2009 CWP Update the DWR formed an interagency steering committee representing over 20 agencies and a 45-member advisory committee to better integrate regional water management activities into the State water and flood management planning.

By law, the CWP documents are required to be published every five years. The purpose of the CWP is to provide regional, local, tribal, state, and federal governments and organizations a strategic planning forum to collaboratively identify short-term and long-term actions that would help sustain California's water resources, and to prepare response plans for catastrophic events that would threaten the livelihood of the people of California.

These reports have evolved from statistical summaries of water supply and demand to expert analyses of complex hydrology, water use, conservation, and emerging trends issues in water resource management, flood safety and climate change adaptation. The CWP provides strategic recommendations to guide future state investments and the direction of resource management policies.

The 2009 Water Plan Update implementation plan identifies 13 objectives that could provide more sustainable water and flood systems given the changing climate and other uncertainties and risks throughout the state. Some of these objectives such as setting co-equal goals for the ecosystem and reliable water supply by managing a sustainable California Delta are site specific, but many of the objectives mentioned requiring regional implementation for their success. The following implementation objectives mentioned by the CWP are also considered by several regional agencies within the SAR watershed as part of their strategy for a more adaptive and resilient water resources management system.

- Integrated Regional Water Management – improve and expand IRWM to create and build on partnerships that are essential for sustainable watershed management, and would increase regional self-sufficiency
- Use Water More Efficiently – use greater water conservation, recycling, and reuse to help meet future water demands and adapt to climate change
- Expand Conjunctive Management of Multiple Supplies –use existing and new surface and import water with groundwater storage to prepare for droughts, and climate change
- Protect Surface Water and Groundwater Quality – protect and restore water quality for public health and beneficial use of state's water supplies
- Reduce Energy Consumption of Water Systems and Uses – reduce the energy consumption of water and wastewater systems by implementing water related strategies

The 2009 CP Update was published in March 2009 right before passage of a historic water legislation package by the California State Legislature in November of 2009. The SAWPA member agencies strategies focusing on the above mentioned objectives are reviewed in Section 4 of this report.

Climate Change

In December 2009, the U.S. Environmental Protection Agency (EPA) issued findings that greenhouse gas (GHG) emissions is a threat to public health. As a result, responding to climate change remains a priority in both Houses and Senate; and increases the likelihood of federal regulatory action. Legislative and regulatory actions will exacerbate the existing water management challenges confronting regional agencies in the watershed. Possible consequences of climate change include:

- More frequent drought periods
- Changes in runoff patterns from the Sierra Nevada
- Increased flooding intensity, as well as impacts to the operations of the State's surface water storage facilities

Higher temperatures in the Sierras will result in earlier and more rapid runoff of snowmelt and less storage ability. The DWR is projecting that the California snowpack will decline by 25 to 40 percent by 2050 and significantly reduce the amount of water that is stored for use during the summer and fall. Decreased energy production through hydropower is also a concern. In addition, population growth will result in an increased demand for water in California. Inadequate storage and increased growth will significantly impact water supply reliability within the State, and the Santa Ana River Watershed.

Regional temperature increases and precipitation variability would likely reduce flows in local streams which would reduce groundwater recharge and impact sources of water supply; increase storm intensity and flooding; increase erosion and related water quality problems; and impact on wildlife habitat. Furthermore, the implications of global sea level rise would increase sea-water intrusion into groundwater supplies and infrastructure damage in the coastal communities. In general, the watershed

should plan for reduced water supply availability, higher costs for water, and lower environmental quality.

While climate change projections at regional scale are undergoing constant refinement, the science, the causes, and extent of climate change will continue to be debated, water agencies within the watershed must position themselves to protect and promote their constituents' interests. SAWPA highlighted the water supply reliability challenges by state droughts, droughts on the Colorado River, and the threat of climate change in its OWOW planning process and helped the regional agencies to work together to address these challenges.

Bay-Delta Conservation Plan

The Bay-Delta Conservation Plan (BDCP) is being prepared through a collaboration of state, federal, and local water agencies, environmental organizations, and other interested parties. These organizations have formed the BDCP Steering Committee. The BDCP will identify a set of water flow reliability and habitat restoration actions that could contribute to the recovery of endangered and sensitive species and their habitats. The goal of the BDCP is to provide for the Sacramento-San Joaquin River Bay-Delta (Delta) species/habitat protection and to improve reliability of water supplies.

As the BDCP evaluates habitat, physical and operational alternatives necessary to restore the Delta ecosystem while providing water supply reliability, state and federal agencies are developing a joint Environmental Impact Report/Statement (EIR/EIS) under the Delta Habitat Conservation and Conveyance Program (DHCCP). The EIR/EIS will determine the potential environmental impacts of the proposed BDCP.

Lead agencies for the EIR/EIS are the California Department of Water Resources, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration's National Marine Fisheries Service, in cooperation with the California Department of Fish and Game, the EPA and the U.S. Army Corps of Engineers (ACoE).

The BDCP is being developed in compliance with the Federal Endangered Species Act (ESA) and the California Natural Communities Conservation Planning Act (NCCPA). When completed, the BDCP would provide the basis for the issuance of endangered species permits for the operation of the state and federal water projects. The BDCP would be implemented over the next 50 years.

The OWOW planning effort highlighted the vulnerability of the Delta and helped the regional agencies to address some of the challenges related to this threat.

Urban Water Management Planning

The State of California requires urban water suppliers that either provide over 3,000 acre-feet of water annually or have more than 3,000 connections to prepare Urban Water Management Plans (UWMP) in support of their long-term resource planning. The UWMP identifies different water supply sources that are available to meet existing and future water demands over a 20-year planning horizon considering

normal, dry, and multiple dry years. The UWMPs are prepared every 5 years and submitted to DWR to make sure the plans meet the requirements identified in the Urban Water Management Planning Act (Division 6 Part 2.6 of the Water Code §10610 - 10656). The Act requires the urban water supply agencies to describe their Demand Management Measures (DMM) in their UWMPs. These DMMs are the same as the California Urban Water Conservation Council (CUWCC) Best Management Practices (described in Section 2.5).

The requirement that all urban retail water suppliers quantify per capita baseline water use, set water use targets, and then show actual reductions in 2015 and 2020 has caused suppliers throughout the watershed to pay particularly close attention to the effectiveness of their water conservation programs.

The water suppliers within the Santa Ana River Watershed prepare UWMPs in support of long-term resource planning in their respective geographic area. Also, as part of the OWOW process, SAWPA took the initiative to highlight the challenges of population growth in the watershed and how this growth can be sustained based on the UWMPs prepared by the water suppliers in the region.

Water Use Efficiency

The CCUWCC was created to increase efficient water use throughout the state by forming partnerships among urban water agencies, public interest organizations, and private industry. Some 400 water agencies and environmental groups have signed a Memorandum of Understanding (MOU) voluntarily pledging to implement a series of Best Management Practices (BMP) within a reasonable time frame. Water agencies that became signatories to the CUWCC MOU pledge to implement the BMPs to specified levels and to report progress on their BMP implementation biannually to the CUWCC.

In order to be eligible for grant or loan funding from the State of California, an urban water supplier, whether a signatory to the CUWCC MOU or not, must demonstrate that it's efforts in implementing each DMM or BMP will be implemented at the coverage level determined by the CUWCC MOU.

Only the BMPs that are cost-effective for the water supplier need to be implemented; and successful implementation of all BMPs and credit for actively participating in the CUWCC process need not be a "complete" implementation of all BMPs.

The CUWCC maintains a self-reporting database on the status of BMP implementation by MOU participants. This information includes results of each BMP, the money invested in each BMP, and the estimated water savings for each of those measures by each participant.

The Water Conservation Act of 2009 (Senate Bill Number 7 of the 7th Extraordinary session - SBX 7-7) was enacted by the California legislature in November 2009. This Act sets an overall goal of reducing per capita urban water use statewide by 20 percent by December 31, 2020 and requires the urban water suppliers to report the 20 percent by 2020 water use reduction goals in their UWMPs. The UWMP documents were one of the most pertinent documents reviewed and used to develop the matrix in Section 5.

The SBX 7-7 legislation also directed DWR to address the following urban water use efficiency issues:

- Convene a task force to investigate alternative best management practices for the commercial, industrial and institutional sectors
- Establish a standardized water use reporting form
- Promote regional water resource management through increased incentives and decreased barriers
- Develop statewide targets for regional water management practices like recycled water, brackish groundwater, desalination and urban stormwater infiltration and direct use

Increasing the supply of water has the same effect on water availability as decreasing the demand for water (through increased efficiency). However, engineered methods for increasing supply, such as building new dams for surface storage, or increasing water exports from the Delta, are becoming less certain as California moves into the future. Many water suppliers are turning to other strategies, such as improving efficiency, to meet increasing demand. As the costs for engineered water supply options go up, even the most expensive conservation strategies are becoming economically viable.

The 2020 state population is expected to be in the range of 44 million people and a decrease in per capita water use of 20 percent will equate to an annual demand reduction of 2 million acre-feet of water.

Many of the water suppliers within the Santa Ana River Watershed are signatories to the CUWCC MOU and evaluate their BMPs when developing their water resources strategies. Need for a collaborative approach amongst the watershed stakeholders to help meet long term goals of water use efficiency is part of the OWOW process.

Regional Water Resources Management Activities

This section reviews major operational efficiencies and water transfer activities in support of the state goals that are being implemented and/or considered at the regional level by Metropolitan Water District of Southern California (MWD), and SAWPA. These integrated activities play an important role in the objectives set by SAWPA member agencies in their respective region, and local water resources leaders in their respective regions/areas.

MWD Integrated Resources Plan

The MWD Integrated Resources Plan (IRP) is the long-term water resources strategy for MWD's six-county service area. The MWD IRP is the blueprint that guides MWD's efforts to increase water supplies and lower demands through 2035. MWD's first IRP was developed in 1996 and updated in 2004.

The MWD's 2009 IRP was prepared as part of MWD's normal five-year planning cycle. The major update on this IRP is addressing changing water supply conditions and the unprecedented series of challenges and uncertainties facing the Southern California region. These uncertainties include Delta and Colorado River water supply restrictions, climate change, continued population growth, emerging water quality

issues and rising energy costs. These challenges require new approaches by MWD, its member agencies, and other regional stakeholders.

MWD member agencies, including the regional stakeholders in the SAR Watershed actively participated in the preparation of the 2009 IRP through Regional Workshops, Technical Oversight Committee and Technical Workgroups. The MWD IRP provided recommendations with respect to six resource areas: groundwater, recycled water, conservation, stormwater/urban runoff, graywater and seawater desalination.

MWD Water Supply Allocation Plan

In 2007, MWD was concerned about many water supply challenges in its service area as a result of:

- Critically dry conditions in the State Water Project (SWP) systems
- A ruling in the Federal Courts in August 2007 provided protective measures for the Delta Smelt in the Sacramento-San Joaquin River Delta

These challenges brought uncertainty about future pumping operations from the SWP and raised the possibility that MWD would not have access to the supplies necessary to meet total demands in Southern California, and would have to allocate shortages in supplies to its member agencies. It is important to note that MWD's SWP supply contract with DWR prohibits importing SWP water into MWD's service area without MWD's consent; therefore, transfers of SWP water originating outside of MWD's service area are subject to approval and agreement with MWD.

In preparing for any potential shortages, MWD developed a Water Supply Allocation Plan (WSAP). The WSAP calculates each of the MWD's member agency supply allocations and identifies the key implementation elements needed for administering an allocation should a shortage occur. The WSAP is used by the MWD's member agencies for the urban water shortage contingency analysis that is required under Water Code Section 10632 and is incorporated into MWD's Regional Urban Water Management Plan (RUWMP).

In February of 2009 Governor Schwarzenegger proclaimed a statewide water shortage emergency when California was in its third consecutive year of drought. At the time, the SWP Table A allocation was at 20 percent and the MWD Board saw it appropriate to implement the WSAP and allocated water to its member agencies effective July 1, 2009. Because of the supply impacts from the recent drought conditions and Bay-Delta operational constraints, deliveries of the discounted water at the replenishment rate were suspended in 2007. MWD is currently working with its member agencies on potential long-term revisions of the Replenishment Water Program. The biggest issue causing MWD's rate increases is the loss of sales. Water sales are at record low as a result of many factors, including unemployment, foreclosures, extraordinary conservation, and the response to water rate increases. MWD water sales are at 1.73 MAF, compared to the usual sale of 2.3 MAF. Since 2007, MWD Tier 1 and Tier 2 rates have increased 69 percent and 86 percent, respectively. The Tier 2 water rate in 2013 is $997/AF.

The proclamation of the water shortage emergency by the Governor, the WSAP, discontinuation of the replenishment water program, and increased MWD water rates, were catalysts for the regional agencies within the SAR Watershed to take a closer look at their water supply reliability.

Planning Work Group Effort within the Santa Ana Watershed

Since the early 1970's, SAWPA has played a key role in the development and update of the Basin Plan for the SAR Watershed. Several task forces have been formed to address complex technical and regulatory issues and resolve inter-Agency conflicts. These task forces generally include staff of the Santa Ana Regional Water Quality Control Board (RWQCB) as active members or advisors and other stakeholders.

SAWPA's Nitrogen/Total Dissolved Solids Task Force, which met between 1996 and 2003,included some 22 water supply and wastewater management agencies and RWQCB. SAWPA has led different Task Force activities and has completed multi-million dollar studies to review groundwater quality, groundwater sub-basin boundaries, waste load allocations, and other related studies within the SAR Watershed. Different Task Force efforts usually include development of more scientifically defensible data and acceptable projects for a sustainable Watershed.

SAWPA's Basin Monitoring Program Task Force (BMPTF) is another effort tasked with executing some of the monitoring and reporting commitments within the Watershed, such as a triennial compilation of ambient groundwater quality data and an annual report of Santa Ana River water quality. The BMPTF also updates the Santa Ana River Wasteload Allocation model used to evaluate different discharge scenarios and the impacts of the Santa Ana River flows on the Orange County groundwater.

Another SAWPA work group is the Emerging Constituents (EC) Task Force. In 2007, a workgroup of water agencies and Publicly Owned Treatment Works (POTWs) was formed to develop a characterization program for emerging constituents. In the early years of its formation, the work group evaluated water quality monitoring programs, regulatory issues, stakeholder concerns, analytical methods, and potential public health and environmental impacts. Later, the workgroup developed an EC Investigative Work Plan based on ongoing characterization studies and other related evaluations. This Work Plan was submitted to and approved by the RWQCB in December 2009 (Resolution No. R8-2009-0071). Thereafter, the workgroup was formalized as a task force of multiple agencies under a task force agreement and renamed the EC Program Task Force.

The Work Plan originally had identified nine ECs, increasing to 13 ECs in 2012 to be sampled, and required each participating POTW agency to sample and pay for its own analyses of these constituents. In 2013, the list was reduced to just the ECs mandated by the SWRCB Water Recycled Water Policy and transitioned to a triennial sampling program.

Integrated Watershed Programming in the Santa Ana Watershed

Since its formation in 1968, SAWPA has been a leader in water resource planning for the SAR Watershed. SAWPA coordinated development of the first Santa Ana Integrated Watershed Program (IWP) document in 2002. This planning document identified seven major elements for a sustainable Watershed:

- Drought-proofing of the watershed by storing up to 1.3 million acre-feet (MAF) of new water
- Mitigating water quality impacts from the past activities
- Use water recycling as a major supply to reduce the area's overall need for imported water
- Develop flood protection along the main stem of the Santa Ana River
- Enhance wetlands and habitat to restore the Pacific Flyway
- Bring additional recreational opportunities and increase public awareness of the environmental needs
- Protect the long-term beneficial uses of the groundwater basins by using the Inland Empire Brine Line (IEBL) to carry saline wastes to the ocean

SAWPA has pursued the above elements based on the needs of its member agencies and other stakeholders within the watershed. The success of the SAWPA's planning efforts have provided the watershed with $389 million of different grant funding, including $250 million of Proposition 13, $25 million of Proposition 50, and $114 million of Proposition 84 grant funding. In 2005, SAWPA updated the IWP to include a summary of the many planning processes underway and priority projects of the stakeholders within the watershed. In early 2009, SAWPA completed a new integrated water management plan for the region known as OWOW. The vision of the OWOW Plan is a sustainable drought proofed and salt-balanced watershed with economic and environmental viability.

As part of OWOW process, SAWPA placed emphasis on building a collaborative approach amongst stakeholders to help meet long-term goals and objectives of the watershed in an integrated and multi-beneficial manner. Hence, the OWOW process includes a ten-member Steering Committee representing different interests throughout the Watershed. The Committee includes two representatives from the SAWPA Commission; three County Supervisors (one from each county); three mayors (one from each county); a business representative from the development community, and a representative from the environmental community. The Steering Committee developed the following working goals and objectives:

- Provide Reliable Water Supply
- Preserve and Enhance the Environment
- Promote Sustainable Water Solutions
- Ensure High Quality Water
- Provide Economically Effective Solutions
- Improve Regional Integration and Coordination
- Use Rainfall as a Resource
- Provide Recreational Opportunities

- Maintain Quality of Life

During the OWOW process, it was recognized that additional projects implemented as a result of different grant funding has closed the gap between supply and demand and increasing emphasis should be placed on water use efficiency and development of local supplies.

With as much as 60 percent of household water consumption going toward outdoor usage, there is a growing need to provide effective programs targeting outdoor landscaping.

While water recycling is an important local supply for the watershed's sustainable future, challenges related to recycled water projects are varied and range from regulatory issues, ability to handle storage/seasonal variability, water quality impacts, salinity management to public acceptance, perception, and other policy issues.

The OWOW planning process has created greater partnerships, funding opportunities, connectivity, and increased awareness of planning projects in all the communities within the watershed. A collaborative process that results in multifunction, multi-benefit projects will ultimately reduce the cost to the taxpayer and increase the efficiency of local agencies. The idea of meeting a number of community needs with a single project is not new; however, specialization within regional agencies has often moved these project types to the backburner. Hence, efforts primarily have focused on a single purpose projects, and efforts required to develop multi-objective solutions have made true multi-benefit projects relatively uncommon.

SAWPA recognizes that the OWOW process is not complete. All solid plans require constant refinement, and the OWOW Plan is no different.

Water Resources Management Activities within the Santa Ana Watershed Regions

This section reviews major planning activities being implemented and/or considered within the SAR Watershed. These planning activities were evaluated as part of the OWOW process and did set the basis for the integrated resources planning objectives set by the OWOW Steering Committee. The water resources management activities are evaluated within five geographic areas of the SAR Watershed, starting from Big Bear Lake to the Pacific Ocean. The watershed is divided into five geographical areas. These management activities, concepts, and concerns are based on a summary of existing conditions as observed by the SAWPA member agencies.

Management Activities in the Upper Santa Ana River Portion of the Watershed

The main regional agency in this area is San Bernardino Valley Municipal Water District (SBVMWD) covers about 353 square miles of southwestern San Bernardino County. The projected demand in the Upper SAR region is expected to increase by about 50 percent from 349,200 AF in 2005 to 519,700 AF in 2030 (2007 Upper Santa Ana River Watershed Integrated Regional Management Plan).

SBVMWD is the fifth largest of the 29 water contractors in the state with an annual maximum Table A entitlement of 102,600 AFY. SBVMWD imports SWP water into its service area and manages groundwater storage within the San Bernardino Valley area. Based on the Department of Water Resources State Water Project Delivery Reliability Report, the long-term average supply for SBVMWD by 2030 is estimated to be 60 percent of their Table A allocation unless the pumping restrictions in the Delta are lifted. To optimize its imported water supply, SBVMWD is attempting to increase the amount of water it imports during wet years for direct delivery and artificial recharge. This stored wet year water can then be pumped during the dry years.

SBVMWD is developing a storage program to help meet direct delivery demands during SWP shortages. The current storage program includes the DWR Carryover Storage Program, the Yuba Accord, the DWR Dry Year Water Transfer Program, storage in the Kern-Delta water bank, and storage in Big Bear Lake.

Development and reuse of recycled water is at its infancy in this region and is projected to increase steadily over the next two decades (2010 Regional UWMP - SBVMWD).

The Cities of San Bernardino and Colton joined together and developed the 41 MGD Rapid Infiltration/Extraction (RIX) process to treat un-chlorinated secondary effluent prior to ultraviolet (UV) light disinfection for tertiary treatment and discharge to SAR. Currently, RIX discharges all of its product water (approximately 33 MGD) to the SAR. RIX is obligated to provide 16,000 AFY for downstream purposes to meet the 15,250 AFY SAR "base flow" obligations. However, there is local interest to use RIX discharge for direct groundwater recharge and non-potable demands.

Yucaipa Valley Water District (YVWD) has an 8 MGD recycled water plant which has microfiltration filters and ultraviolet (UV) light for disinfection. YWVD Regional Water Recycling Facility discharges about 1,000 AFY of recycled water into the San Timoteo Creek. YVWD is considering construction of reverse osmosis membrane treatment at its Yucaipa Valley Regional Water Filtration Facility for the treatment of imported water supplies in compliance with the basin plan objectives set by the RWQCB. In order to dispose of the brine flow, YVWD constructed a 15-mile brineline to connect to the existing IEBL pipeline in San Bernardino. YVWD has adopted planning guidelines requiring the use of recycled water for front and rear yard irrigation of new development in its service area, and has developed a dual distribution system of potable and recycled water to convey recycled water (2010 Regional UWMP - SBVMWD).

The City of Redlands supplies recycled water to Southern California Edison’s Mountain View Power Plant for its cooling water. City of Redlands expects to produce 8,015 AFY of recycled water by 2030 and is evaluating the potential of providing recycled water to the City of Loma Linda (2010 Regional UWMP - SBVMWD). Recycled water facilities are not currently available in the City of Colton's service area; construction of such facilities is cost prohibitive and the City has no plans to reuse recycled water in the area at this time (2010 Regional UWMP - SBVMWD). The City of Rialto is updating its Recycled Water Master Plan and is investigating the expansion of its existing tertiary treatment plant and reclaimed water system as a way to supplement the City's water supply. Beaumont-Cherry Valley Water District is upgrading its Waste Water Treatment Plant from 2 MGD to 4 MGD. The District is currently discharging

this water to Cooper Creek, but is planning to use a portion of its recycled water in the future. Fontana Water Company and City of Fontana are planning the construction of a facility that will produce 5,000 AFY of recycled water for distribution; while Big Bear Valley Recycled Water Master Plan emphasizes on groundwater recharge (2007 Upper Santa Ana River Watershed Integrated Regional Management Plan).

Approximately 60 percent of this region's supply is from groundwater, 70 percent of which is from the San Bernardino Basin Area (SBBA). The SBBA was adjudicated by the 1969 Judgment. This Judgment established a natural safe yield of 232,100 AFY; SBVMWD agencies are allowed 167,238 AFY and Riverside County agencies receive 64,862 AFY of the safe yield (2010 Regional UWMP - SBVMWD).

SBVMWD and WMWD share a long history of working together on water supply issues; both agencies are members of the Watermaster Committee for the OC Judgment and they are the two-member Watermaster Committee for the 1969 Judgment.

Liquefaction in the Pressure Zone remains a major threat. The City of San Bernardino has a very high water table and experiences high pressure; at times wells have become artesian and damaged property in the area. An agreement among groundwater producers in the Pressure Zone to maximize production from this area during high groundwater level conditions is desirable. Additional facilities may be required to produce and convey large quantities of groundwater from the Pressure Zone for use outside of this area (2007 Upper Santa Ana River Watershed Integrated Regional Management Plan).

SBVMWD and San Bernardino Valley Water Conservation District (SBVWCD) are primarily the agencies in charge of groundwater recharge. Conjunctive use projects may be feasible with construction of additional recharge basins, wells, pipeline facilities; so long as the projects comply with terms and conditions of the 1969 Judgments, and various decrees and agreements (2010 Regional UWMP - SBVMWD).

Bunker Hill groundwater basin is estimated to have 6 million AF of storage capacity; with a recharge efficiency rate of 95 percent (2007 Upper Santa Ana River Watershed Integrated Regional Management Plan).

In 2010, SBVMWD and Western Municipal Water District (WMWD) received two permits from the State Water Resources Control Board (SWRCB) to divert Santa Ana River water downstream from Seven Oaks Dam. The yield from these two permits is estimated to be up to 200,000 AF in wet years, with an average annual yield of 10,800-27,000 AF. Additional infrastructure for capturing and utilizing this local stormwater is required. SBVMWD has completed CEQA and 60 percent design for the first phase of these facilities.

The City of Redlands has surface water rights to approximately 15,000 AFY from the Mill Creek and SAR. The current use of this water by the City is limited to its treatment capacity. Fontana Water Company as an agent for Fontana Union Water Company diverts water from Lytle Creek. During normal years, West Valley Water District (WVWD) uses up to 5,500 AFY from Lytle Creek surface flows and projects using a minimum of 2,130 AFY during extended drought periods. East Valley Water District (EVWD) has water

rights for 4,500 AFY of SAR water, with the ability to expand to 7,300 AFY through the conversion of remaining agricultural properties and water shares of stock through the North Fork Mutual Water Company (2010 Regional UWMP - SBVMWD).

Nine agencies in the area have an "exchange agreement" that allows them to exchange SWP, SAR, and Mill Creek water through simultaneous and deferred exchanges for the benefit of each party (2010 Regional UWMP - SBVMWD).

The San Gorgonio Pass Water Agency (SGPWA) may have a shortage of about 17,500 AFY by 2030. During multi-year drought periods, this shortage could increase to 26,700 AFY. This shortfall can be overcome by reducing demands and/or purchasing additional water supplies (2007 Upper Santa Ana River Watershed Integrated Regional Management Plan).

The agencies in the San Bernardino County have difficulty achieving adequate local funding. A major constraint in implementing many of the projects in this region is lack of financial capacity and funding availability. Many of the local communities are economically disadvantaged and may not be able to finance costly projects.

The water agencies in this region are concerned about expansion of the critical habitat area for the Santa Ana Sucker fish, which could impact water allocation, water use, and recharge efforts along the SAR. In October 2012, several water agencies in this region lost a court battle when the federal district judge allowed for the expansion of the critical habitat of the Santa Ana Sucker in upstream areas of the SAR. The agencies are appealing this court decision.

Management Activities Between Colton and Prado Dam

The main stem of the SAR extends between the cities of Colton and Corona. Temescal Creek also flows into the Prado dam in Corona. The main regional water agency in this area is Western Municipal Water District (WMWD) serves the western portion of Riverside County (**Figure 5.10-1**) including nine water purveyors in its jurisdiction 1) Box Springs Mutual Water Company, 2) City of Corona, 3) City of Norco, 4) City of Riverside, 5) Eagle Valley Mutual Water Company, 6) Elsinore Valley Municipal Water District, 7) Lee Lake Water District, 8) Rancho California Water District, and 9) Jurupa Community Services District.

WMWD receives treated imported water through MWD's Mills and Skinner Water Filtration Plants (WFPs); the untreated imported water is delivered through MWD's Lower Feeder. Demand for imported water within the WMWD area is expected to increase from 104,000 AFY in 2010 to 208,000 AFY by the year 2040 (2008 Updated IRWM Plan - WMWD).

Imported water from MWD accounts for 33 percent of total water demands in the WMWD area and is expected to comprise 35 percent of total water demand by 2030 (2008 Updated IRWM Plan - WMWD). WMWD recognizes the importance of a collaborative relationship with MWD and expects to receive 100 percent of its imported water needs from MWD. Even though WMWD is counting on the imported water from MWD, there are concerns over salinity, bromide, and organic carbon concentration levels of the imported water (2008 Updated IRWM Plan - WMWD).

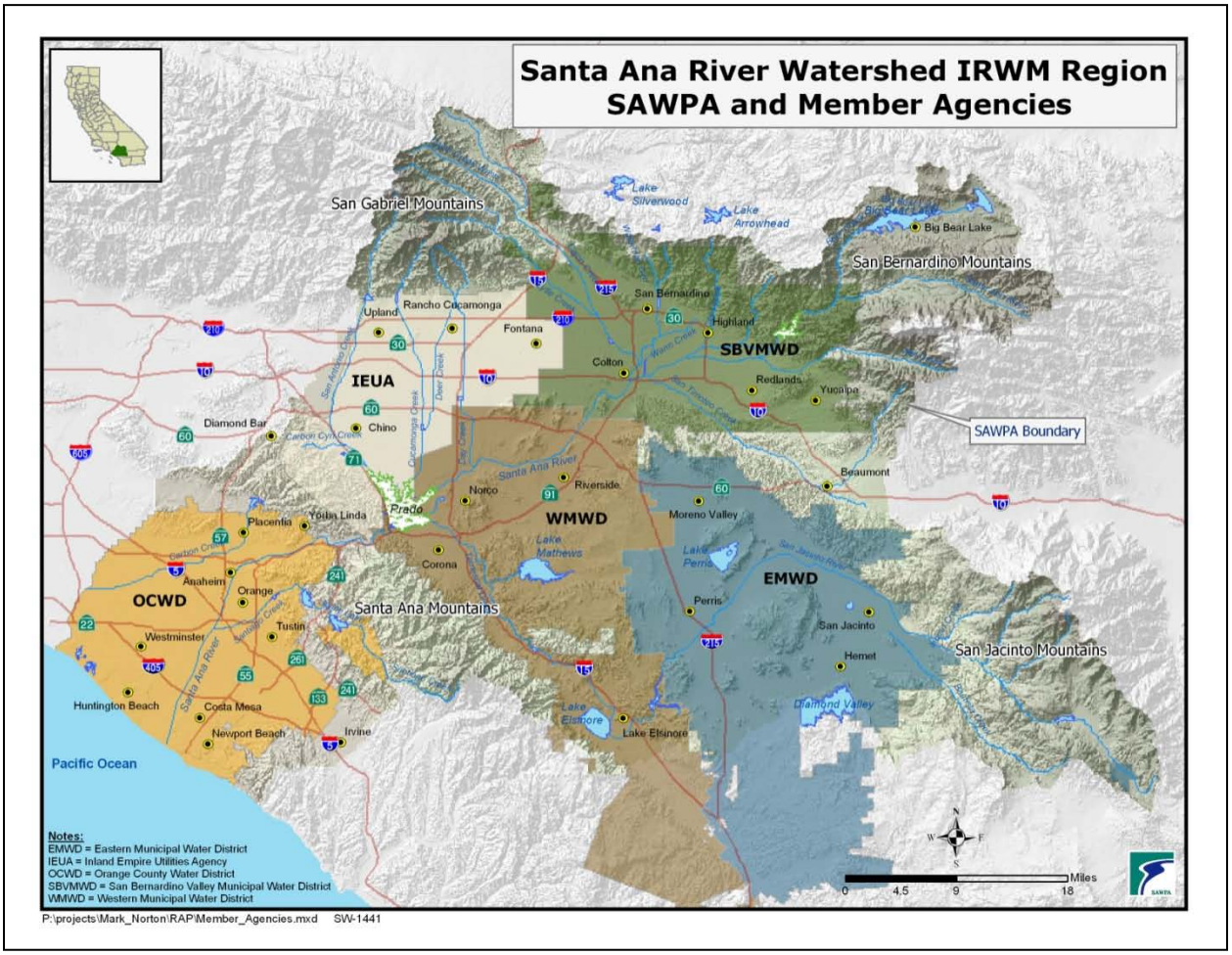
WMWD's Ordinance 377 requires customers to use recycled water where this resource is available and can be properly used (2010 UWMP Update - WMWD). Recycled water use in 2005 accounted for 9,100 AFY (3 percent of total water demands in 2005) within the WMWD area. The use of recycled water is expected to increase to 59,600 AFY by 2030, which represents about 12 percent of the total demands in 2030 (2008 Updated IRWM Plan - WMWD). WMWD is interested in expanding the current recycled water treatment capacities and reuse this resource for recharge into the groundwater basins (2010 UWMP Update - WMWD).

Groundwater continues to be the primary water supply source available to WMWD and agencies within its jurisdiction. The largest city in this region is the City of Riverside, which receives less than 5 percent of its supply from WMWD (2010 UWMP Update - WMWD), and its remaining supply from Bunker Hill, Riverside North, and Riverside South groundwater basins (2010 UWMP - City of Riverside). Groundwater is expected to meet 252,000 AFY of demands by 2025 which is approximately 54 percent of the 2025 total water supply (2008 Updated IRWM Plan - WMWD). WMWD is interested in expanding its groundwater production capacity in the vicinity of the March Air Reserve Base (2010 UWMP Update - WMWD). WMWD is a member of the Chino Desalter Authority, and this membership gives WMWD access to treated Chino Basin groundwater (2010 UWMP Update - WMWD). Future expansion and use of the groundwater resources may require additional treatment and/or desalination which are subject to availability of brine disposal facilities (2008 Updated IRWM Plan - WMWD).

In 2010, WMWD and SBVMWD received two permits from SWRCB to withdraw water from the SAR. These permits are issued based on the surface water that can be made available from the Seven Oaks Dam facilities (2010 UWMP Update - WMWD). WMWD is interested in storing excess stormwater runoff, SAR water, and SWP water in the San Bernardino Groundwater basin (2010 UWMP Update - WMWD).

WMWD has been proactive in developing its regional water shortage contingency plan and has a Water Conservation and Supply Shortage Program. WMWD has implemented a tiered-rate billing system and Staff is focused on reducing land use irrigation water consumption through the District's Water Use Efficiency Master Plan (2010 UWMP Update - WMWD).

Figure 5.10-1 Different Geographical Regions within the Santa Ana River Watershed



Management Activities within the San Jacinto Watershed

San Jacinto Watershed extends from San Jacinto Mountains to Canyon Lake. The water from San Jacinto River flows into Canyon Lake and to Temescal Creek. The main regional agency serving the San Jacinto Watershed is Eastern Municipal Water District (EMWD). This region includes four water purveyors 1) Lake Hemet Municipal Water District, 2) City of Hemet, 3) City of San Jacinto, and 4) City of Perris. Population in the EMWD service area is expected to grow by 75 percent in the next 25 years (2011 IRP - EMWD).

EMWD receives treated imported water through MWD's Mills and Skinner WFPs; the untreated imported water is delivered though several MWD connections with EMWD. EMWD receives approximately 80 percent of its potable water supply from MWD (2011 IRP - EMWD). EMWD is concerned about its imported water supply because MWD's reliability buffer for retailers is predicated on finding a solution to the Delta issues within the next ten to fifteen years. Other imported water concerns include persistence of drought in the Colorado River system, and water quality issues such as salinity, uranium, perchlorate, chromium VI, nutrients, N-Nitrosodimethylamine, and pharmaceuticals in the water supply from the Colorado River Aqueduct. MWD is making significant investments to its

infrastructure to improve supply and system reliability, and EMWD is concerned about the cost increases to the MWD member agencies as a result of these improvements (2011 IRP - EMWD).

MWD is facing regional treatment capacity shortages in the future. In 2007, MWD in cooperation with EMWD and WMWD completed an Integrated Area Study (IAS) and identified the need for a new filtration plant in the area. In addition, Mills WFP conveyance capacity for delivery of treated water to EMWD is limited, which requires significant transmission infrastructure upgrades (2011 IRP - EMWD).

To address some of the imported water concerns, EMWD has expanded local treatment of untreated MWD water, and with the cooperation of three of its purveyors has developed a groundwater replenishment program to reduce reliance on treated MWD water in its area (2011 IRP - EMWD)/ (2010 UWMP - EMWD).

EMWD is responsible for all wastewater collection and treatment in its service area and treated 46,500 AF of water in 2010. All of the wastewater collected in the EMWD service area is treated to tertiary standards, and EMWD has an extensive recycled water system for the use of its recycled water. EMWD's recycled water system includes four Regional Water Reclamation Facilities (RWRF), several recycled water unlined surface storage ponds, above ground storage tanks, and a distribution system that connects all of its RWRF's. EMWD has a mandatory recycled water use ordinance, which requires new and existing customers to use recycled water for appropriate permitted uses when available (2010 UWMP - EMWD).

EMWD reuses all of its produced recycled water during peak demand months (June-September). The demand during these months is higher than the recycled water that is produced, and supply is supplemented by recycled water that is stored during cooler, wetter parts of the year (October –May). During these months surplus recycled water is stored in unlined surface storage ponds, resulting in extensive groundwater recharge. Any surplus water that cannot be stored due to storage limitations is disposed through a regional outfall pipeline to Temescal Creek and Santa Ana River (2010 UWMP - EMWD).

EMWD intends to capture and reuse all of its future growth generated recycled water by constructing an Advanced Water Treatment Facility (AWTF) and recharging the product water into the San Jacinto groundwater basin (2011 IRP - EMWD). Such a project requires significant capital investment, a significant outreach program to overcome regulatory and local acceptance hurdles, and additional capacity in the brine disposal facilities.

EMWD produces potable groundwater from two management plan areas in the San Jacinto Watershed, the West San Jacinto Groundwater Basin Management (WSJGM) area, and the Hemet/San Jacinto Water Management (HSJWM) area. The groundwater produced from the WSJGM area is brackish and requires treatment. EMWD operates two desalination plants in the WSJGM area to convert brackish groundwater into potable water (2010 UWMP - EMWD).

The groundwater from the HSJWM area is of potable quality, but the basins are overdrafted. The overdrafted conditions caused a prolonged litigation against EMWD and MWD, by the Soboba Band of Luiseño Indians, and a settlement that was signed in 2006. Under this settlement, the local purveyors in the HSJWM area are required to develop a management plan for the HSJWM area; and for thirty years MWD is obligated to deliver 7,500 AFY for groundwater replenishment. The HSJWM Plan activities will be coordinated by a Watermaster who is responsible to overcome the chronic groundwater overdrafts in the HSJWM area (2010 UWMP - EMWD). The Watermaster in collaboration with EMWD will be responsible for operating the HSJWM groundwater basins within their safe yield limits; recharge groundwater basins with imported water; and use EMWD's San Jacinto River flow diversion rights of 5,760 AFY for recharge of the HSJWM groundwater basins.

As part of compliance with SBX7-7 legislation, EMWD implemented a budget based tiered rate program for its retail residential and landscape customers. Each customer account has a monthly budget based on the number of persons in the household and the irrigation landscape area. The conservation programs being implemented by EMWD are expected to conserve 19,200 AFY of water by 2035 (2010 UWMP - EMWD).

High reliance on imported water and its associated challenges have caused EMWD to pay particular attention to improving water supply reliability within its service area. EMWD is continuously looking at programs such as conservation, desalination, budget based tiered rate billing structure, recycled water use, urban stormwater runoff harvesting, groundwater recharge, and water transfers to improve its water supply reliability.

Management Activities within the Chino Basin Area

This region extends from San Gabriel Mountains to Prado Dam. The two main regional agencies serving this area are Chino Basin Watermaster (CBWM) and Inland Empire Utility Agency (IEUA).

Activities Within The Chino Basin Watermaster Area

The Optimum Basin Management Plan (OBMP) for the Chino Basin is a major strategic planning in the CBWM area which was prepared by the IEUA and CBWM to address groundwater quality problems and identify groundwater management opportunities. The OBMP objective is to develop cost-effective, reliable, potable water supplies, enhance and protect the yield and quality of the Chino groundwater basins; while minimizing demand for imported water and encouraging the use of the large available storage space in the aquifer system. The OBMP provides the framework for cooperative groundwater management program development among agencies in the Chino groundwater basins. To facilitate implementation of the OBMP, an agreement (the "Peace Agreement") was signed by Watermaster, Inland Empire Utility Agency (IEUA), Western Municipal Water District (WMWD), and various other stakeholders in June of 2000. The OBMP does address the urban water management planning needs within the Chino groundwater basins through water quality treatment, groundwater recharge, groundwater desalination, and water recycling programs. In 2007, the original Peace Agreement was updated (Peace II Agreement) to redefine the future programs and actions required to implement the OBMP. In 2010, IEUA completed a Peace II subsequent Environmental Impact Report (SEIR) for the OBMP update.

The Peace II Agreement includes groundwater desalination which creates "Hydraulic Control" in the Chino groundwater basin. The Hydraulic Control ensures that the water management activities in the Chino groundwater basins will not impair the beneficial uses of the Santa Ana River downstream of Prado Dam.

Activities Within the Inland Empire Utility Agency Area

IEUA was originally formed in 1950 as the Chino Basin Municipal Water District and officially changed its name to IEUA on July 1, 1998, to reflect the change in the District's mission. IEUA provides imported water, wastewater management, and energy recovery/production services to a 242 square mile area in the southwest corner of San Bernardino County (see **Figure 5.10-1**). IEUA provides water and wastewater services to ten contracting agencies in its jurisdiction 1) City of Chino, 2) City of Chino Hills, 3) Cucamonga Valley Water District (CVWD), 4) City of Fontana, 5) San Antonio Water Company, 6) City of Ontario, 7) City of Upland, 8) Monte Vista Water District, 9) Fontana Water Company, and 10) City of Montclair. The IEUA service area population is expected to grow from 830,000 to 1,200,000 by 2035.

MWD has invested $2.7 million in a 100,000 AF Chino Basin groundwater conjunctive use program. MWD and IEUA are working together to expand this program by a minimum of 50,000 AF. This strategy will provide dry year water supplies for the Chino Basin and the SAR watershed (2010 UWMP - IEUA). In December 2012, the MWD Board eliminated their groundwater replenishment program.

Although IEUA has worked to reduce its reliance on imported water, due to increased demand, in six of the past ten years IEUA was required to purchase imported water at a higher cost (MWD's Tier 2 rate) (2010 UWMP - IEUA).

Since 2007, MWD Tier 1 and Tier 2 rates have increased 69 percent and 86 percent, respectively. Increasing rates in conjunction with the elimination of the replenishment program has caused IEUA and its member agencies to re-evaluate how the Chino Basin is operating. As a result, it is no longer economical for the groundwater users to overproduce the basin during dry years, and it is less expensive to purchase MWD's imported water at the Tier 1 rate as a direct import (2012-13 Operating and Capital Budget - IEUA).

Currently, IEUA produces about 60,000 AFY of recycled water from four recycled water plants IEUA reuses about 54 percent of its recycled water and discharges the remaining 36 percent of its recycled water into the SAR.

The Inland Empire Regional Composting Facility is a joint venture between IEUA and Los Angeles County Sanitation District. This facility uses biosolids from IEUA's anaerobic digesters (2010 UWMP - IEUA). IEUA's ultimate recycled water plan is for delivery of 93,000 AFY of recycled water from all four of its plants. As of 2012, the recycled water distribution pipeline network has been constructed at a cost of $250 million, and is expected to deliver 62,000 AFY for direct use and replenishment by 2035 (2010 UWMP - IEUA). Currently IEUA recharges 10,000 AFY into the Chino Basin; with plans to double the recycled water recharge within the next ten years.

Available recycled water supplies are projected to reach 83,000 AFY by 2035. The SAR judgment requires IEUA to discharge 17,000 AFY into the SAR. This leaves approximately 66,000 AFY of recycled water available for beneficial use within the IEUA service area by 2035 (2010 UWMP - IEUA).

The Chino Basin is the largest groundwater basin in the Upper Santa Ana Watershed. In 2010, Chino Basin groundwater provided the IEUA service area with 105,000 AFY of supply (60-70 percent of its water supply). Development and maintenance of the Chino Basin are critical for the supply reliability in the region. Chino Basin groundwater production is expected to reach 170,000 AFY by 2035(2010 UWMP - IEUA).

The 1978 Chino Basin Judgment adjudicated water rights in the Chino Basin and formed the Chino Basin Watermaster (CBWM). The Judgment set the safe-yield at 145,000 AFY, but an additional 40,000 AFY of desalted groundwater can be produced via three desalters under the CBWM's OBMP. These desalters use a combination of reverse osmosis and ion exchange technology to treat the pumped groundwater. Salt balance is a major issue for the Chino Basin and the SAR Watershed as a whole. Depletion of groundwater reserves, undesired water quality, contravention of existing water rights, excessive increases in production costs, streamflow depletion, and subsidence are other factors that affect the Chino Basin water supplies. In 2005, CBWM, IEUA, OCWD, and the RWQCB developed a hydraulic control monitoring program to characterize the relationship of the SAR and the Chino Basin. Information from this program is used to adaptively manage the Chino Basin's storage and recovery activities (2010 UWMP - IEUA). The Chino Basin is a valuable resource for water transfers in the SAR Basin because of its ability to store vast quantities of water, and has storage capability of up to 6 million AF (2010 UWMP - IEUA).

In 2002, CBWM, Chino Basin Water Conservation District (CBWCD), San Bernardino County Flood Control District (SBCFCD), and IEUA formed a joint committee to implement the Chino Basin Facilities Improvement Project (CBFIP). Improvements to the Chino Basin groundwater recharge will substantially increase the replenishment of the groundwater basin through a combination of storm water, recycled water, and imported water. This project is designed to maximize the use of uninterruptible supplies when available (2010 UWMP - IEUA). IEUA is the lead agency for implementation of the CBFIP which has constructed and improved 19 recharge sites with a total potential recharge capacity of 110,000 AFY(2012-13 Operating and Capital Budget - IEUA).

Changes in the environmental regulations, the GHG emission legislation, and other legislations can significantly impact energy programs and costs. As a result, IEUA has adopted a "Gridless by 2020" campaign, in which IEUA will meet 100 percent of its2020 energy needs with renewable energy sources (2012-13 Operating and Capital Budget - IEUA).

Population increase, combined with uncertain effects from climate change, have prompted IEUA management to alert its Board of Directors to the significant water management challenges that the area will be facing in the future (2010 UWMP - IEUA).

Management Activities within the Orange County Area

The SAR below Prado dam flows through Orange County and discharges into the Pacific Ocean. The main regional groundwater agency serving this area of the SAR Watershed is Orange County Water District (OCWD). The OCWD was formed in 1933 to manage and protect the Orange County groundwater basin (**Figure 5.10-1**). OCWD encompasses 350 square miles in the lower SAR Watershed serving more than 2.4 million people and providing water supply to thirteen cities and six water districts.

Total water demand within OCWD's boundary is about 480,000 AFY (2009 Update GWM Plan - OCWD). Total demand includes the use of groundwater, surface water from Santiago Creek and Irvine Lake, recycled water, and imported water (2009 Long-Term Facilities Plan - OCWD). The groundwater basin managed by OCWD provides up to 75 percent of the water needed within OCWD's boundary. Municipal Water District of Orange County (MWDOC) has estimated total water demands within OCWD's boundary in 2035 to be 558,000 AFY (2010 UWMP - MWDOC).

MWDOC and the cities of Anaheim, Fullerton, and Santa Ana are members of MWD and can import water directly from MWD. Since 2004, OCWD, MWDOC, and participating producers in the region have participated in MWD's Conjunctive Use Program. The existing MWD storage program provides for MWD to store up to 66,000 AF of water in the basin in exchange of MWD's contribution to improvements in basin management facilities (2010 UWMP - MWDOC).

Water managers in Orange County are very concerned about the increasing cost of the imported water due to endangered/threatened species in the Delta, drought along the Colorado River, and reduced water sales by MWD.

The Orange County Sanitation District (OCSD) is the regional wastewater management agency for 21 cities, three special districts, and a portion of the unincorporated county areas. The OCSD treats 210 MGD of wastewater at its two treatment facilities in Huntington Beach and Fountain Valley. OCWD receives secondary treated wastewater from OCSD and treats it to a pristine level at the Groundwater Replenishment System (GWRS) before recharging it into the groundwater basin. GWRS can currently produce up to 72,000 AFY (2009 Update GWM Plan - OCWD). The system can be expanded to a total of 120,000 AFY in two phases (2009 Long-Term Facilities Plan - OCWD).

Since 1965, Los Angeles County Flood Control District (LACFCD) and OCWD have been jointly operating injection wells in the Alamitos and Talbert Barriers to control the seawater intrusion into the Orange and Los Angeles Counties. Controlling seawater intrusion into the groundwater basin is critical to protecting the water quality of groundwater in the region. GWRS provides water for the Talbert Barrier injection wells in addition to recharge water for the Anaheim surface water recharge facilities. Approximately 34,000 AFY (30 MGD) of injection is used at the Talbert Barrier to substantially raise water levels, an amount sufficient to fully prevent seawater intrusion. Talbert Barrier may require up to 45 MGD of injection to meet the projected 2020 conditions (2009 Update GWM Plan - OCWD).

OCWD owns and operates a network of recharge facilities that cover over 1,500 acres in addition to the 2,150 acres that it owns above Prado Dam (used for conservation and water quality improvement).

OCWD has two diversion permits from the SWRCB for diversion and use of up to 362,000 of SAR water, and collection and storage of 33,560 AFY from Santiago Creek. OCWD utilizes the permitted diversions from the SAR and Santiago Creek to maximize recharge of the groundwater basin. SWRCB has also agreed to hold an additional 143,000 AFY in abeyance for OCWD for possible future projects. This provides an opportunity for OCWD to pursue long-term projects and complete environmental analysis and planning of those projects by 2023.In its Long-Term Facilities Plan (2009 Long-Term Facilities Plan - OCWD) OCWD identified potential projects for recharge enhancement, including sediment removal from SAR; new injection wells to recharge GWRS water in the basin; subsurface recharge galleries to recharge more GWRS water; and cooperation with the County of Orange to recharge at Fletcher Basin-area.

The groundwater basin's primary source of water is the OCWD recharge activities in and adjacent to the SAR and Santiago Creek. The SAR bed percolation rate has been declining by approximately one percent per year for the last 20 years due to the coarsening of the riverbed. In addition, invasive and pervasive plant species, such as Arundo Donax, prohibit maximize flow in the SAR and Prado dam areas. OCWD is able to recharge essentially all non-storm flow in the SAR that enters the OC through Prado Dam; however, stormflows exceed the diversion capacity during years of heavy precipitation. During wet years, there is a significant loss of water to the ocean. Maximum percolation at the recharge facilities is estimated at 500 cubic-feet per second (cfs), while the rate of stormflow can reach 3,000 cfs. In 1997-98 alone, approximately 270,000 AF of SAR stormflow were lost to the ocean (2009 Update GWM Plan - OCWD).

OCWD has legal rights to a minimum of 42,000 AFY of SAR baseflow (defined as “perennial flows from the upper watershed” in SAR which is predominantly treated wastewater). Over the last 10 years, the SAR provided approximately 200,000 AFY of water to Orange County (150,000 AFY of baseflow and 50,000 AFY of stormflow) to recharge the groundwater basin (2009 Long-Term Facilities Plan - OCWD).

OCWD has developed an extensive groundwater modeling, monitoring, and tracking system; and has comprehensive sub-surface geology, and water quality data for the region. OCWD estimates the entire groundwater storage capacity in the region to be 66,000,000 AF. In 2009, OCWD estimated the inflows to the groundwater to be approximately 341,000 AF (with 235,000 AF at the Forebay recharge facility, 35,000 AF at Talbert Gap, 2,500 AF at Alamitos Gap, and 69,000 AF of other recharge). This inflow is balanced with groundwater production of 335,000 AF and subsurface outflow of 8,000 AF (2009 Update GWM Plan - OCWD).

The GWRS provides a dependable supply of water and is expected to remove approximately 47,000 tons of salt per year. In addition, Tustin and Irvine desalters remove and treat impaired groundwater in the region (2009 Update GWM Plan - OCWD). MWDOC has identified several projects in the area that would double impaired groundwater production. However, these projects will require additional replenishment water for their implementation (2010 UWMP - MWDOC).

To control nitrate levels, OCWD operates 350 acres of wetlands in the Prado Basin to naturally remove nitrates before they enter recharge facilities. In addition, OCWD is interested in developing more wetlands above the Prado Dam at Chino Creek (Prado Basin area), River Road (to treat SAR baseflow

that is not diverted to the existing Prado wetlands), Temescal Creek, and Mill Creek (proposed by the City of Ontario) (2009 Long-Term Facilities Plan - OCWD).

Development and implementation of water use efficiency programs to assure 20 x 2020 compliance and establishing water use efficiency is considered as a main source for water resources mix in Orange County by the MWDOC Strategic plan. One of the key strategies identified by MWDOC is increasing Orange County's water supply from non-local sources. MWDOC plans to assist member agencies with water transfers and exchanges and would like to be proactive in identifying and screening innovative, non-local water supply. Irvine Ranch Water District (IRWD) worked with MWD and MWDOC to develop the IRWD Strand Ranch Integrated Banking Project that allows for recharge, storage and recovery of 50,000 AF of SWP water in Kern County. Another MWDOC objective is to build coalitions in support of developing ocean desalination as a component of the water resources strategy for Orange County.

Concerns within this region includes:

- Decreases in baseflows reaching Prado Dam caused by several factors including increased recycling in the upper SAR basin
- Protecting groundwater quality from industrial contamination and other potential sources of contamination
- Declining flows in the SAR and tributaries to the SAR impacting natural resources in the watershed
- Changes in the amount of inflow to OCSD that could affect supplies for the GWRS
- Continuation of drought conditions impacting the MWD supply reliability
- Availability of imported water to replenish the groundwater basin
- Maintaining the quality of water in the SAR that is the source water for recharging the Orange County groundwater basin

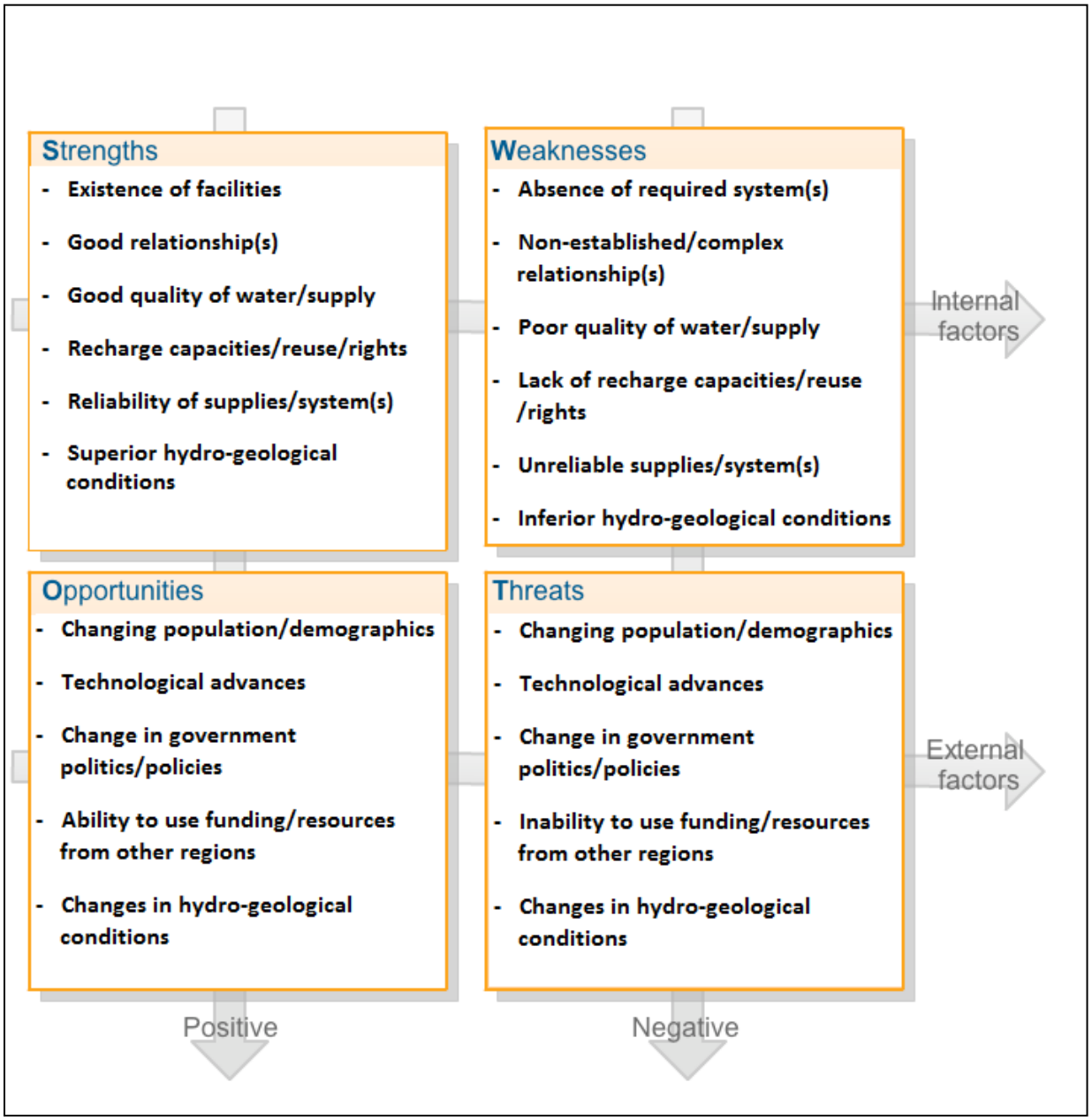
Water agencies within the Orange County recognize the importance of a collaborative relationship with the agencies in the upper SAR watershed and have historically entered into agreements with these agencies for excess water that the agencies pump into the SAR and reaches Prado dam (2009 Update GWM Plan - OCWD).

Watershed Integration Nexus Analysis

By definition, Strengths (S) and Weaknesses (W) in a geographic area are considered to be internal factors over which water supply agencies have some measure of control. Also, by definition, Opportunities (O) and Threats (T) are considered to be external factors over which the agencies in a geographic region have essentially no control. SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats, and SWOT Analysis is the most renowned tool for analysis of the overall strategic position of a business and its environment. The key purpose of a SWOT analysis is to identify the strategies that will create a specific business model that will best align resources and capabilities to the requirements of the environment in which the business operates. Basic guidelines were set to categorize Strengths, Weaknesses, Opportunities, and Threats for each geographical area. These

guidelines (shown in **Figure 5.10-2**) provide a standardized approach in preparation of SWOT analysis for the entire watershed. A SWOT analysis, also called situational analysis, is usually used to evaluate the internal strengths and weaknesses of an organization and the external opportunities and threats to that organization.

Figure 5.10-2 SWOT Analysis Guidelines



However, in this report, a SWOT analysis is conducted to explore the strategies that have already been defined by SAR watershed stakeholders, in particular SAWPA member agencies, and identify the strengths and opportunities that can be developed by a cooperative planning effort amongst SAWPA member agencies. Such cooperative concepts can benefit from the integration of different resources,

facilities, and capabilities that currently exist within the watershed. The SWOT analysis used for this WIN study began with an examination of strengths and concerns identified in different geographical areas by SAR watershed agencies in their strategic documents, and the opportunities and threats are based on information gathered from the regional planning documents. The goal of the report is to provide a Watershed Integration Nexus (WIN) concept by utilizing SWOT analysis elements within different geographical regions of the SAR watershed in support of the OWOW program.

Using the SWOT analysis presented in this report, water managers can help the SAR watershed increase its internal strengths and reduce its internal weaknesses while augmenting external opportunities and reducing external threats.

The accuracy of a SWOT analysis is dependent upon the amount and source of data that are available. Any analysis with a lack of data may suffer from a biased viewpoint, and an incorrect hypothesis may be formulated that would corrupt the sole purpose of the analysis. In order to validate the accuracy of data and information related to a particular geographical area, several meetings with the SAWPA member agencies' strategic planners were conducted. **Table 5.10-1** through **Table 5.10-5** summarizes the SWOT analysis results for different geographical areas. These summary tables were prepared based on information provided in Section 4 of the report, which were validated by SAWPA member agencies' strategic planners.

The SWOT analysis is instrumental in strategy formulation and is a strong tool, but it involves a great subjective element. The analysis provided in this report is intended as a guideline and not as a prescription. Regional water managers in different geographical regions can use the SWOT analysis summaries in **Table 5.10-1** through **Table 5.10-5** capitalize on their regional strengths, and collaborate with agencies in other geographical regions to overcome weakness and external threats to their specific region.

Table 5.10-1 SWOT Analysis Summary for the Upper Santa Ana River Portion of the Watershed

Strengths	Weaknesses	Opportunities	Threats
SBVMWD permits to divert Santa Ana River Water	Lack of a mature recycled water reuse program in the region	Construct additional recharge facilities to capture recently permitted diversions	Liquefaction threat if groundwater levels rise within 50 feet of land surface
Most of the watershed's runoff flows through this region	Conjunctive use opportunities limited to around 40,000 acre-feet due to potential for high groundwater in San Bernardino	Increase stormwater capture through "Active Recharge" and "Rubber Dam" projects	Many of the local communities are economically disadvantaged and unattractive to potential companies for economic growth
Stored water in Kern-Delta and Big Bear Lake to supplement direct delivery needs in dry years	Good quality groundwater preservation requires expensive AWTF of recycled water for groundwater recharge	Optimize the effectiveness of existing recharge operations and build additional recharge facilities so that SBVMWD can import SWP in wet years	Expansion of the critical habitat area for the Santa Ana Sucker, and its interference with regional water management efforts
The region has an estimated groundwater capacity of 5 million acre-feet	Projected supply shortage in the SGPWA area	Regional access to the Inland Empire Brine Line (IEBL)	Environmental needs in the Delta impacting imported supplies to the SAR watershed
SBVMWD is the fifth largest of the 29 water contractors in the state		Dewatering plan should high groundwater return	Meeting demands during droughts
Maximizing imported water during wet years through Cooperative Recharge Program		Improve the local economy by attracting pharmaceutical and other businesses that need a brine line	
Collaborative water management through the Basin Technical Advisory Committee (BTAC)			
Having the Rapid Infiltration/Extraction (RIX) project permits/process.			

Table 5.10-2 SWOT Analysis Summary for Area Between City of Colton and Prado Dam

Strengths	Weaknesses	Opportunities	Threats
WMWD collaborative relationship with MWD and its involvement in the IRP Process	Expansion and use of the groundwater requires additional treatment and/or desalination	Planning for expansion of recycled water use in the area	Significant future demand increase in the region due to rapid population growth and urban development
Participation in different Task Force activities to resolve regulatory issues with RWQCB		Ability to store excess stormwater runoff, SAR water, and SWP water, in the San Bernardino Groundwater basin	Climate change altering hydrologic conditions impacting imported supplies to the SAR watershed
Ability to address concerns within the SAR Watershed through collaborative approach amongst stakeholders (Members of SAWPA)		WMWD has a temporary permit from SWRCB to receive surface water from Seven Oaks Dam	Concerns over salinity, bromide, and organic carbon concentration levels of the imported water
Ability to receive treated imported water from two WFP (MWD's Mills and Skinner WFP)		Access to the IEBL for brine disposal	Restrictions on SWP and Colorado River operation
Reliance on imported water limited to 33 percent of total water demand in the WMWD area			Extensive MWD imported water rate increases in recent years
WMWD is a member of the Chino Desalter Authority with access to treated Chino Basin groundwater			
Long history of working relationship between WMWD and SBVMWD on water supply issues			
WMWD has implemented a tiered-rate water rate structure to improve water use efficiency in the area			

Table 5.10-3 SWOT Analysis Summary for the San Jacinto River Sub-watershed Area

Strengths	Weaknesses	Opportunities	Threats
Collaborative relationship with MWD and its involvement in the IRP Process	Reliance on imported water exceeds 80 percent of total potable water demand in the EMWD area	Development of a stipulated judgment to address the over drafted groundwater issues	Climate change altering hydrologic conditions impacting imported supplies to the SAR watershed
Participation in different Task Force activities to resolve regulatory issues with RWQCB	Reuse all of future generated recycled water requires construction of AWTF	Existence of a comprehensive conservation program in the area	Significant future demand increase in the region due to rapid population growth and urban development
Ability to address concerns within the SAR Watershed through collaborative approach amongst stakeholders	Need for significant transmission infrastructure upgrades, and future regional treatment capacity shortages at the Mills WFP	Regional access to the Inland Empire Brine Line (IEBL)	Restrictions on SWP (finding a solution to the Delta issues within the next ten to fifteen years) and persistence of drought in the Colorado River system
Ability to receive treated imported water from two WFP (MWD's Mills and Skinner WFP)	Over drafted groundwater basins in the area		Extensive MWD imported water rate increases in recent years
Existence of a groundwater replenishment program to reduce reliance on treated MWD water			
Having a budget based tiered rate program			
Existence of an extensive recycled water system in the area			
Existence of desalination plants to treat and use the brackish groundwater in the area			
Expanded local treatment of untreated MWD water			
Availability of tertiary treated recycled water in the area			

Table 5.10-4 SWOT Analysis Summary for the Chino Basin Area

Strengths	Weaknesses	Opportunities	Threats
Collaborative relationship with MWD and its involvement in the IRP Process	Operational, capacity and permitting limitations to the recycled water recharge program	The SAR judgment requiring discharge of 17,000 AFY into the SAR (another 66,000 AFY of recycled water is available by 2035)	Climate change altering hydrologic conditions impacting imported supplies to the SAR watershed
Participation in different Task Force activities to resolve regulatory issues with RWQCB	Groundwater contamination	Regional access to the Inland Empire Brine Line (IEBL)	Extensive MWD imported water rate increases in recent years
Ability to address concerns within the SAR Watershed through collaborative approach amongst stakeholders	Procedural and legal constraints due to the Adjudication	Having CBWM and a framework (OBMP) for cooperative groundwater management development	Significant future demand increase in the region due to rapid population growth and urban development
Implementing the OBMP to ensure the water management activities will not impair the beneficial uses downstream of Prado Dam		IEUA's "Gridless by 2020" campaign to meet 100 percent of its2020 energy needs with renewable energy sources	No longer economical for the groundwater users to overproduce the Chino Basin during dry years after the elimination of MWD's replenishment rates
Ability to use recycled water for irrigation, agriculture, commercial/industrial and groundwater recharge instead of imported water		Further expansion of conjunctive use type programs, to further manage imported and groundwater resources during wet and dry periods	Increase in groundwater production costs, streamflow depletion, groundwater contamination, and subsidence effect on the Chino Basin
Extensive investment in a major conjunctive use program			Restrictions on SWP and droughts in the Colorado River system
Chino Basin having up to 6 million AF of storage capability			Changes in the environmental regulations, the GHG Emission legislation, and other legislations

Table 5.10-5 SWOT Analysis Summary for the Orange County Area

Strengths	Weaknesses	Opportunities	Threats
Having good collaborative relationships with agencies in the upper SAR region	Need to control seawater intrusion into the groundwater basin, and using GWRS water for the Talbert Barrier	Groundwater production in 2035 will only be 7.5 percent more than the current production	Future demand increase in the region due to population growth and urban development
Ability to address concerns within the SAR Watershed through collaborative approach amongst stakeholders	Diversion capacity along the SAR is less than wet year stormflows (flow rates up to 3,000 cfs)	GWRS can be expanded to a total of 120,000 AFY	Restrictions on SWP and drought in the Colorado River system
Participation in different Task Force activities to resolve regulatory issues with RWQCB	Lack of sufficient replenishment water	OCWD has two diversion permits from the SWRCB (up to 362,000 of SAR water, and 33,560 AFY from Santiago Creek)	Climate change altering hydrologic conditions impacting imported supplies to the SAR watershed
OCWD has legal rights to 42,000 AFY of perennial flows from the upper watershed (this is predominantly treated wastewater)		Extensive increase of recycled water reuse in the region from current 85,000 AFY to 135,000AFY by 2035	Increased use of recycled water in the upper SAR basin (decreases base flows reaching Prado Dam)
GWRS provides a dependable supply of water and treats up to 72,000 AFY for recharge into the groundwater basin		SWRCB has agreed to hold 143,000 AFY in abeyance for OCWD for possible future projects	Decline in baseflow due to upper basin recycling projects and other factors
450 acres of wetlands naturally remove nitrates before SAR flows enter OC		Developing additional recharge capability (recharge basins; new injection wells; and recharge galleries)	SAR bed percolation declining one percent per year for the last 20 years
OCWD owns and operates a network of recharge facilities that cover over 1,500 acre		Ability to develop ocean desalination as a component of the water resources strategy in the region	Arundo Donax prohibits maximum flows in the SAR to reach OC

(Continuation of Table 5.10-5 SWOT Analysis Summary for the Orange County Area)

Strengths	Weaknesses	Opportunities	Threats
GWRS removes up to 47,000 tons of salt per year		Potential for USACE/OCWD agreement to increase water conservation behind Prado Dam	Increased water demands within the region due to population growth
Cooperative relationship with other agencies in the region		Ability to recharge all non-storm SAR flows (max. percolation capacity is at 500 cfs)	USACE Prado stormwater releases at rates exceeding the region recharge capacity
Ability to use groundwater for more than 2/3 of the water needs in the area			The increasing cost of the imported water
IRWD Strand Ranch Integrated Banking Project allows for recharge, storage and recovery of 50,000 AF of SWP water in Kern County			Sediment accumulation behind Prado Dam reducing storage capacity
SAR provides approximately160,000 AFY (to groundwater basin in the region(110,000 AFY of baseflow and 50,000 AFY of stormflow)			Legal constraints affecting groundwater contamination remediation
OCWD has extensive knowledge of the groundwater basins in the region (groundwater modeling, monitoring, and tracking system; comprehensive sub-surface geology, and water quality data)			
The groundwater storage capacity in the region is estimated to be 66,000,000 AF			

Conclusions and Recommendations

The stakeholders within the Santa Ana River Watershed were asked how they would distribute future strategic planning funds in their geographical area using a standardized questionnaire. **Table 5.10-6** shows the different funding categories that were listed on the questionnaire, and **Figure 5.10-3** shows the responses received for four out of the five agencies participating in the process. The numbers shown on **Figure 5.10-3** correspond to categories list on **Table 5.10-6**.

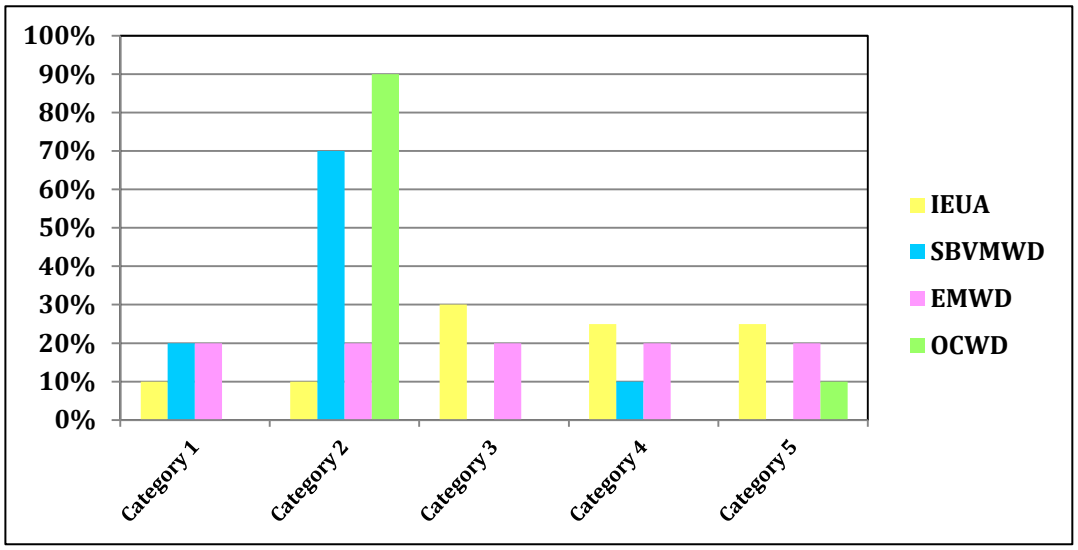
Table 5.10-6 Questionnaire Identifying Different Strategic Planning Funding Categories

Strategic Funding Categories	Category Nos. Used on Figure 5.10-3
Expand compliance with the SBx7-7 and implement projects that reduce per capita water usage by more than 20 percent by the year 2020.	**1**
Create/ Expand supply and system reliability during drought, emergency, and peak demand situations.	**2**
Create/Expand coordination with other agencies in the area and develop regional water management strategies that would increase conservation and local water supplies.	**3**
Create/Expand local recycled water reuse program(s) in the area.	**4**
Develop/Implement projects that protect groundwater resources and the environment.	**5**

It is interesting to note that the agencies at the most upstream and most downstream geographical areas of the watershed are more focused on creating and expanding supply and system reliability during drought, emergency, and peak demand situations (Category 2), whereas the interest of the agencies in the middle of the watershed is more distributed amongst the other categories listed on **Table 5.10-6**. The conceptual recommendations offered in this report are based on information presented.

The sections below provide brief discussion for these recommendations.

Figure 5.10-3 Future Strategic Planning Funding Priorities within Different Santa Ana River Watershed Geographic Area



Recommended Water Transfer Concepts

Based on the feedback received from strategic planners in different geographical regions, it is concluded that Watershed Integration Nexus (WIN) can be developed for two different water transfer concepts to improve operational efficiency in the watershed:

- Imported Water Transfer
- Recycled Water Transfer

Imported Water Transfer Concept

This concept allows an agency to take MWD imported water during wet years and store it in the groundwater basins within (or outside) its own geographic area. This concept requires an agency with groundwater storage rights (Storing Agency) to work with another agency looking at improving its water supply reliability (Consuming Agency) and coordinate their supply and demand activities within their respective geographical areas.

During the years that MWD stores water in its storage accounts such as the Semitropic Water Storage District and Kern County Water Bank, the Storing Agency receives imported water from MWD in-lieu of groundwater production; and the Consuming Agency pays MWD for the water delivered to the Storing Agency at the time of delivery.

During the years that MWD Board implements the Water Supply Allocation Plan (see section 3.2 for more detail on MWD's WSAP) and MWD withdraws water from its storage accounts, the Consuming Agency will receive additional imported water from MWD above its WSAP allotment while the Storing Agency receives a reduced WSAP allotment and increases its groundwater production to offset the reduced WSAP allotment. In addition, during the Dry Year period the Consuming Agency pays the Storing Agency a storage fee for the additional water it receives above its WSAP allotment from MWD.

At the present time, MWD staff is working with its member agencies to develop a Local Storage Program that is complementary with other storage programs and provide:

- Regional water management benefits
- Equity for MWD member agencies
- Financial integrity (program should not reduce the full service purchases in the year when the water is stored)
- Operational flexibility for MWD

Therefore, it is important for MWD to participate in further development of the imported water transfer concept in the SAR watershed, and MWD's willingness to allow for allotment exchange between the Storing and Consuming Agencies at a revenue neutral price to MWD.

This section quantifies a proposed imported water transfer project based on the imported water transfer concept.

Recycled Water Transfer Concept

This concept allows a geographical region to receive revenue for discharge of recycled water into SAR in-lieu of developing costly AWTF for treatment and use of recycled water in the same geographical region that the recycled water is generated. This concept requires the agency that discharges recycled water into the SAR (Discharging Agency) to coordinate with an agency with existing water purification facilities downstream of the discharge point (Consuming Agency). A good Consuming Agency candidate would be OCWD with its existing GWRS.

In this concept, the Discharging Agency will handle any salinity management regulatory requirements through mitigation at the Consuming Agency's geographical area. This would require the Discharging Agency to pay the Consuming Agency for the cost of any salinity mitigation at the point of treatment. In return, the Consuming Agency will pay for the water provided by the Discharging Agency. The revenues received by the Discharging Agency can be used to purchase imported water from MWD during Wet Years for recharge in the Discharging Agency's groundwater basins. This concept will improve operational efficiency and water supply reliability at both Discharging and Consuming Agencies' geographical areas. It is important for the SAR Watermaster to be involved in the development of this concept.

The section below quantifies a proposed recycled water transfer project based on the above described concept.

Recommended Water Transfer Projects

Defining the institutional, technical, legal, and financial aspects of the concepts outlined the sections below can be very complex and would require close coordination between different stakeholders involved in a particular project benefiting from a particular concept.

The implementation of such projects requires economic studies to define benefits for specific agencies that can participate in each concept, and cooperation between agencies in different geographical areas to jointly prepare project specific implementation plans.

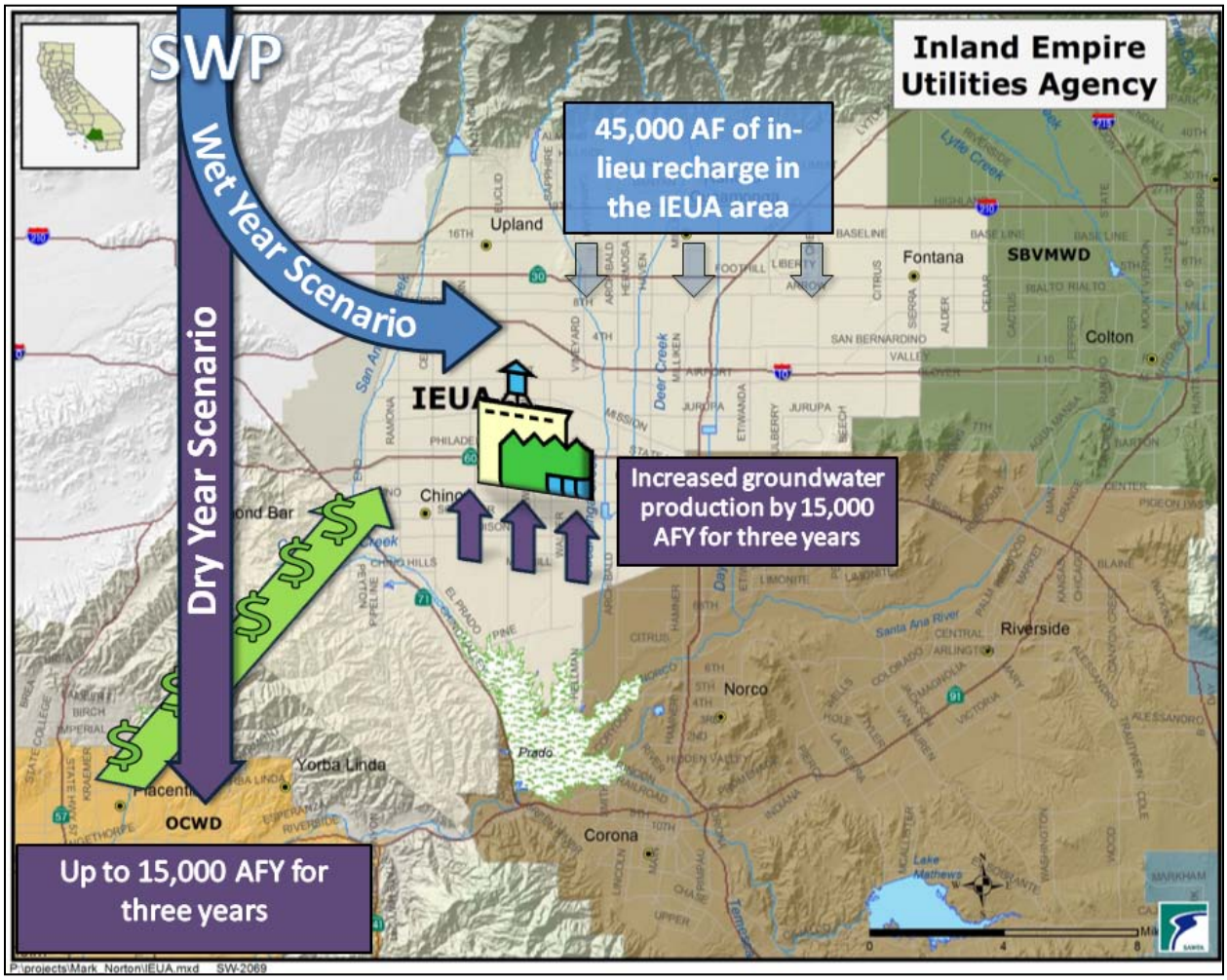
The sections below provide basic quantification for two potential projects that can be implemented based on the concepts outlined in this section.

Recommended Imported Water Transfer Project

Using Chino Basin storage capabilities as a resource to improve water supply reliability in Orange County is the basis for this recommended project. Inland Empire Utility Agency (IEUA) staff has indicated ability to use 45,000 AF of the Chino Basin storage during wet years, and groundwater production capacity of agencies within the Chino Basin to extract up to 15,000 AFY of additional groundwater during dry years. In addition, Orange County Water District (OCWD) is willing to discuss this potential project in more detail with IEUA.

This project concept would require OCWD member agencies to provide some (or all) funding for the purchase of up to 45,000 AF of imported water by the IEUA member agencies during wet years. It is important for MWD to provide the imported water at a rate that recognizes the benefits of MWD not storing the SWP water at one of MWD's own storage programs such as the Semitropic Water Storage District and/or Kern County Water Bank. During dry years, OCWD member agencies can request IEUA member agencies to increase their groundwater production for three years by up to 15,000 AF per year in-lieu of direct deliveries from MWD, while MWD increases deliveries in the Orange County area by an equal amount. Under this scenario, the net MWD deliveries during dry years (years that Water Supply Allocation Plan is implemented) will remain unchanged, without the need for MWD to produce water from its own storage accounts. At the same time, having the imported water stored in the SAR watershed will increase local supply reliability, and provide some financial incentive to both IEUA and OCWD member agencies. **Figure 5.10-4** shows the schematics for this project. Institutional, technical, legal, and financial details for this project need to be developed by interested agencies within the Chino Basin and Orange County areas.

Figure 5.10-4 Recommended Imported Water Transfer Project



Recommended Recycled Water Transfer Project

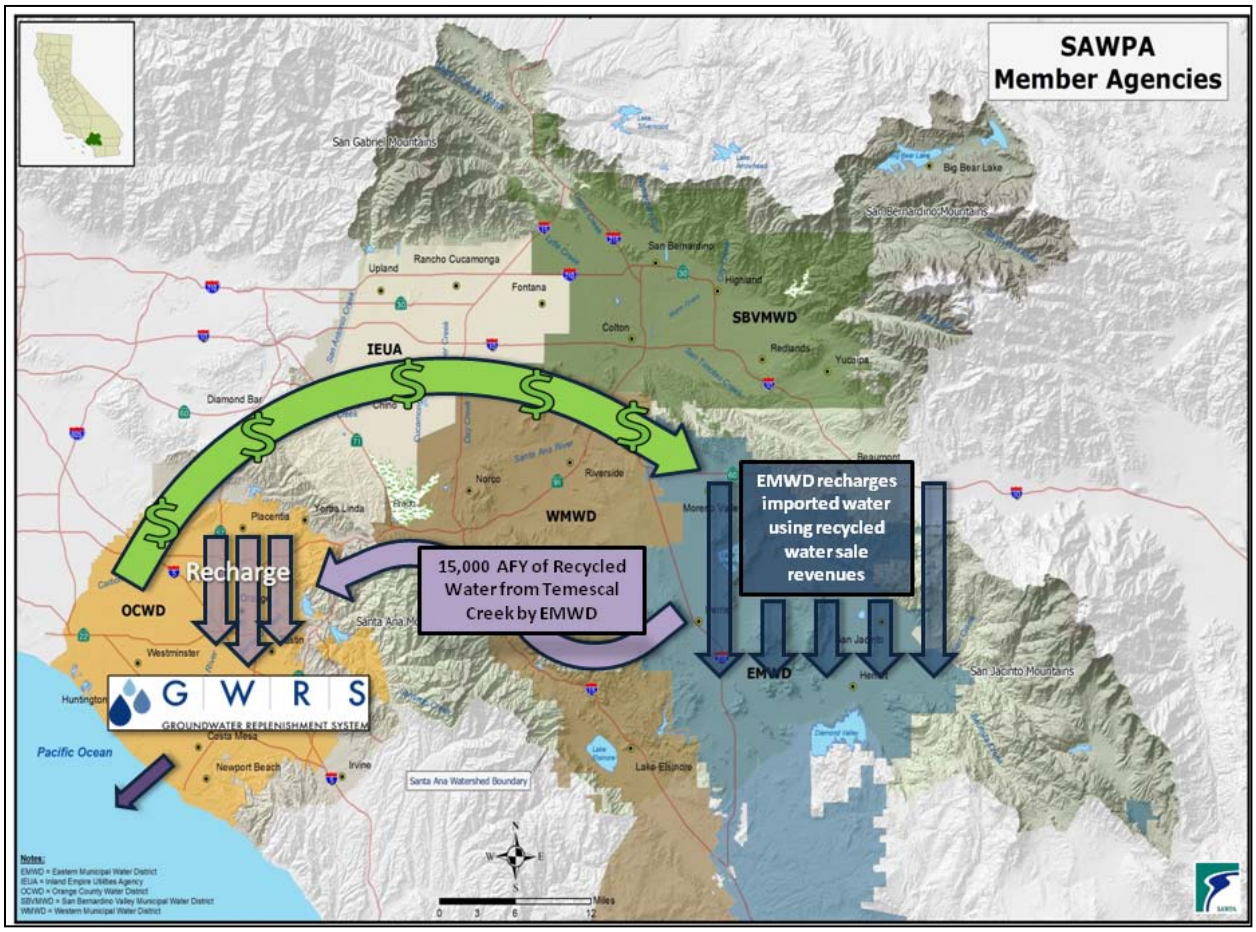
EMWD has the capability to discharge 15,000 AFY of recycled water into Temescal Creek. The discharge will be mostly in the winter months of the year for the benefit of OCWD member agencies. With the approval of the SAR Watermaster, this flow can be contractually added to OCWD's SAR base flow allocation at Prado.

The water quality of EMWD's discharged recycled water may require some salinity mitigation by OCWD to meet the RWQCB Basin Plan Objective in basins downstream of Temescal Creek and Orange County. The details of the required mitigation shall be defined and negotiated with the RWQCB. There is a potential to use GWRS for the required mitigation. EMWD will be responsible to pay for the cost of that mitigation.

As part of this project, OCWD will credit EMWD for the purified water that is recharged into the Orange County groundwater basin, and compensate EMWD when that water is produced by OCWD member

agencies. To increase water supply reliability in the SAR Watershed, it is important for EMWD to use the revenues from this water transfer project for imported water banking during wet years in the San Jacinto Watershed groundwater basins. **Figure 5.10-5** shows the schematics for this project. Institutional, technical, legal, and financial details for this project need to be developed by EMWD and OCWD.

Figure 5.10-5 Recommended Recycled Water Transfer Project



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