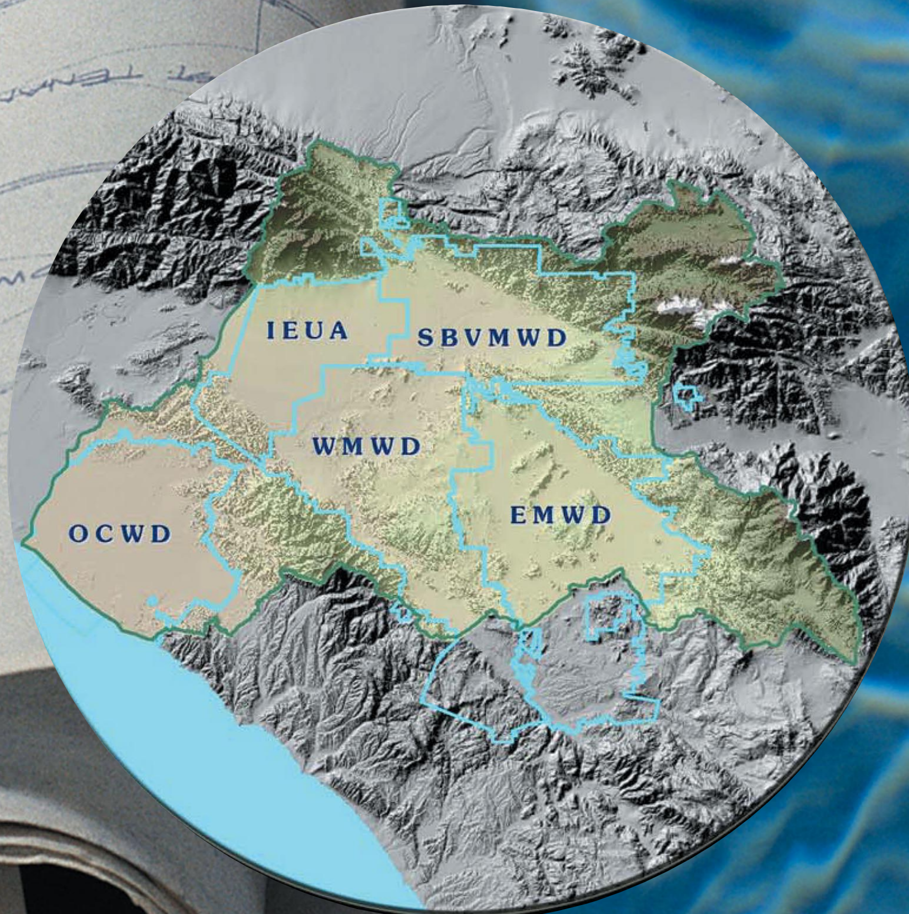

Santa Ana Integrated Watershed Plan
Volume 1 Water Resources Component

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SANTA ANA INTEGRATED WATERSHED PLAN

2002 INTEGRATED WATER RESOURCES PLAN

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Abbreviations and terms used in this report:

AAOC	Average Annual Operation Capacity
AF	Acre-feet
AFY	Acre-feet per year
AWT	Advanced Water Treatment of Effluent. A high level effluent treatment process such as microfiltration or desalination.
Basin Plan	Water Quality Control Plan, Santa Ana River Basin
BMP	Best Management Practices
BEA	Basin Equity Assessment
BPP	Basin Production Percentage
BBARWA	Big Bear Area Regional Wastewater Agency
CIP	Capital Improvement Plan
CDA	Chino Basin Desalter Authority
CFS	Cubic feet per second
CPA	Central Pool Augmentation
CRA	Colorado River Aqueduct
CSDOC	County Sanitation Districts of Orange County
CCWD	Cucamonga County Water District
DHS	California Department of Health Services
DWR	California Department of Water Resources
EMWD	Eastern Municipal Water District
EPA	California Environmental Protection Agency

EVMWD	Elsinore Valley Municipal Water District
GPM	Gallons per Minute
GAP	Green Acres Project
IEUA	Inland Empire Utilities Agency
IRP	(MWD) Integrated Water Resources Plan
IWP	Integrated Watershed Program
IWRP	(SAWPA) Integrated Water Resources Plan
JCSD	Jurupa Community Services District
Lower SAR	Lower Santa Ana River. That portion of the Santa Ana River below Prado Dam.
LRP	MWD's Local Resource Program
MCL	Maximum Contaminant Level
mg/L	Milligrams per liter
MGD	Million gallons per day
MWD	Metropolitan Water District of Southern California
MVWD	Monte Vista Water District
MWDOC	Municipal Water District of Orange County
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
OBMP	Chino Basin Watermaster Optimum Basin Management Program
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
OCR	Orange County Reclamation Project
OEHHA	Office of Environmental Health Hazard Assessment

PAL	Provisional Action Level
ppb	parts per billion
PRI	Primary Treatment of Effluent
RA	Replenishment Assessment
RCFCWCD	Riverside County Flood Control District and Water Conservation District
RCWD	Rancho California Water District
RWQCB	Regional Water Quality Control Board
SBCFCD	San Bernardino County Flood Control District
SBMWD	City of San Bernardino Municipal Water Department
SBVMWD	San Bernardino Valley Municipal Water District
SBVWCD	San Bernardino Valley Water Conservation District
SGPWA	San Gorgonio Pass Water Agency
SAR	Santa Ana River
SARI	Santa Ana River Interceptor
SAW	Santa Ana Watershed
SAWPA	Santa Ana Watershed Project Authority
STWMA	Timoteo Watershed Management Authority
SCCWRR	Southern California Comprehensive Water Reclamation and Reuse
SDCWA	San Diego County Water Authority
SCAG	Southern California Association of Governments
SEC	Secondary Treatment of Effluent
SMR	Salinity Management Report
SWP	State Water Project

TDS	Total Dissolved Solids
TER	Tertiary Treatment of Effluent
THM	Trihalomethanes
TIN	Total Inorganic Nitrogen
UCR	University of California, Riverside
Upper SAR	Upper Santa Ana River. That portion of the Santa Ana River above Prado Dam typically excluding the San Jacinto Basin.
USAWRA	Upper Santa Ana Water Resources Association
USBR	United States Department of the Interior Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
VOC	Volatile Organic Compound
WSDM	(MWD) Water Surplus and Drought Management Plan
WWTP	Wastewater Treatment Plant
WMWD	Western Municipal Water District
WRCRWA	Western Riverside County Regional Wastewater Authority
WQCP	Water Quality Control Plant
WRP	Water Reclamation Plant
WRP	Water Resources Plan
YVWD	Yucaipa Valley Water District

EXECUTIVE SUMMARY

While those in the water industry realize that water is the lifeblood of a vital economy and an absolute necessity to support a growing population, the *solutions* to providing adequate high quality water are often not so evident. The Santa Ana Watershed has literally become a model for the nation in terms of planning and implementation of innovative projects necessary to meet water demands. Through careful planning, based on the sound engineering principles laid out in the various agency master plans, the Santa Ana Watershed Project Authority (SAWPA) member agencies have orchestrated practical and successful methods of providing water from both local and imported supplies. This document attempts to build upon those member agency plans, particularly in terms of water supply and water quality, in order to help ensure the continuing long-term health and prosperity of the watershed and its inhabitants.

The Santa Ana Watershed (SAW), shown here in Figure ES.1, represents one of the vital components that contributes to Southern California's enviable reputation. The total watershed area spans approximately 2,650 square miles and is largely covered by five agencies, which together comprise SAWPA, a joint powers authority formed in 1972. SAWPA was created for the purpose of "developing and maintaining regional plans, programs, and projects that will protect the Santa Ana River basin water resources to maximize beneficial uses within the watershed in an economically and environmentally responsible manner."

The member agencies of SAWPA are Eastern Municipal Water District (EMWD), Inland Empire Utilities Agency (IEUA), Orange County Water District (OCWD), San Bernardino Valley Municipal Water District (SBVMWD), and Western Municipal Water District (WMWD). Each of these agencies plans and executes long-term plans and management programs of their own, but it is primarily SAWPA that provides the vehicle to provide effective and concerted planning efforts on a regional basis.

EMWD's service area covers a 555 square mile area that holds a population of approximately 400,000. IEUA provides its services to a 242 square mile area in which about 650,000 people reside, while OCWD serves a population of two million over a 358 square mile area. SBVMWD currently serves approximately 600,000 people over a 325 square mile area and WMWD consists of a 510 square mile area that holds a population of about 438,000 people.

ES.1 Purpose of the Integrated Water Resources Plan Update

The first SAWPA Water Resources Plan (WRP) was authored in 1998. This comprehensive document outlined, in detail, the measures that must be taken in order to more efficiently utilize both local and imported water resources. The 2002 Integrated Water Resources Plan (IWRP) is part of SAWPA's overall Integrated Watershed Plan for the Santa Ana River Watershed, and serves as an update to the 1998 WRP. While the IWRP is intended to be a stand-alone document, it does not delve into the historical and legal issues that were already aptly covered in the WRP. Because of this, the IWRP may also be used as a supplemental tool to the WRP.

What the IWRP *does* focus on is as follows:

- Changes in terms of recent water districts' planning updates and funding status that warrant a fresh analysis of the watershed.
- Planning time horizons for 2010, 2025, and 2050 of water demands and supplies.
- Water resource plans by member district.
- A breakdown of planned water resource projects into six major project categories.
- Balancing and integration of available resources, including projects that enhance the environment.
- Identification of regional problems, issues, and descriptions of long-term integrated solutions.

While reading this document, be aware that, in general, all discussed data, information, and analyses primarily pertain to the projects and plans of the five SAWPA member districts. Figure ES.1 clearly shows that very small segments of OCWD, WMWD, and EMWD lay outside the watershed's boundaries, while other small areas within the boundaries are not fully taken into account. This approach is justified, as the SAWPA agencies undisputedly represent the major water purveyors in the watershed.

ES.2 Recent Changes

SAWPA agencies (with the exception of SBVMWD) have historically relied on the Metropolitan Water District of Southern California (MWD) as a provider of imported water. From 1996 through 2000, SAWPA agencies have purchased an average of approximately 450,000 AF per year from MWD, or 33% of total water supply. MWD delivers imported water to SAWPA agencies from two primary sources: 1) The Department of Water Resources' California Aqueduct, which imports water from the Sacramento-San Joaquin Delta to Southern California and 2) MWD's Colorado River Aqueduct (CRA), which moves water from the Colorado River to the SAW region.

MWD is currently preparing an update to its <u>Integrated Water Resources Plan</u> (IRP), which was adopted by the MWD Board of Directors in January of 2002. One of the principal recommendations of the 1996 IRP was MWD's reduced dry-year dependence on supplies from the California Aqueduct and the Colorado Aqueduct through increased reliance on groundwater storage. MWD's IRP Update will emphasize, "balanced diversified resource strength," primarily through MWD's commitment to groundwater storage, water recycling, conservation, and groundwater recovery. SAWPA's IWRP will account for the effects of MWD's 1996 IRP and any changes that result from the update that may impact SAWPA agencies. SAWPA has also been providing meaningful input to MWD's IRP Update by identifying and explaining the benefit of potential and planned projects in the Santa Ana Watershed. The forum for this input has been a series of meetings held under the collaborative planning Memorandum of Understanding signed by SAWPA and MWD.

A number of planning documents have recently been published by SAWPA member agencies, as well as other agencies within the SAW. Each one of these documents provides new information, not available for the 1998 WRP that provides an updated vision of the SAW's future. The documents reviewed are listed in Appendix B.

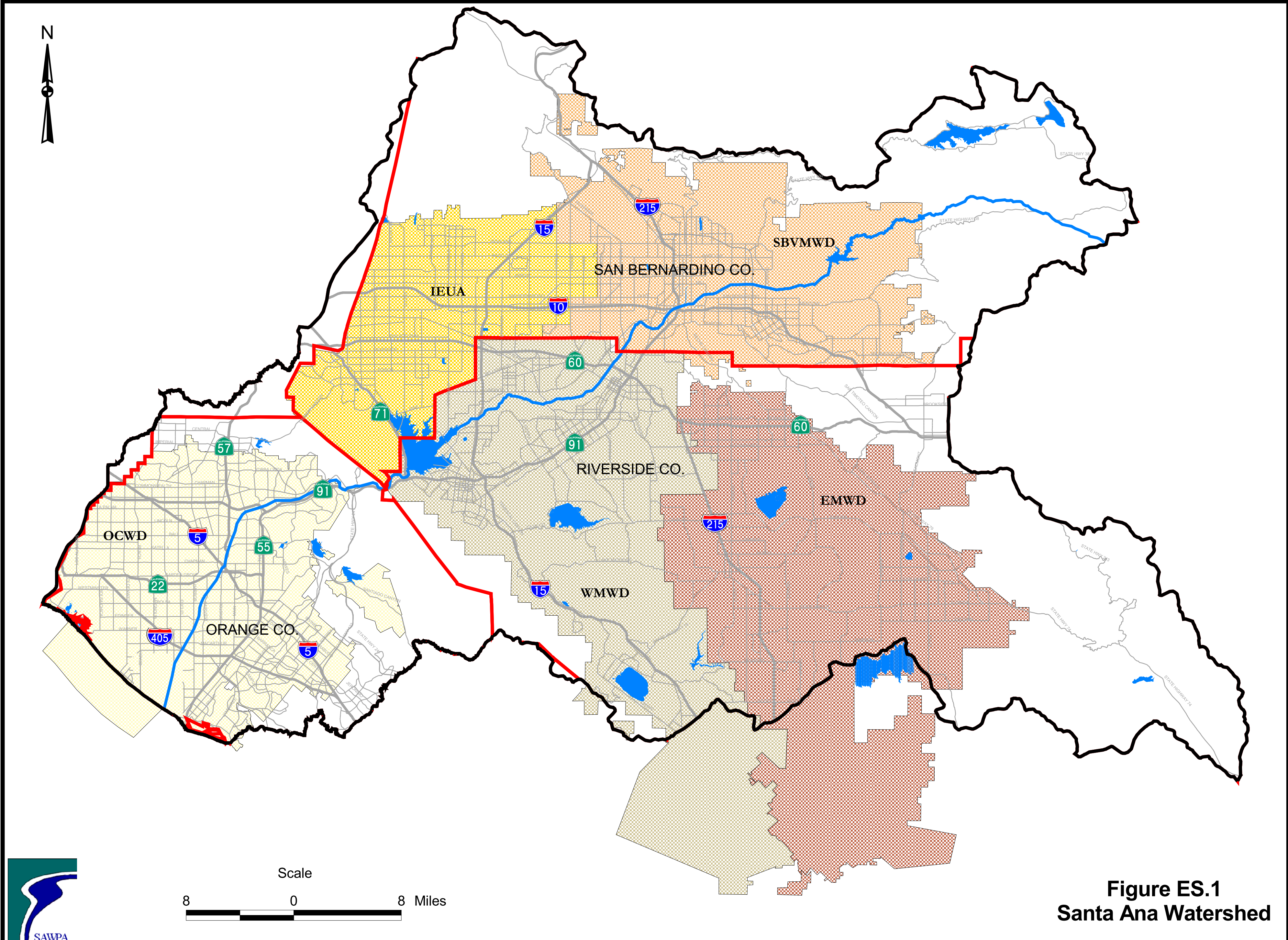


Figure ES.1
Santa Ana Watershed

Finally, another change that perhaps more radically affects the importance of the SAWPA IWRP is the securing of 250 million dollars in state funds from Proposition 13, also known as the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act" and the Costa-Machado Water Act of 2000. 235 million dollars are to be used toward the "Southern California Integrated Watershed Program," which specifically targets the SAW. The remaining 15 million dollars are solely to be used to restore the water quality and recreational benefits of the Lake Elsinore and San Jacinto Watersheds.

Because SAWPA's member agencies are taking advantage of this recent influx of funds, many are now able to accelerate their own planning and project construction schedules. This necessitates that the entire 1998 WRP assumptions and conclusions be revisited.

ES.3 Challenges

The primary challenges facing the SAW as a whole are a reflection of those facing each individual member district, albeit in varying degrees. These challenges, as listed below, will only intensify as the SAW population increases an estimated 40% by the year 2025 and 90% by the year 2050.

1. Groundwater Management Plans – SAWPA agencies, in conjunction with their retail subagencies and private well owners, are developing cooperative groundwater management plans to optimize and protect the use of groundwater. These plans, in general, also emphasize a decreased dependence on imported water.

2. Seasonal Storage, Dry Year Supply, and Conjunctive Use – SAWPA agencies have developed and are implementing plans to recharge local groundwater basins with imported water during hydrologic "wet years." The intent is to ultimately expand the programs to levels that allow significant reliability improvements through in-lieu use of stored imported water during periods of drought. One important tenet, discussed further in Chapter 11, is the significant link between utilizing recycled water, imported water, and captured stormwater for basin recharge purposes.

3. Desalination Programs – SAWPA agencies have developed and are implementing plans to desalt brackish groundwater as a means of reducing dependence on imported water supplies and protecting existing high quality groundwater. High salt concentrations continue to plague many areas of the SAW region.

4. Water Quality – SAWPA agencies seek to clean up existing contaminated groundwater and surface water sources, while also protecting untainted water sources from the possibility of future contamination.

5. Water Recycling – SAWPA agencies continue to be leaders in Southern California water recycling efforts, with major environmental and municipal reuse projects planned for implementation in the next 5 years.

6. Funding – While Proposition 13 funds allowed SAW agencies to accelerate many of their construction programs, there remains a tremendous need for additional federal, state, and local sources of funding.

ES.4 Project Categories

As illustrated in Figure ES.2, the IWRP will focus on six major project categories, which were originally outlined in SAWPA's 2001 Santa Ana Integrated Watershed Program (IWP). The purpose of the IWP was to present a comprehensive list of projects that fell within these project categories to illustrate how the watershed was moving in a purposeful and solution-oriented direction. The six major project categories are:

(1) **Water Storage** will enable much of the Watershed to withstand a major statewide drought by storing upwards of 1,300,000 acre-feet of new water underground throughout the basin;

(2) **Water Quality Improvements** will mitigate negative water impacts from nearly a century of agricultural, industrial and residential point and nonpoint source pollution contributions**;**

(3) **Water Recycling** is the product of a major attitude shift in water use, and the IWP encourages recycling as a means to reduce our area's overall consumption;

(4) **Flood Protection** will keep lives and property safe along the Santa Ana River main stem;

(5) **Wetlands, Environment, and Habitat** welcomes a new era of man-made and natural wetlands that has potential to restore the watershed's environment;

(6) **Recreation and Conservation** will bring much-needed recreational opportunities to the region, providing access to open spaces and increasing public awareness of the Santa Ana's environmental needs and purpose. This category also includes projects and programs that significantly reduce water demands through conservation.

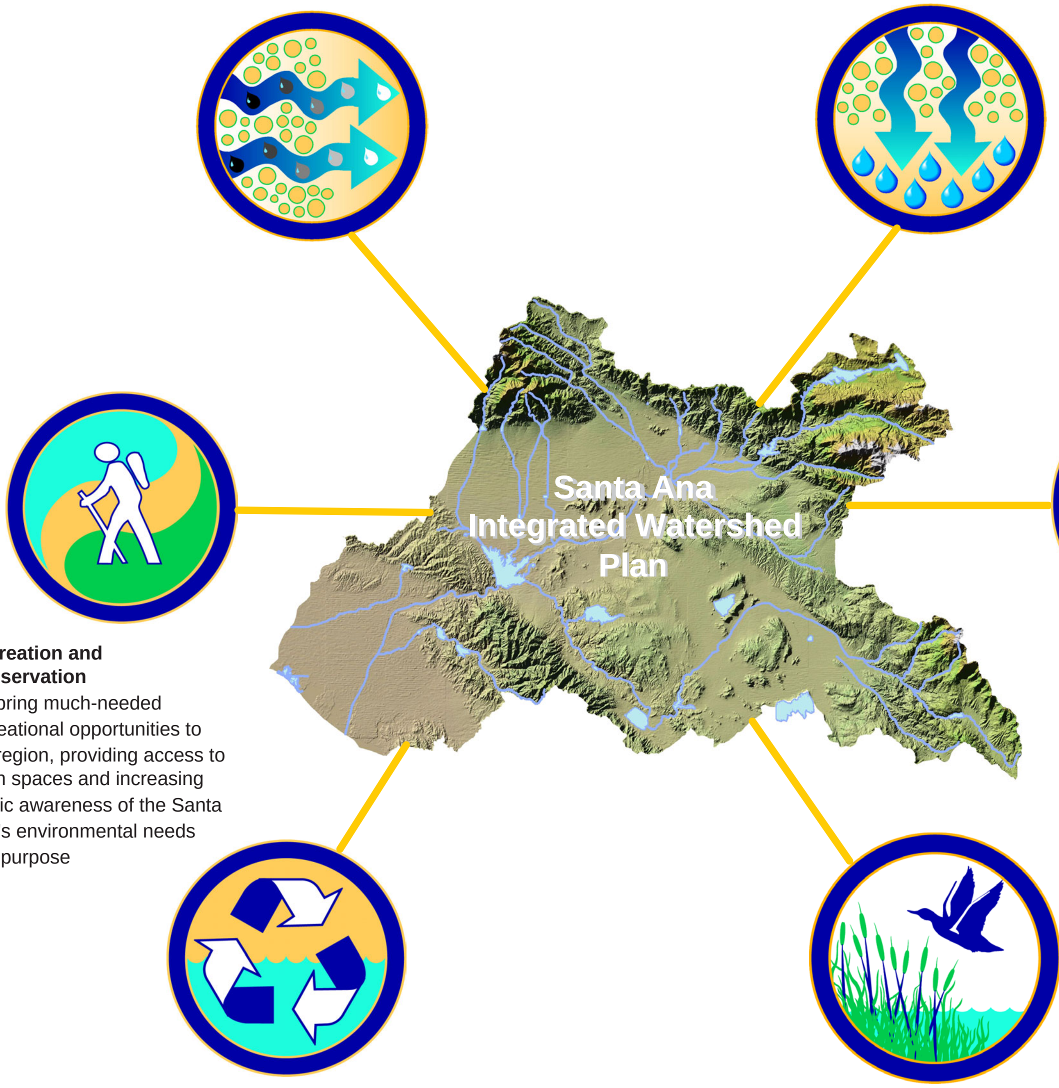
While the above project categories are clearly distinct, with unique objectives, they are also integrated and each builds on the success of the others. Maximum benefits will be derived from the application of these program areas to meet the objectives of the IWRP. Table ES.1 separates all of the IWRP projects not only by the six project categories, but by the regional agencies, implementing agencies, and planning time horizons as well. The planning time horizon listed for each project serves as the date by which the project is expected to at least begin construction. If an actual estimated construction date is known, that information is listed as well.

ES.5 Timeline

During meetings with the SAWPA member agencies, a series of timelines emerged that, in concert with the categorical breakdowns just discussed, help clarify the goals of the IWRP. The

Water Quality Improvements
will mitigate negative water impacts from nearly a century of agricultural, industrial and residential point and nonpoint source pollution contribution

Water Storage
will enable much of the Watershed to withstand a major statewide drought by storing upwards of 1,300,000 acre-feet of new water underground throughout the basin



Recreation and Conservation
will bring much-needed recreational opportunities to the region, providing access to open spaces and increasing public awareness of the Santa Ana's environmental needs and purpose

Flood Protection
will keep lives and property safe along the Santa Ana River main stem

Water Recycling
is the product of a major attitude shift in water use, and the IWP encourages recycling as a means to reduce our area's overall consumption

Environment and Habitat
welcomes a new era of man-made and natural wetlands with potential to restore the West's now-hindered Pacific Flyway

FIGURE ES.2
IWRP PROJECT CATEGORIES

first timeline focuses on projects planned up to the year 2010. These projects are by and large certain to occur, i.e., the agencies see these short-term projects as being essential for long-term goals. The second and third timelines address projects that are likely to occur by the years 2025 and 2050. These two time horizons serve as goals by which to envision the future, and it is exactly this kind of forward thinking that will prepare the SAW agencies to reach the goal of drought-proofing the watershed.

Because the political climate, the economy, funding availability, and other factors can change so rapidly, it is important to recognize that the above timelines should be considered to be flexible. For example, should projected imported supplies fall short, agencies within the SAW may have to accelerate the implementation of those projects discussed throughout this document. This could translate into the need to construct of 2025 or 2050 projects years in advance of what is reflected in this IWRP.

ES.6 Water Demands

Current and projected direct use water demands were gathered from each SAWPA member agency. These demands represent only the areas within the watershed; therefore portions of some member agencies' areas were not included. Overall SAW water demands, discussed more thoroughly in Chapter 2, show a 16%, 30%, and 48% increase (from the base year 2000) for 2010, 2025, and 2050 respectively.

As part of the IWRP, population projections were estimated for the entire SAW (Table 11.1). These projections were independent of the projected water demands collected from each SAWPA member agency. When the two growth projection sets are compared, they are within three percent of one another up through 2020. For 2025 and 2050, however, the population growth projections are 10 percent and 42 percent, respectively, higher than the water demand projections. What this comparison suggests is that long-term water demand projections may have been significantly underestimated for the time horizons of 2025 and 2050.

ES.7 Water Supplies

The four primary direct use water supply sources for the SAW are groundwater, imported water, surface water, and recycled water. Though covered in more detail in Chapter 2, overall direct use water supply shows the same increases as the water demand figures.

While MWD is in the process of completing their 2002 IRP Update, there still remain some key issues to resolve with regard to long-term imported water supply dependability:

- The 1998 USBR/MWD Salinity Management Report projects CRA water salinity through the year 2015 to be above 800 mg/L under dry year conditions. In light of this, MWD is supporting projects that would help meet the federal action level of 747 mg/l. Even so, solving the high salinity for this source of imported water still remains a major reliability issue within the SAW.
- In 25 or 50 years, the SAW may not be able to rely on the delivery of expanded SWP deliveries, as SWP water has become less available due to environmental constraints in

the Bay-Delta. Securing water from this source may become even more difficult in the future.

- One of the areas that will be acknowledged as being deficient in the 2002 IRP Update is conjunctive use, where groundwater storage is expected to be lower than the previous 2020 target.

Also tabulated in Chapter 2 is additional recharge water, used specifically for groundwater replenishment purposes. The three sources for additional recharge water are imported water, surface water, and recycled water. Projections for additional recharge water show a 14%, 45%, and 66% increase (from the base year 2000) for 2010, 2025, and 2050 respectively.

ES.8 Conservation

Water conservation was *not* considered as a source of supply for the purposes of this report, with the exception of the 2025 and 2050 drought year scenarios discussed in Chapter 11. Each SAWPA member agency addressed conservation in different ways. For example, EMWD included conservation as part of their demand projections, while the remaining agencies did not include conservation in the demand projections shown in Table 2.1.

Chapter 10 discusses conservation in more detail, but SAWPA member agencies may eventually need to consider conservation measures that would involve some significant lifestyle changes. These changes may be intrusive initially; the goal, however, would be to ultimately educate consumers in the way they view water usage. Promoting xeriscape through incentives/disincentives or requiring that all commercial and industrial buildings, and all golf courses, use solely non-potable water for irrigation are two possible examples of future conservation measures.

ES.9 Water Quality

Improving water quality within the SAW is a continuing concern, particularly as more constituents come under closer scrutiny due to technology improving the ability to detect them to very minute levels. Salt, however, continues to be the overall major water quality concern within the watershed, as it accumulates in the watershed faster than it is removed. Achieving "salt balance," where tons of salt into the SAW equals or exceeds tons of salt out, is a principal long-term goal of the IWRP. Without constructing the necessary desalting facilities and brineline improvements to accomplish salt balance, water quality will only continue to degrade. It is anticipated that within 50 years water regulations will require each groundwater basin to be in salt balance in order to protect and maintain water quality.

ES.10 Biosolids

As recycled water production grows, so will the production of biosolids, which is also known as treated sewage sludge. This inevitable by-product of reused wastewater presents a formidable challenge to SAW agencies, as the conventional and convenient methods of disposal, such as land application, landfill disposal, and exportation, are likely to become less and less available in the future due to increasingly stringent restrictions. Table 4.1 reveals existing and projected biosolids production for the listed SAW agencies. Overall biosolids production growth shows a 37%, 73%, and 124% increase (from the base year 2000) for 2010, 2025, and 2050 respectively.

Both challenges and current and potential solutions for the watershed are detailed in Chapter 4. The foremost regional solutions include:

- Organic Management Facilities
- Odor Control
- Educating the Public
- Addressing Health Issues
- Appropriate Facility Location
- New Technology

ES.11 Other Agencies

This report also includes projects from several agencies that fall within the confines of the SAW, yet are not located within the boundaries of SAWPA's member agencies. The fact that many of these agencies are located in the upper watershed regions underscores the importance of including them as part of this IWRP. By recognizing that water quality and water supply issues begin in the upper watershed, the practices and programs of these agencies take on new meaning and significance.

Some of the agencies that have projects in the IWRP are listed under SBVMWD, although they are located outside SBVMWD's service area. These agencies, shown in Figure ES.3, are: the Big Bear Area Regional Wastewater Agency (BBARWA), the San Gorgonio Pass Water Agency (SGPWA), and the San Timoteo Watershed Management Authority (STWMA).

For example, BBARWA proposes to utilize 1.2 MGD of recycled water from the 2.7 MGD BBARWA treatment plant for the purposes of local landscape irrigation and environmental uses. BBARWA is also in the preliminary planning stages of utilizing recycled water for an endangered species and wetlands enhancement project at Baldwin Lake, as well as for a marsh stabilization project at a Big Bear Municipal Water District site.

Formed in 1961 by an act of the Legislature, SGPWA's mission statement includes preparation of a water resources management plan, which "shall serve the water needs of the present and future water users concerning groundwater, groundwater overdraft, surface water retention, recycled water, water conservation, and imported water supplies." The management plan was deemed necessary for several reasons:

- To eliminate groundwater overdraft by seeking the most efficient method at the most effective locations without regard to city or water district boundaries.
- To find the most effective locations without regard for boundaries for underground storage of purchased water and the use of recycled water.
- To avoid litigation between cities and agencies that lie over shared groundwater basins.
- To spend money and resources to provide the most water at the least cost.

STWMA, a joint powers agency formed in January 2001, has recently expressed interest in becoming a SAWPA member. STWMA members include Beaumont-Cherry Valley Water

District (BCVWD), City of Beaumont, South Mesa Water Company, and the Yucaipa Valley Water District (YVWD). The service area of STWMA is the watershed area of the San Timoteo Watershed served by the JPA members and is largely located within the SAW. Thus far, STWMA has identified over $227 million in projects to help achieve these goals, of which approximately $81 million are identified in this IWRP.

ES.12 Long-Term Regional Planning

ES.12.1 Water Supplies

One of the major goals of this document is to identify sufficient local water supplies to meet demands during times of drought. Though many projects are planned over the next ten to twenty years to help achieve this, much more long-term planning is necessary to reach that goal. Unless more projects in all six of the major categories listed in this report are implemented, the watershed will not be self-sufficient during a drought year by 2050. While all six categories are significant, the following three categories are of particular importance:

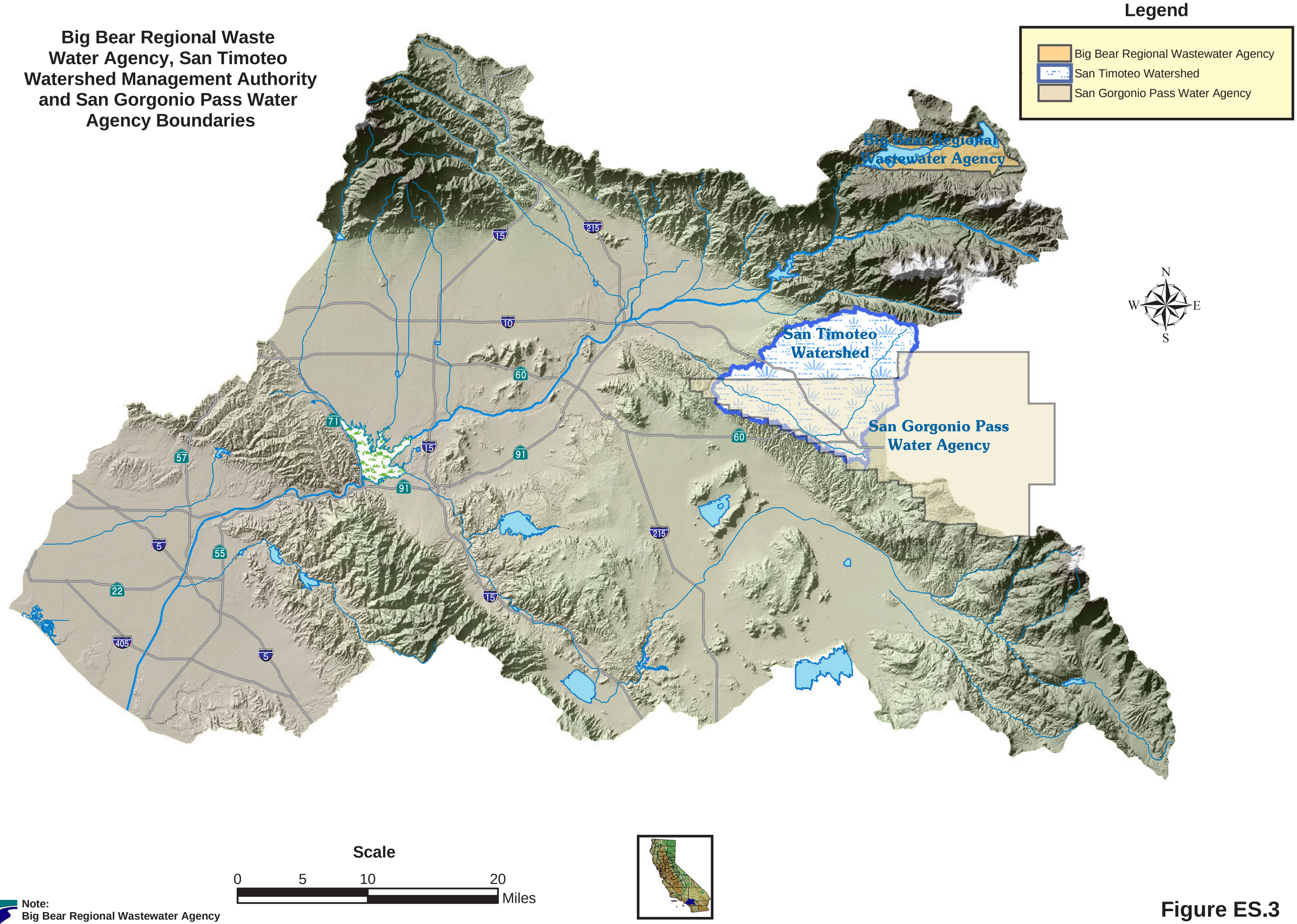
- Conjunctive use - More projects in this category will be needed to store water during times of drought
- Water recycling - More projects will be needed in this category to provide new water sources, thus reducing dependence on imported supplies
- Desalting/ion exchange - More projects will be needed in this category to provide new water sources, which will not only to reduce dependence on imported supplies, but will also clean existing groundwater
- Conservation – Consistent long-term conservation efforts within the SAW are likely to result in reducing demand by 8 to 10 percent by 2050.

Table 11.2 lists a group of potential supply sources for each SAWPA member agency to achieve zero imports during a drought year by 2025 and 2050. As explained in Chapter 11, imported water demands during a drought year were estimated to be 7% above normal or regular year demands. In order to achieve this, a total of 671,000 AFY of additional local water supply is still necessary from additional supply sources, i.e., supply sources that were not included in the member districts' water supply projections (shown in Table 2.2).

For the purposes of this report, zero imported water during a drought year means the following:

> SAWPA member agencies would conjunctively (collectively) be self-sufficient such that no imported water supplies would be necessary to meet demands. It is understood, however, that during "normal" years, imported water would regularly contribute to conjunctive use storage, which would then be drawn upon during times of drought. In short, the proposed goal of this document is that SAWPA agencies would continually strive to reduce dependence on imported supplies during normal years. They would likely continue to import water during normal years for both direct use and groundwater recharge, but would be capable of importing zero water directly during drought years. A three year stored water take period is assumed based on current conjunctive storage practices. Once the drought period ended, or when SAWPA member agencies deemed

Big Bear Regional Waste Water Agency, San Timoteo Watershed Management Authority and San Gorgonio Pass Water Agency Boundaries



Note:
Big Bear Regional Wastewater Agency Boundaries approximated.

Figure ES.3

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the time appropriate, the conjunctive use facilities would again be replenished to their pre-drought levels.

ES.12.2 Conservation

For both the 2025 and 2050 scenarios to drought-proof the watershed (Chapter 11), conservation is treated as a reliable supply source that helps to reduce dependence on imported supplies. The conservation projections through 2020 for EMWD, IEUA, MWDOC (for OCWD), and WMWD were provided by MWD using data from MWD's retail demand projections and the MWD-MAIN model from the MWD 2001 Sales Forecast. SAWPA staff estimated conservation projections beyond 2020 based on MWD conservation rates. For 2025, conservation is estimated to account for 161,000 AFY (8.4% of total 2025 regular year water demands); for 2050 the amount is 182,000 AFY (8.4% of total 2050 regular year water demands), respectively.

ES.12.3 Water Quality

Figure 11.1 shows that for the year 2000, the SAW is receiving a net increase in salts of 590,000 tons per year. Given current planning efforts, that number should drop to a net increase in salts of 195,000 tons per year by 2050, as shown in Figure 11.4. While this is a tremendous improvement, it is clear that more facilities need to be planned and constructed in order to actually start decreasing overall groundwater TDS content. Figure 11.5 shows that with the additional projects listed to drought-proof the SAW, a net salt *loss* of 127,000 tons is projected in 2050.

ES.13 Summary

SAWPA recognizes that a planning document, such as the IWRP, is only valuable if the diverse group of agencies within the SAW aggressively seek new and innovative ways to fund their projects, while working with other agencies to construct projects that will collectively improve the watershed at a regional level. The IWRP is inherently an ever-evolving document, which loses its value unless it is updated on an ongoing and regular basis. New funding mechanisms, natural and manmade disasters, economic forces, political changes, new technologies, and changing regulations are just a few of myriad stimuli that may affect premises for the projections made within this document. It is recommended that the IWRP continue to be updated during the upcoming months and years.

Identifying the long-term water quality and water supply issues facing the watershed over the next half century enables SAW agencies to more effectively plan for the projects necessary to meet these challenges. All six project categories described in the IWRP are essential to protecting our water quality, maximizing our limited water resources, and enhancing our environment at the same time. This integrated approach allows SAW agencies to draw from a multitude of resources, thus diversifying our water supply sources over a broad range of projects. In particular, conjunctive use, water quality improvement, recycled water projects, and conservation appear to be the primary categories that will ensure reliable water supplies for both regular and drought years through 2050.

In order to meet these long-term goals, however, SAW agencies must continue to vigorously pursue funding opportunities at both the state and federal levels. Coupled with interagency cooperation and a united vision of those projects that are vital over the next fifty years and beyond, SAW agencies will help maintain a vibrant and healthy watershed for future generations.

ES.14 Presentation Overview

A slide presentation of the information presented in the IWRP is attached as Appendix D – IWRP Slide Presentation Overview.

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
Water Storage								
EMWD								
	EMWD	Hemet/San Jacinto Conjunctive Use Cross Basin and Pipeline	50.00	20,000		2004	2010	CEQA in Progress - 20, 000 AFY Capacity
	EMWD	Mills 2 Intertie East	60.00			2004	2010	Feasibility Report Complete; CEQA in Progress
	EMWD	Hemet Conjunctive Use/Long Term Shift	15.00	25,000		2006	2010	No CEQA
	EMWD	Lakeview Conjunctive Use/Long Term Shift	6.00	10,000		2006	2010	No CEQA
IEUA								
	CCWD	CCWD Project 1 - Well No. 36	0.85		2,500		2010	
	CCWD	CCWD Project #2 – Two New Wells	1.50		5,000		2010	
	City of Chino	City of Chino Project 5 - West Chino Basin Interagency (Chino Hills, MVWD, and Ontario) Interagency Connections	5.26		5,377		2010	
	City of Chino	City of Chino Project 1 Benson/Palo Verde ASR	1.44		5,040		2010	
	City of Chino	City of Chino Project 2 State/Benson ASR	0.40		4,480		2010	
	City of Chino	City of Chino Project 3 Phillips/Central ASR	2.00		3,584		2010	
	City of Chino Hills	City of Chino Hills Well 13 Blending Station	0.09		2,100		2010	
	City of Ontario	City of Ontario #1 - 4 New Wells	2.80		12,000		2010	
	City of Ontario	City of Ontario Project 5 - Well 15 Blending Station	0.20		2,000		2010	
	City of Ontario	City of Ontario Project 7 - Jurupa Connection	0.08				2010	
	City of Ontario	City of Ontario Project 8 - Chino II Desalter Transmission Facilities	0.85				2010	
	IEUA	IEUA Reactivate MWD Connections	0.55				2010	
	IEUA	Chino Basin Groundwater Conjunctive Use Program	27.50	100,000			2010	
	MVWD	MVWD Project 1 New Well	0.83		2,167		2010	Feasibility Study 11/02. CEQA 02/03.
	MVWD	MVWD Project 2 New Well	0.83		2,167		2010	Feasibility Study 11/02. CEQA 02/03.
	MVWD	MVWD Project 3 New Well	0.83		2,167		2010	Feasibility Study 11/02. CEQA 02/03.
	MVWD	MVWD Project 4 New Well	0.83		2,167		2010	
	San Antonio Water Company	San Antonio Water Company Project 1 New Well	0.75		3,000		2010	
	CCWD	CCWD Project 7 Cucamonga Basin Recharge Project	2.60		4,000		2010	
**	IEUA	Recharge Basin Projects (20)	46.14	123,195		2003	2010	
**	*IEUA*	*Regional Plant No. 3 (RP-3) Basins*	*5.42*	*8,650*		*2003*	*2010*	
**	*IEUA*	*Turner Basin No. 1*	*3.87*	*1,550*		*2003*	*2010*	
**	*IEUA*	*Turner Basin Nos. 2, 3, and 4*	*3.10*	*4,400*		*2003*	*2010*	
**	*IEUA*	*Hickory Basin*	*2.15*	*4,600*		*2003*	*2010*	
**	*IEUA*	*Wineville Basin*	*2.77*	*1,500*		*2003*	*2010*	
**	*IEUA*	*Ely Basins*	*2.29*	*6,800*		*2003*	*2010*	
**	*IEUA*	*Jurupa Basin*	*1.59*	*1,600*		*2003*	*2010*	
**	*IEUA*	*Etiwanda Basins*	*0.25*	*8,650*		*2003*	*2010*	

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
**	*IEUA*	*Montclair Basins*	*1.20*	*14,900*		*2003*	*2010*	
**	*IEUA*	*Upland Basin*	*1.06*	*8,250*		*2003*	*2010*	
**	*IEUA*	*Brooks Street Basins*	*1.25*	*4,450*		*2003*	*2010*	
**	*IEUA*	*College Heights Basins*	*5.31*	*6,685*		*2003*	*2010*	
**	*IEUA*	*Banana Basin*	*3.03*	*3,700*		*2003*	*2010*	
**	*IEUA*	*7th and 8th Street Basins*	*1.79*	*3,100*		*2003*	*2010*	
**	*IEUA*	*Lower Day Creek Basin*	*1.53*	*3,950*		*2003*	*2010*	
**	*IEUA*	*San Sevaine Basins 1-3*	*0.37*	*20,510*		*2003*	*2010*	
**	*IEUA*	*San Sevaine Basins 4 & 5*	*3.96*	*7,200*		*2003*	*2010*	
**	*IEUA*	*Victoria Basin*	*0.47*	*5,150*		*2003*	*2010*	
**	*IEUA*	*Declez Basin*	*1.70*	*1,750*		*2003*	*2010*	
**	*IEUA*	*Etiwanda Conservation Ponds*	*3.02*	*5,800*		*2003*	*2010*	
	IEUA	IEUA Regional Plant No. 1 (RP-1) Basin	1.28	300			2010	
	IEUA	Regional Conjunctive Use – Chino Basin	100.00	500,000			2025/2050	
OCWD								
	OCWD	Basin Cleaning Vehicles	6.00		20,000	2002	2010	CEQA Complete. Prototype Being Tested.
	OCWD	East Orange County Feeder Number Two/Inland Well Field	24.00		16,000	2005	2010	CEQA 2002
	OCWD	MWD - OCWD Conjunctive Use	0.00	60,000			2010	This $26.5M project is funded by MWD
	OCWD	Lakeview Pipeline	2.30		6,000		2010	CEQA Complete. Under Design 2002.
	OCWD	La Jolla Street Recharge Basin	10.00				2010	Feasibility Report Underway
	OCWD	Miraloma Avenue Recharge Basin	12.00				2010	Feasibility Report Underway
	OCWD	Mid Basin Injection Wells	15.00				2010	Feasibility Report Underway
**	OCWD/OCSD	Groundwater Replenishment System (GWRS), Phase I	367.00	75,000		2002	2010	CEQA Complete. Final Design 2002
	OCWD/OCSD	Groundwater Replenishment System (GWRS), Phase II	120.00	33,600			2025/2050	CEQA Complete
	OCWD/OCSD	Groundwater Replenishment System (GWRS), Phase III	120.00	33,600			2025/2050	CEQA Complete
SBVMWD								
	Beaumont-Cherry Valley Water District	Beaumont- Cherry Valley Water District (BCVWD) Storm Water Capture and Recharge Project	10.00		4,100	2003	2010	CEQA 12/02
	Beaumont-Cherry Valley Water District	Beaumont- Cherry Valley Water District (BCVWD) Bogart Park Recharge Facilities Study	0.50				2010	CEQA 12/02
	San Timoteo Watershed Project Authority (STWMA)	Supplemental Water Conveyance and Conjunctive Use Project Investigation for the San Timoteo Watershed Project Authority (STWMA)	1.00				2010	CEQA 12/02
	SBVWCD	Seven Oaks Dam Borrow Pit Spreading Facilities	7.00	150,000			2010	No CEQA
**	SGPWA	Little San Gorgonio Creek Recharge Facilities	1.13	3,000		2002	2010	CEQA Complete
**	SBVMWD	Baseline Feeder Extension West	27.30				2010	CEQA Complete - 25,000 AFY Capacity

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	SBVMWD	Baseline Feeder Extension North/South Alignment	13.80				2010	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	Baseline Feeder Pump Station West Alternative	10.35				2010	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	Baseline Feeder Pump Station East Alternative	5.18					
	SBVMWD	9th Street Feeder	2.70				2010	CEQA Complete - 4,000 AFY Capacity
	SBVMWD	South End Feeder	13.52				2010	CEQA Complete - 22,000 AFY Capacity
	SBVMWD	Central Feeder West (West of San Bernardino PS)	24.40				2010	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	DWR Pump Station Alternative 1	3.71				2010	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	DWR Pump Station Alternative 2	4.48					
	SBVMWD	Riverside Pump Station	0.88				2010	CEQA Complete - 36,000 AFY Capacity
	SBVMWD	South End Pump Station	0.68				2010	CEQA Complete - 7,000 AFY Capacity
**	SBVMWD	High Groundwater Pumpout	18.30		25,000		2010	CEQA for Phase I Project
	SBVMWD	Seven Oaks Dam Plunge Pool Pipeline	11.49				2010	No CEQA - 217,000 AFY Capacity
	SBVMWD	Seven Oaks Dam Minimum Discharge Pipeline	5.45				2010	No CEQA - 72,000 AFY Capacity
	SBVMWD	Groundwater Management Program	21.06				2010	No CEQA. Monitoring Wells Only
	SBVMWD	Mentone Feeder	21.24				2010	Program Level CEQA - 208,000 AFY Capacity
	SBVMWD	Mentone Pipeline	14.63				2010	Program Level CEQA - 93,000 AFY Capacity
	SBVMWD	Devil Canyon Bypass Pipeline	0.25				2010	Program Level CEQA - 79,000 AFY Capacity
	SBVMWD	San Bernardino Pump Station #1	0.67				2010	Program Level CEQA - 14,000 AFY Capacity
	SBVMWD	Mentone Pump Station	10.64				2010	Program Level CEQA - 72,000 AFY Capacity
	SBVMWD	San Bernardino 5 MG Reservoir	3.70	N/A	N/A		2010	Program level CEQA
	SBVMWD	Central Feeder East (East of San Bernardino PS)	31.73				2025/2050	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	Redlands Pump Station	1.28				2025/2050	CEQA Complete - 72, 000 AFY Capacity
	SBVMWD	Redlands 5 MG Reservoir	3.70	N/A	N/A		2025/2050	CEQA Complete
	SBVMWD	San Bernardino Conjunctive Use Facilities		300,000			2025/2050	See Description - Includes many 2010 Components Already Listed
	SBVMWD	Additional Conjunctive Use Facilities	40.00				2025/2050	Conceptual
	SBVMWD	Supply Wells (7)	6.03		35,000		2025/2050	No CEQA
	SBVMWD	Yucaipa Connector	7.98				2025/2050	Program level CEQA - 72, 000 AFY Capacity
	SBVMWD	San Bernardino Pump Station #2	4.33				2025/2050	Program level CEQA - 72, 000 AFY Capacity
	SBVMWD	Foothill Pump Station	1.79				2025/2050	Program level CEQA - 72, 000 AFY Capacity
	SBVMWD	Mentone 100 MG Reservoir	5.00				2025/2050	Program level CEQA
	San Timoteo Watershed Project Authority (STWMA)	San Timoteo Conjunctive Use Facilities	25.00	100,000			2025/2050	Conceptual. SAWPA staff cost estimate
WMWD								
	City of Corona	Coldwater Basin Conjunctive Use Project	40.00	2,000			2010	
	City of Corona	Temescal Basin Recharge	0.00				2010	Included as Component of City of Corona Recycled Water Distribution System, Phases 1 - 5
	EVMWD	EVMWD Elsinore Basin Conjunctive Use Study	15.00	60,000			2010	No CEQA. SAWPA staff cost estimate

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
	JCSD	Jurupa Community Services District Water Import Facilities	1.20				2010	
**	WMWD	Riverside South Basin Agriculture Water Conveyance	9.88		6,000		2010	
	WMWD	Riverside Corona Feeder	90.00		40,000		2010	No CEQA
	WMWD	Riverside Groundwater Basin Improvements	60.00				2010	Est. Cost Approximate - Potential of 27,000 AFY
	SAWPA	Prado Groundwater Replenishment	150.00				2025/2050	No CEQA. Refer to the Riverside Corona Feeder and High Groundwater Pumpout projects for yield information.
		Subtotal 2010 Projects	1,115.03	628,195	174,849			
		Subtotal 2025 Projects	616.84	967,200	35,000			
		Total	1,731.87	1,595,395	209,849			

Water Quality Improvements

Desalination and Brine Disposal

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
EMWD								
**	EMWD	4.5 MGD Perris Desalter	20.00		4,000	2002	2010	CEQA in Progress
	EMWD	4 MGD Perris II Desalter	20.00		4,480	2005	2010	CEQA in Progress
	EMWD	Moreno Valley Brine Line	9.30			2005	2010	No CEQA
	EMWD	Temecula Valley Brine Line	9.30			2005	2010	No CEQA
	EMWD	Winchester Brine Line	4.80			2006	2010	No CEQA
	Various	Conceptual IWRP Desalination/Ion Exchange Projects	352.80		78,400		2050	Conceptual Projects
IEUA								
**	Chino Basin Desalter Authority	Chino I Desalter Expansion and Chino II Desalter Project	62.40		16,800	2002	2010	Preliminary Design
	IEUA	Dairy Sewer Project	15.00			2003	2010	Five Year Program
	IEUA	Organics Management Program	42.00			2003	2010	Five Year Program
**	JCSD	Chino I - Chino II Desalter Intertie	1.20			2003	2010	
	Various	Chino III Desalter (formerly West Chino Desalter/Ion Exchange)	48.00		10,640		2010	No CEQA
	Various	Chino II Desalter Ion Exchange Expansion	75.00		20,000		2010	
	Various	Conceptual IWRP Desalination/Ion Exchange Projects	100.80		22,400		2050	Conceptual Projects
OCWD								
	IRWD	Irvine Desalter Project (IDP)	28.00		7,000	2005	2010	CEQA Complete. Under Design/Construction by IRWD. Scheduled to be operational in 2006
	OCWD	Orange County Regional Brineline	13.70				2010	Conceptual Stage
	OCWD/IRWD	Tustin/Irvine (Frances) Desalter Project	24.00		11,200		2010	No CEQA
	Various	Conceptual IWRP Ocean Desalination Projects	50.40		11,200		2050	Conceptual Projects

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
SBVMWD								
	YVWD	Yucaipa Valley Regional Water Supply Renewal Project	41.00		13,000	2003	2010	CEQA 2002
	Various	Conceptual IWRP Lower Bunker Hill Desalter/Ion Exchange Projects	40.00		17,920		2050	Conceptual Projects
SAWPA **	SAWPA	Arlington Desalter Enhancement Project, Phase I	16.00		6,000	2002	2010	CEQA Complete
	SAWPA	SARI Protection/Relocation	100.00				2010	CEQA 10/02
WMWD								
	City of Corona	Temescal Desalter Expansion	5.00		5,600	2004	2010	Design underway
	SAWPA	Brine Line from Colton Power Plant	10.00				2010	Conceptual Stage
	Various	Conceptual IWRP Desalination/Ion Exchange Projects	100.80		22,400		2050	Conceptual Projects
		Desalination and Brine Disposal Subtotal 2010 Projects	544.70	0	98,720			
		Desalination and Brine Disposal Subtotal 2025 Projects	644.80	0	152,320			
		Desalination and Brine Disposal Total	1,189.50	0	251,040			

Groundwater and Lakewater Cleanup

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
IEUA								
	CCWD	CCWD Project 3 - Reservoir 3A Wellhead Treatment	1.85		3,500		2010	
	CCWD	CCWD Project 4 - Reservoir 2A Wellhead Treatment Facility	7.12		6,300		2010	
	CCWD	CCWD Project 5 -Reservoir 3 Wellhead Treatment Facility	6.79		9,700		2010	
	City of Chino	City of Chino Project 4 Nitrate Removal Water	4.30		13,441		2010	
	City of Chino Hills	City of Chino Hills Project 1 New Well With Wellhead Treatment	2.12		3,000		2010	
	City of Ontario	City of Ontario Project 6 - Wellhead Ion-exchange Treatment & Transmission Line	3.50		5,000		2010	
	City of Upland	City of Upland Project 1 Wellhead Ion-exchange	3.00		2,700		2010	
	Fontana W.C.	Fontana Water Company Project 1 Wellhead Ion-exchange	4.00		3,700		2010	
	Fontana W.C.	Fontana Water Company Project 2 Wellhead Ion-exchange	4.00		3,700		2010	
	JCSD	Jurupa Community Services District (JCSD) Ion Exchange Facility	10.00		14,000	2003	2010	CEQA Complete, Phases I & II Constructed 2003

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
	MVWD	MVWD Project 6 Wellhead Ion-exchange Treatment for Two Wells at Plant 4	2.14		4,700		2010	
	MVWD	MVWD Project 7 Wellhead Ion-exchange Treatment at Well 2	0.88		1,450		2010	
	San Antonio Water Company	San Antonio Water Company Project 2 Well Retrofit & Wellhead Treatment	2.00		3,000		2010	
OCWD								
	IRWD	DATS Color Water Project	3.00		700	2005	2010	No CEQA
	IRWD	Westside Wellfield Color Water Project	10.00		11,000	2005	2010	Feasibility Report Underway
	OCWD	Coastal Groundwater Treatment Project	10.00				2010	Feasibility Report Complete. CEQA Underway.
**	OCWD	Dairy Washwater Treatment Project	0.35				2010	
	OCWD	Fullerton Forebay Water Quality Improvements	2.80		6,000	2002	2010	Feasibility Study Completed 2001
	OCWD	Santiago Pits Pump-out Facility	4.50		20,000	2002	2010	CEQA Complete. Under Design 2002.
	OCWD	Talbert Barrier Improvements, Phase II	20.00				2010	Feasibility Report Underway
	OCWD	Well Closure Program	14.00				2010	
	OCWD	Diemer Bypass Pipeline	0.00				2025/2050	This $4M project is funded by MWD
	OCWD	River Water Quality Monitoring Facilities	1.00				2025/2050	
SBVMWD	City of San Bernardino	City of San Bernardino TCE Cleanup	6.60		10,000		2010	
WMWD								
	LESJWA	RWQCB TMDL Monitoring	0.20			2001	2010	
	LESJWA	Lake Elsinore Fishery Enhancement and Bio-manipulation	0.60			2002	2010	CEQA 2002
	LESJWA	Lake Elsinore Metal Salts Application	2.40			2002	2010	CEQA 2002
	LESJWA	Canyon Lake Aeration/Oxygenation	0.60			2003	2010	CEQA 2003
	LESJWA	Canyon Lake East Bay Silt Removal	3.60			2003	2010	CEQA 2003
	LESJWA	Lake Elsinore Aeration/Oxygenation	11.10			2003	2010	CEQA 2002
	LESJWA	Nutrient Removal – EVMWD Railroad Canyon Water Reclamation Plant	2.50		1,500		2010	No CEQA
	LESJWA	Nutrient Removal – EVMWD Regional Reclamation Treatment Facilities	6.60		5,000		2010	No CEQA
	LESJWA/RCFCWCD	Ortega Channel Detention/Desilting	1.20				2010	No CEQA
	LESJWA	Salt Creek Debris Basin	1.40				2010	No CEQA
	LESJWA	Salt Creek Detention/Desilting Basin	2.60				2010	No CEQA
	LESJWA	Upper Watershed Nutrient Control	12.00				2010	No CEQA
	LESJWA	Water Quality Feasibility Study	0.30				2010	No CEQA
	LESJWA	Lake Elsinore Dredging	90.00				2010	No CEQA
	LESJWA	San Jacinto Watershed Detention/Desilting	3.60				2010	No CEQA
**	RCSD	Rubidoux Community Services District (RCSD) Water Treatment Facility (WTF) Cleanup	0.60		4,839		2010	No CEQA
	City of Corona	City of Corona Well Site Treatment	0.24		1,620		2010	

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Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
**	WMWD	March Air Reserve Base (MARB) Cleanup Recovery	1.02		300		2010	No CEQA
	WMWD	Pump and Treatment for Riverside/Colton Basin	38.00		20,000		2010	No CEQA
		Groundwater and Lakewater Cleanup Subtotal 2010 Projects	301.51	0	155,150			
		Groundwater and Lakewater Cleanup Subtotal 2025 Projects	1.00	0	0			
		Groundwater and Lakewater Cleanup Total	302.51	0	155,150			

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
		Water Quality Improvements Grand Subtotal 2010 Projects	846.21	0	253,870			
		Water Quality Improvements Grand Subtotal 2025 Projects	645.80	0	152,320			
		Water Quality Improvements Grand Total	1,492.01	0	406,190			
Water Recycling								
EMWD								
	EMWD	Hemet/San Jacinto Regional Water Reclamation Facility (RWRF) Tertiary Expansion	11.00		24,860	2005	2010	No CEQA
	EMWD	Temecula Valley Regional Water Reclamation Facility (TVRWRF) Effluent Pipeline	38.00			2007	2010	No CEQA
	EMWD	Hemet/San Jacinto Regional Water Reclamation Facility (RWRF) System Intertie	8.20			2006	2010	No CEQA
	EMWD	Distribution System Upgrade	9.00			2004	2010	No CEQA
	EMWD	Distribution Pipeline Construction	15.00			2004	2010	No CEQA
	EMWD	EMWD Recycled Water Masterplan	0.56			2003	2010	Masterplan Study
	Various	Conceptual IWRP Recycled Water Projects	8.98		1,796		2050	Conceptual Projects
IEUA								
	City of Ontario	City of Ontario Recycled Water Masterplan	0.42		12,000		2010	No CEQA
	IEUA	Regional Plant No. 5	79.00		15,680	2002	2010	Under Construction
	IEUA	Whittram Avenue Regional Pipeline	1.09			2003	2010	2,000 AFY Capacity
	IEUA	Interim Groundwater Recharge Project – Etiwanda Conservation Basins Pipeline	0.30			2003	2010	950 AFY Capacity
	IEUA	Etiwanda North Distribution Line, Segment I, Phase I	2.49			2003	2010	7,963 AFY Capacity
	IEUA	Fourth Street Regional Pipeline, Segment I	5.50			2003	2010	8,850 AFY Capacity
	IEUA	Wineville Avenue Regional Pipeline	1.04			2003	2010	1,800 AFY Capacity
	IEUA	Pine Avenue Intertie Pipeline	0.40			2003	2010	570 AFY Capacity
	IEUA	Regional Plant No. 1/Regional Plant No. 4 Regional Recycled Water Pump Station, Phase I	6.62			2003	2010	50,000 AFY Capacity
	IEUA	Regional Water Recycling Plant No. 1/ Regional Water Recycling Plant No. 4 Pump Station – Heart of the Regional System	6.29			2003	2010	55,000 AFY Capacity
	IEUA	Booster Station at Regional Water Recycling Plant No. 4	2.14			2003	2010	17,400 AFY Capacity
	IEUA	Booster Station at Regional Water Recycling Plant No. 5	1.59			2003	2010	12,900 AFY Capacity
	IEUA	Jurupa Regional Pipeline	2.75			2003	2010	2,250 AFY Capacity
	IEUA	Grove Avenue Regional Pipeline	1.15			2003	2010	1,727 AFY Capacity
	IEUA	Philadelphia Avenue Regional Pipeline	0.83			2003	2010	2,300 AFY Capacity

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	IEUA	Carbon Canyon Water Recycling Facility/Regional Water Recycling Plant No. 5 Intertie Pipeline	2.08			2003	2010	6,175 AFY Capacity

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

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	IEUA	Regional Water Recycling Plant No. 5/ Regional Water Recycling Plant No. 2 Intertie Pipeline	0.99			2003	2010	3,385 AFY Capacity
	IEUA	Fourth Street Regional Pipeline, Segment II	7.30			2004	2010	7,700 AFY Capacity
	IEUA	Etiwanda North Distribution Line, Segment II	4.85			2004	2010	7,963 AFY Capacity
	IEUA	Monte Vista Regional Pipeline	1.85			2004	2010	6,424 AFY Capacity
	IEUA	Etiwanda South Regional Pipeline	0.99			2004	2010	351 AFY Capacity
	IEUA	Arrow Route Regional Pipeline	9.20			2004	2010	4,100 AFY Capacity
	IEUA	Benson Avenue Regional 4.25-Million Gallon Storage Reservoir and Pumping Station	4.22			2004	2010	
	IEUA	Etiwanda Ave Regional 9.18-Million Gallon Storage Reservoir and Pumping Station	8.95			2004	2010	
	IEUA	EdisonMerril Regional Pipeline	6.11			2006	2010	500 AFY Capacity
	IEUA	210 Freeway Distribution Pipeline	13.90			2006	2010	5,210 AFY Capacity
	IEUA	Walnut/Riverside Regional Pipeline	9.30			2006	2010	1,575 AFY Capacity
	IEUA	Euclid Avenue Regional Pipeline (Alternative A)	2.15			2006	2010	2,150 AFY Capacity
	IEUA	Conversion Ramona Feeder Regional Pipeline (Alternative B)	6.80			2006	2010	1,127 AFY Capacity
	IEUA	Benson Avenue Regional Pipeline	0.67			2006	2010	39 AFY Capacity
	IEUA	Foothill Boulevard Regional Pipeline	2.85			2006	2010	274 AFY Capacity
	IEUA	Montclair 4.25 Million Gallon Storage Reservoir and Pumping Station	4.72			2010	2010	10,970 AFY Capacity
	Various	Conceptual IWRP Recycled Water Projects	18.49		3,698		2050	Conceptual Projects
OCWD								
	IRWD	Irvine Ranch Water District (IRWD) Recycled System	30.80		2,500		2010	
	OCSD	OCSD Microfiltration Recycling	200.00				2010	
	OCWD	Green Acres Project Expansion	9.00		3,000	2008	2010	CEQA Complete
	OCWD	Prado Dam Conservation Project	3.00				2010	Feasibility Report Complete. CEQA Underway.
	Various	Conceptual IWRP Recycled Water Projects	35.64		7,128		2050	Conceptual Projects
SBVMWD								
	Beaumont/BCVWD	City of Beaumont/Beaumont-Cherry Valley Water District Recycled Water System, Phase 1	5.00	1,000	2,250	2002	2010	CEQA 2002
	Beaumont/BCVWD	City of Beaumont/Beaumont-Cherry Valley Water District Recycled Water System, Phase 2	5.00		1,750	2003	2010	CEQA 2002
	Big Bear Area Regional Wastewater Agency	Big Bear Recycled Water Planning Study	0.40		500	2002	2010	No CEQA
**	City of Redlands	City of Redlands Recycled Water System	19.50		9,500	2002	2010	CEQA Complete
	Running Springs Water District	Running Springs Recycle Project Study	0.06		300	2002	2010	No CEQA

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
**	YVWD	Yucaipa Valley Water District (YVWD) Recycled System	18.50		4,700		2010	
	Various	Conceptual IWRP Recycled Water Projects	8.05		1,609		2050	Conceptual Projects

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
WMWD								
	City of Corona	City of Corona Recycled Water Distribution System, Phases 1 - 5	46.30		7,100	2005	2010	CEQA Complete
**	City of Norco	City of Norco Recycled Water Piping	0.73		900	2002	2010	
	City of Riverside	City of Riverside Recycled System	9.10		3,696		2010	No CEQA
	EVMWD	EVMWD Recycled Water System	26.70		6,500		2010	No CEQA
	SAWPA	Colton Water Reclamation Plant to Colton Power Plant	7.00				2010	
**	WMWD	March Air Reserve Base (MARB) Tertiary Treatment	3.89		1,000	2002	2010	
	Various	Conceptual IWRP Recycled Water Projects	19.52		3,904		2050	Conceptual Projects
		Subtotal 2010 Projects	665.26	1,000	96,236			
		Subtotal 2025 Projects	90.68	0	18,135			
		Total	755.93	1,000	114,371			

Flood Protection

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
EMWD								
**	EMWD	San Jacinto Water Harvesting Project	0.90	320		2002	2010	CEQA Complete
	RCFCWCD	San Jacinto MDP Line E	4.60				2010	
IEUA								
**	RCFCWCD/EMWD	County Line Channel	14.13				2010	
	SBCFCD	Grove Basin to Prado Dam	18.00				2010	
	SBCFCD	English Channel (Chino Hills)	2.00				2010	
	SBCFCD	Sultana/Cypress Storm Drain	2.00				2010	
	SBCFCD	Cactus Basin #4 and #5	15.00				2010	
	SBCFCD	Potato Creek Spreading Grounds	10.00				2010	
	SBCFCD	Randall Basin (CSDP 3-5)	3.00				2010	
**	SBCFCD	Riverside Drive Storm Drain, Segment 2	10.30				2010	
OCWD								
	OCPFRD	Anaheim-Barber City	42.00				2010	
	OCPFRD	Bolsa Chica Channel	51.00				2010	
	OCPFRD	Brea Canyon Channel	15.00				2010	
	OCPFRD	Carbon Creek	61.00				2010	
	OCPFRD	Coyote Creek	22.00				2010	
	OCPFRD	East Garden Grove-Wintersburg and OV	147.00				2010	
	OCPFRD	Fullerton Creek	62.00				2010	
	OCPFRD	Hunington Beach/Talbert Channel System	40.00				2010	
	OCPFRD	Imperial Channel	7.00				2010	
	OCPFRD	La Mirada Channel	2.00				2010	
	OCPFRD	Los Alamitos Pump Station	5.00				2010	

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
	OCPFRD	Los Alamitos	30.00				2010	
	OCPFRD	Loftus Diversion	9.00				2010	
	OCPFRD	San Juan Creek Trabuco Creek	24.00				2010	
	OCPFRD	Santa Ana - Delhi Channel	11.00				2010	
	OCPFRD	Westminster Channel	40.00				2010	
SBVMWD								
	EVRCD	East Valley Resource Conservation District - Yucaipa Detention Basins	6.00				2010	
WMWD								
	RCFCWCD	Gavilan Hills Debris Basin	3.00				2010	
	RCFCWCD	Mockingbird Canyon Floodplain Acquisition	4.40					
	LESJWA	Agricultural Flood Protection	6.00				2010	
	LESJWA	Salt Creek Channel Improvements	2.40				2010	
	LESJWA	Canyon Lake Causeway Improvement	1.20				2010	
	LESJWA/RCFCWCD	San Jacinto River Stage 4	14.40				2010	
		Subtotal 2010 Projects	685.33	320	0			
		Subtotal 2025 Projects	0.00	0	0			
		Total	685.33	320	0			

Wetlands, Environment, and Habitat

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
EMWD								
	EMWD	San Jacinto Habitat Acquisition	3.20			2003	2010	CEQA 2003
	LESJWA	San Jacinto Flow-Through Wetands	3.00				2010	No CEQA
	RCWD	Rancho California Water District (RCWD) Arundo Removal	0.30		500		2010	
IEUA								
	City of Ontario/City of Chino	City of Ontario/City of Chino Habitat Acquisition	24.20				2010	
OCWD								
	OCPFRD	Orange County Public Facilities & Resources 1,200 Acre Arundo Removal	6.00		4,000		2010	
	OCCC	Orange County Conservation Corps Arundo Removal @ Featherly Park	3.00		2,000		2010	
SBVMWD								
	Riverside Consevancy	San Timoteo Greenway Co. Wetlands	11.00				2010	
	SAWA RCD	East Valley Resource Conservation District (EVRCD) Arundo Removal	20.00		3,000		2010	

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
SAWPA								
	SAWPA	Arundo Removal/Restoration	56.00		18,000		2010	
	Various	Native and Treatment Wetlands	63.70				2010	
	Various	Santa Ana Sucker Restoration	10.00				2010	
	Various	Watershed Planning, Modeling, and Stakeholder Programs	4.00				2010	
WMWD								
	LESJWA	Lake Elsinore Nutrient Removal (Wetlands)	12.00			2003	2010	CEQA 2002
	LESJWA	Non-Native Plant Material Removal	2.40				2010	
	RCFCWCD	Mockbird Canyon Floodplain Acquisition	4.40				2010	
	RCPOSD	Riverside County Arundo Removal	25.00		10,000		2010	
		Subtotal 2010 Projects	248.20	0	37,500			
		Subtotal 2025 Projects	0.00	0	0			
		Total	248.20	0	37,500			

Recreation and Conservation

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
IEUA								
	IEUA	Water Conservation Program (Year 2000 – 2005)	1.20				2010	
OCWD								
	MWDOC	MWDOC Water Conservation Program	35.00				2010	
SBVMWD								
	City of Redlands	City of Redlands Water Conservation	3.00				2010	
	SBVWCD	San Bernardino Valley Water Conservation District (SBVWCD) Enhancement	5.00				2010	
	SBVMWD	Bunkerhill Water Storage and Conservation / San Bernardino Vision 2020 Lakes & Streams Project	100.00				2010	
SAWPA								
	Various	Watershed Conserve/Efficiency Grants	50.00				2010	
	Various	Watershed Restoration Education	5.00				2010	
	Various	River Habitat Improvement/Restoration	30.00				2010	
	Various	Santa Ana River Trail Parkway	62.00				2010	No CEQA
	Various	River and Stream Linear Parks and Buffer Openspace	10.00				2010	No CEQA
	Various	Chino Hills State Park Expansion	20.00				2010	
WMWD								

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
	LESJWA	Reclaimed Water Connection and Conveyance Facilities	1.30			2003	2010	CEQA 2002

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

Table ES.1
2002 Integrated Water Resource Plan Projects in the Santa Ana Watershed

Region	Implementing Agency	Project Name	Total Cost (millions)	Storage (AF)	Yield (AFY)	Estimated Start of Construction	IWRP Planning Time Horizon	Notes
	LESJWA	Make-Up Water Purchases	1.80				2010	
	RCRCD	Riverside-Corona Resource Conservation District Agricultural Water Management	0.05				2010	
		Subtotal 2010 Projects	324.35	0	0			
		Subtotal 2025 Projects	0.00	0	0			
		Total	324.35	0	0			
		Subtotal 2010 All Programs	3,884.38	629,515	562,455			
		Subtotal 2025 All Programs	1,353.32	967,200	205,455			
		Total All Programs	**5,237.70**	**1,596,715**	**767,910**			

**Projects Already Funded under the Southern CA Integrated Watershed Program (SCIWP) Project

CHAPTER 1 INTRODUCTION

Water supply and water quality issues are the focal points of the 2002 Integrated Water Resources Plan (IWRP). The IWRP recognizes that in order to support future economic growth, agencies within the Santa Ana Watershed (SAW) must proactively protect existing water resources and identify new methods and technologies to obtain future and reliable water supplies. Compiling a water resources plan in a region where the population is projected to increase almost two-fold over the next 50 years is indeed a major undertaking. The reader must bear in mind that the IWRP is a planning document, and merely attempts to build upon the foundation of the 1998 Santa Ana Watershed Project Authority (SAWPA) Water Resources Plan (WRP). By taking into account the many current and projected projects and plans of SAWPA's five member agencies, as well as those of many agencies within the SAW boundaries, an overall picture of the goals and challenges facing the watershed comes more clearly into focus.

SAWPA's origins can be traced to its formation as a planning agency in the early 1970's. A joint powers agency, SAWPA was formed as a by-product of the 1969 Stipulated Judgment involving four of its member agencies, among others, to ensure the supply of good quality water from the SAW. Today, SAWPA's five member agencies are Eastern Municipal Water District (EMWD), Inland Empire Utilities Agency (IEUA), Orange County Water District (OCWD), San Bernardino Valley Municipal Water District (SBVMWD), and Western Municipal Water District (WMWD). Together they are working toward ensuring a stable and reliable water supply for the region.

1.1 IWRP Planning Process

SAWPA staff spent approximately four months acquiring data from various agencies within the watershed boundaries. Most of the information within the pages of this report is gleaned primarily from planning documents from the various agencies, as well as from direct discussions/interviews with agency staff members. In general, regional long-term projects are primarily developed and described by SAWPA Staff.

1.1.1 Data Collection

SAWPA solicited input and met with personnel from each of its five member agencies, and also met on a regular basis with MWD personnel, who are currently in the process of revising their own IRP.

With regard to wastewater treatment facilities production, SAWPA contacted almost two dozen agencies and, when available, collected the requested information.

In all, the following agencies were contacted during the development of this plan:

- City of Beaumont
- Big Bear Area Regional Wastewater Agency
- California Department of Corrections
- California Regional Water Quality Control Board, District 8

- City of Colton
- City of Corona
- Eastern Municipal Water District
- Elsinore Valley Municipal Water District
- Inland Empire Utilities Agency
- Irvine Ranch Water District
- Lee Lake Water District
- Metropolitan Water District of Southern California
- Municipal Water District of Orange County
- County of Orange
- Orange County Sanitation District
- Orange County Water District
- City of Redlands
- City of Rialto
- City of Riverside
- County of Riverside
- Running Springs Water District
- City of San Bernardino
- County of San Bernardino
- San Bernardino Valley Municipal Water District
- Water Conservation District
- Western Municipal Water District
- Yucaipa Valley Water District

It should be noted that Section 1.2, Demographic Information, was provided by William F. Gayk, Center for Demographic Research, California State University, Fullerton.

1.2 Demographic Information

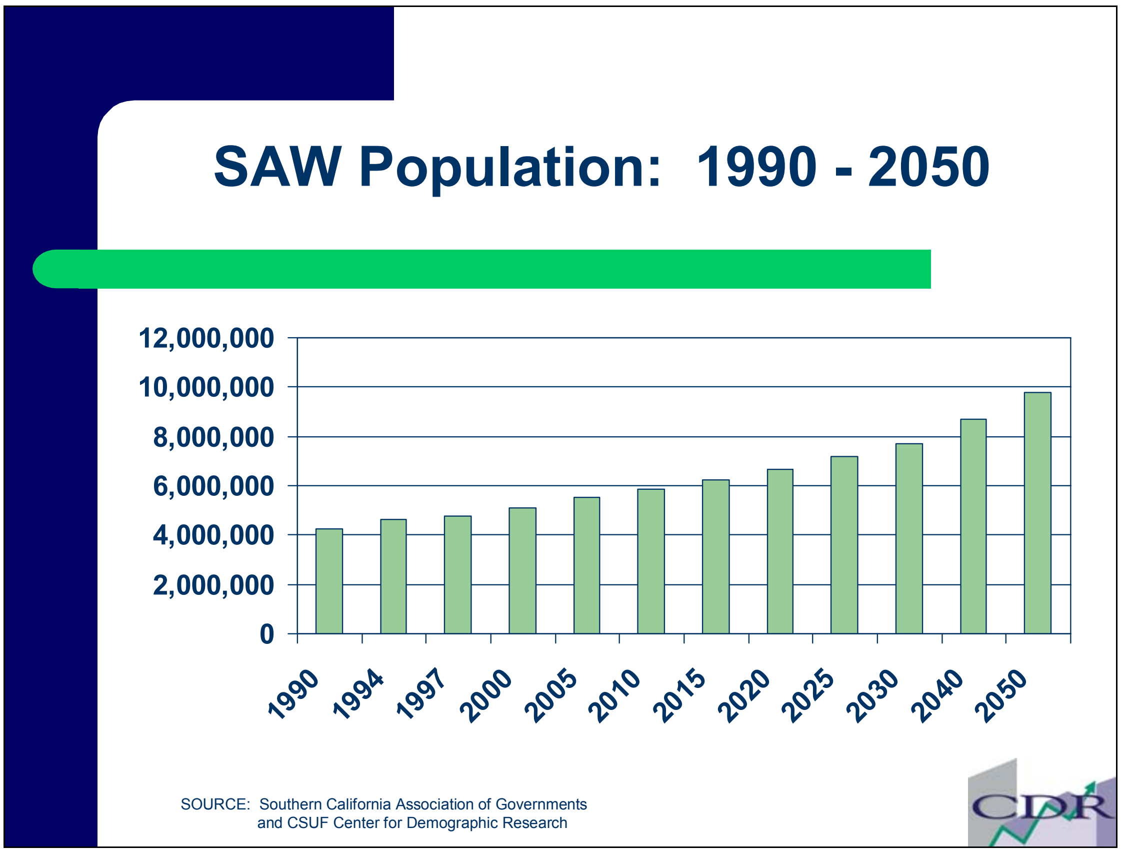
This section presents forecasts of several key socio-economic variables for the Santa Ana Watershed (SAW) region. Most of the forecasts have a planning horizon of 2025, with the exception of population, housing, households, and employment, which were forecasted to 2050. This region includes areas from the counties of Los Angeles, Orange, Riverside and San Bernardino, most of which are within the Santa Ana River watershed.

The primary source data for these forecasts are the Southern California Association of Governments' (SCAG) socio-economic forecast data sets used in the 1998 and 2001 Regional Transportation Plans, which included 1990 counts and forecasts to 2025. These forecasts were supplemented with data from the California State Department of Finance (DOF) 1998 population projections, DOF projection of population by county to 2040 and Census 2000 information, DOF estimates of population, housing and households, 2000 Census and employment projections developed by the California State University, Fullerton Institute for Economic and Environmental Studies. These data were used to forecast population, housing, households, and employment for 2030-2050.

1.2.1 Population

In 1990, approximately 4.2 million people resided in the Santa Ana Watershed. Approximately 2.08 million resided in Orange County, 1.1 million in San Bernardino County, 0.9 million in Riverside County, and 0.2 million in Los Angeles County. During the 1990s, the population increased by just over 900,000 or an increase of 21.3 percent. The rate of growth in this area was above the 12.7 percent for the four counties between 1990 and 2000.

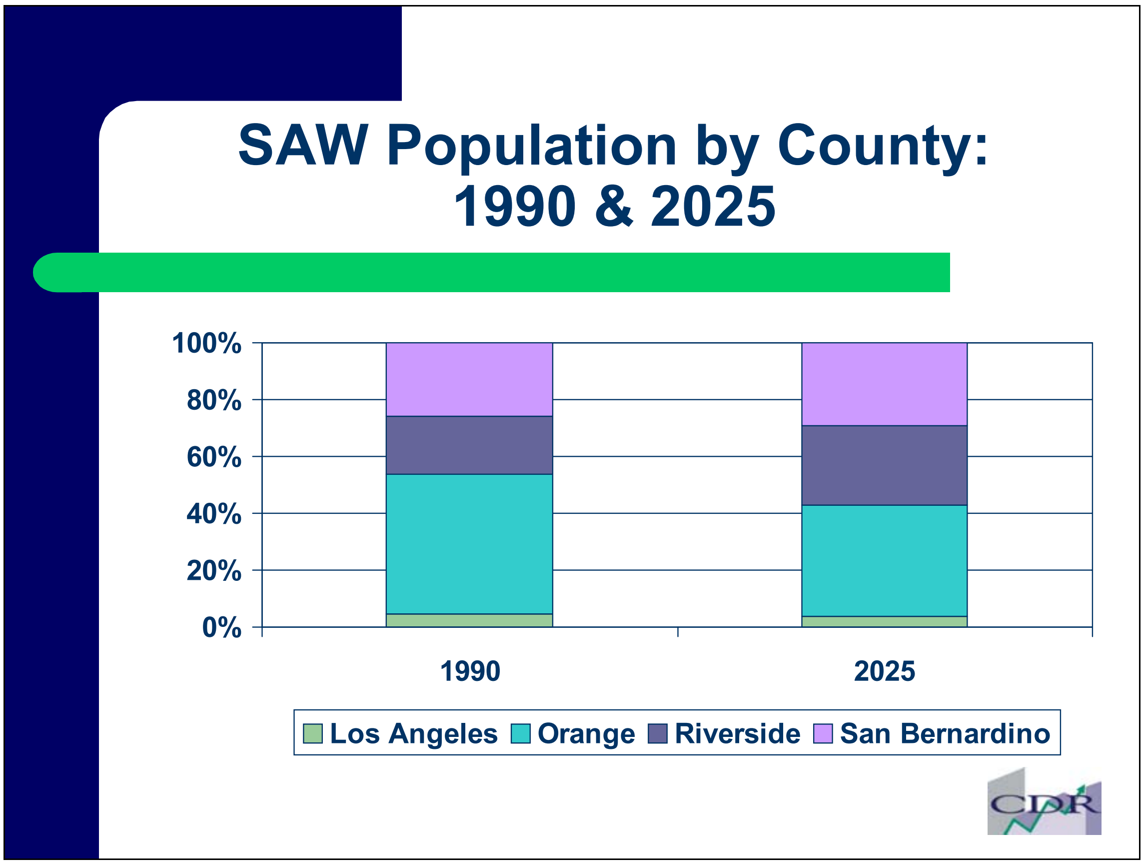
Figure 1.1



By 2010, the population of the SAW is expected to reach 5.9 million, a 768,000 increase. The rate of increase during this period translates to 15 percent, or a simple annual average of 1.5 percent. The rate of growth in San Bernardino and Riverside Counties will be much higher than that in Los Angeles and Orange Counties. While in 1990 and 2000 the majority of the population resided in the Los Angeles and Orange Counties portion of the region, by 2010 the population split is expected to essentially be even between Riverside-San Bernardino Counties and Los Angeles-Orange Counties as the level of population growth declines in the two coastal counties and the level of growth remains high in the two inland counties.

From 2010 to 2025, the population is expected to grow by 1.41 million people, reaching 7.3 million. The simple annual rate of increase will be 1.6 percent, a higher rate than the prior ten-year period. Much of this can be attributed to the availability of land in the eastern portion of the region in relation to the unavailability of land in southern and central Los Angeles County and most of Orange County. By 2025, the majority of the population in the SAW will be in Riverside and San Bernardino County. Of the total population, 4.2 million will be located in these two counties, while the remaining 2.9 million will be located in Orange and Los Angeles Counties.

Figure 1.2



By 2050, the population of the region is projected to reach 9.9 million. This is a 35 percent increase from 2025 or a 1.4 percent average annual increase. This figure seems to be startling at first sight, because the population will nearly double from what it is today. To help put this in perspective, the 2040 population is projected here to reach 8.9 million, an increase of 3.8 million from the 2000. In comparison, the State Department of Finance (DOF) has projected the total population for the 4 counties of Los Angeles, Orange, Riverside, and San Bernardino to reach 26.6 million by 2040, or an increase of over 11 million from the 2000 population. In 2040, the SAW region population will account for 32.7 percent of the total population in the four counties, while today it accounts for about 31 percent of the total population. DOF also projects the populations of both Riverside and San Bernardino to each exceed that of Orange County. Currently, their combined populations are about equal to that of Orange County. A significant portion of the growth in Orange and Los Angeles Counties will be outside of the SAW, while a significant portion of the growth in Riverside and San Bernardino Counties will be within the

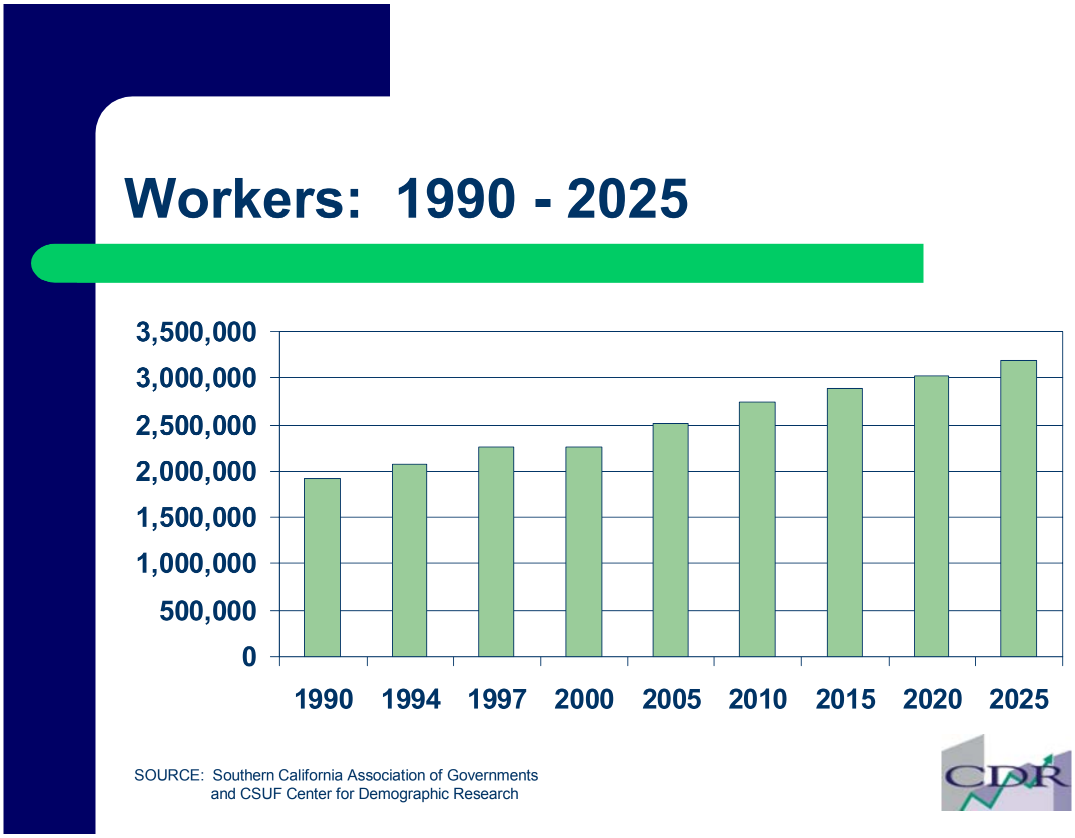
SAW region. Figure 1.1 demonstrates the overall SAW population growth from 1990 to 2050 while Figure 1.2 compares 1990 population by county with 2025 population projections.

1.2.2 Workers

Growth of the size of the workforce is highly correlated with the growth of the population. It is the supply side of the number of the "workers equation." On the one hand, the growth of the workforce is directly related to growth associated with migration of the adult population, both from domestic and foreign migration. Although population growth due to births does not influence the size of the workforce immediately, there is a lag effect on the size of the workforce as the youth population ages and moves into adulthood. The number of workers is also related to the number of jobs. This is the demand side of the "workers equation." In a "closed" economy, the number of workers would equal the number of jobs if each worker had one and only one job. In today's economy, many individuals hold more than one job. Even if workers hold more than one job, the number of workers will expand and contract as the economy expands and contracts. The SAW region is not a "closed" economy, but exists within the larger Southern California regional economy. Many workers residing in the SAW region may work outside of the SAW region somewhere else in Southern California. The health of the regional economy will influence the number of workers.

The number of workers in the SAW region numbered 1.9 million in 1990. This number increased by 333,000 by 2000 reaching 2.26 million. This is a 17.3 percent increase or a simple average annual increase of 1.73 percent. By 2010, the number of workers is expected to reach 2.7 million and 3 million by 2025. Over the next twenty years, there will be a large supply of workers to meet the needs of the local, as well as the regional, economies.

Figure 1.3

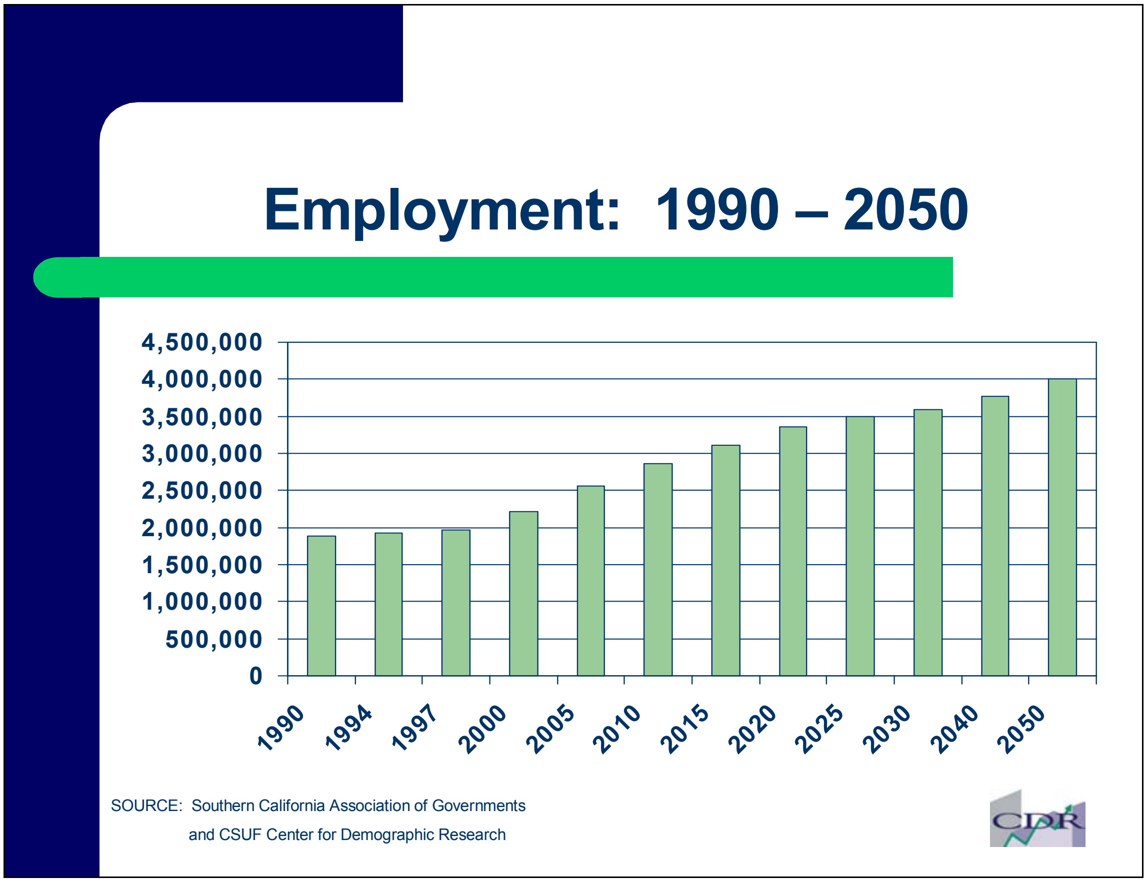


The rate of growth of the workforce will be below that of the total population, although they do parallel one another. Much of this is due to the fact that the "baby boom" cohort is aging and will be leaving the workforce over the next 25 years. The youngest "baby boomers" will be over 60 years of age in 2025, while the oldest will be close to 80. Across Southern California, including the SAW region, the population of persons of working ages (primarily persons 25 to 64 years of age) will not grow as fast as the total population. Thus, the population of workers will grow at a slower rate even though it is expected that the number and percentage of people working beyond traditional retirement years will increase. Figure 1.3 reveals the growth of the workforce from 1990 to 2025.

1.2.3 Employment

The SAW region is a major job center in Southern California. There were 1.9 million jobs in the SAW region in 1990. If the SAW region were a Metropolitan Statistical Area, it would rank second in the state, next to Los Angeles, in the number of jobs. By 2000, it was estimated that there were 2.2 million jobs and a projected 2.9 million jobs by 2010. The projected increase of 655,000 jobs between 2000 and 2010 is a 35 percent increase (a simple average annual increase of 3.5%). It is more than double that of the population and housing increase. Job growth between 2010 and 2025 will continue at a rate above population and housing, but lower than the 2000 to 2010 rate. It is projected that jobs will grow by 624,000, or an increase of 22 percent for a simple average annual increase of 1.5 percent. The number of jobs in the SAW region will top four million by 2050, adding just over one-half million jobs from 2025. Job growth will slow considerably during this period, down from a 1.5 percent simple annual average to a 0.6 percent simple average annual rate of growth. See Figure 1.4 for employment growth projections from 1990 through 2050.

Figure 1.4

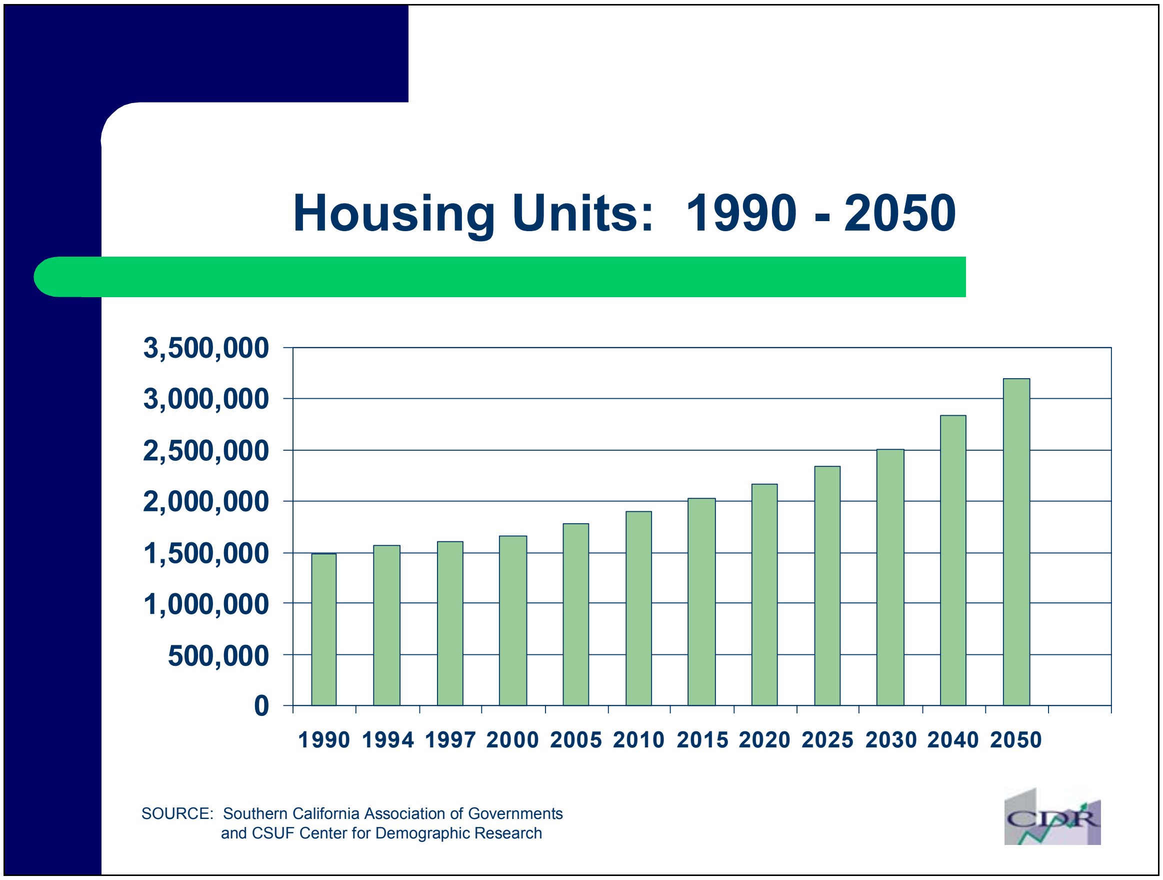


1.2.4 Housing

In 1990, there were approximately 1.49 million housing units on the ground in the SAW region. By 2000, the number of housing units in the SAW region was estimated to have reached 1.67 million, or an increase of approximately 179,000 housing units. The rate of increase averaged 1.2 percent during the decade of the 1990s. The rate of increase for housing was below that of population, resulting in a higher density in 2000. The average number of persons per household in 1990 for the region was 3.03 and it increased to 3.22 by 2000.

The projected number of housing units in 2010 is expected to reach 1.9 million with 236,000 units being added to the housing stock. This is an increase of 14.2 percent, or a simple annual average of 1.4 percent. Both the number of units added and the rate of increase will be higher than that in the prior decade.

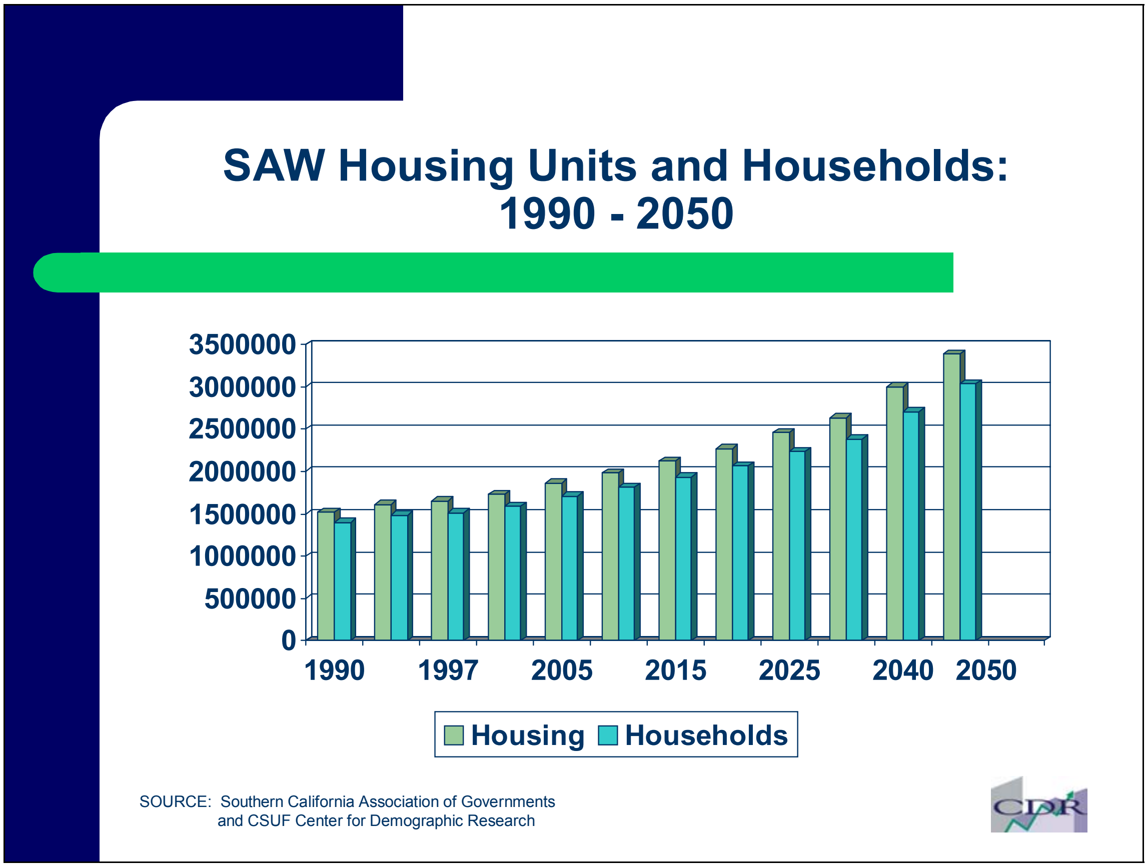
Figure 1.5



There are at least two reasons for the increase in housing units. First, the Southern California housing market was somewhat depressed in the early part of the 1990 decade. In the combined counties of Orange, Riverside, and San Bernardino, which make up most of the SAW area, approximately 46% of the housing built during the 1990s was in the first five years and the remaining 54% was built in the remaining five years. Second, a larger share of future development in Southern California will occur in the SAW region, particularly in western Riverside and San Bernardino Counties.

From 2010 to 2025, the rate of increase for housing units will increase to 1.5 percent, because of the second reason noted just above. The number of housing units will reach 2.35 million. By 2050, the number of housing units is projected to reach 3.19 million. Putting this in perspective, this figure is less than the current number of housing units currently in Los Angeles County. See Figure 1.5 for the project growth of housing units from 1990 through 2050.

Figure 1.6



Looking at households (technically defined as occupied housing units), the patterns are similar, but there are some notable differences in the rates. Households grew at a higher rate between 1990 and 2000. This growth absorbed almost 2% of the vacant housing stock that existed in 1990. Between 2000 and 2010, and 2010 and 2025, the number of households is projected to grow at a faster rate than housing, resulting in a continued shrinking of the vacant units. In 2025, the vacancy rate will be about one-half of what it was in 1990. Over the next 25 years, vacancy rates are expected to remain low in the SAW region.

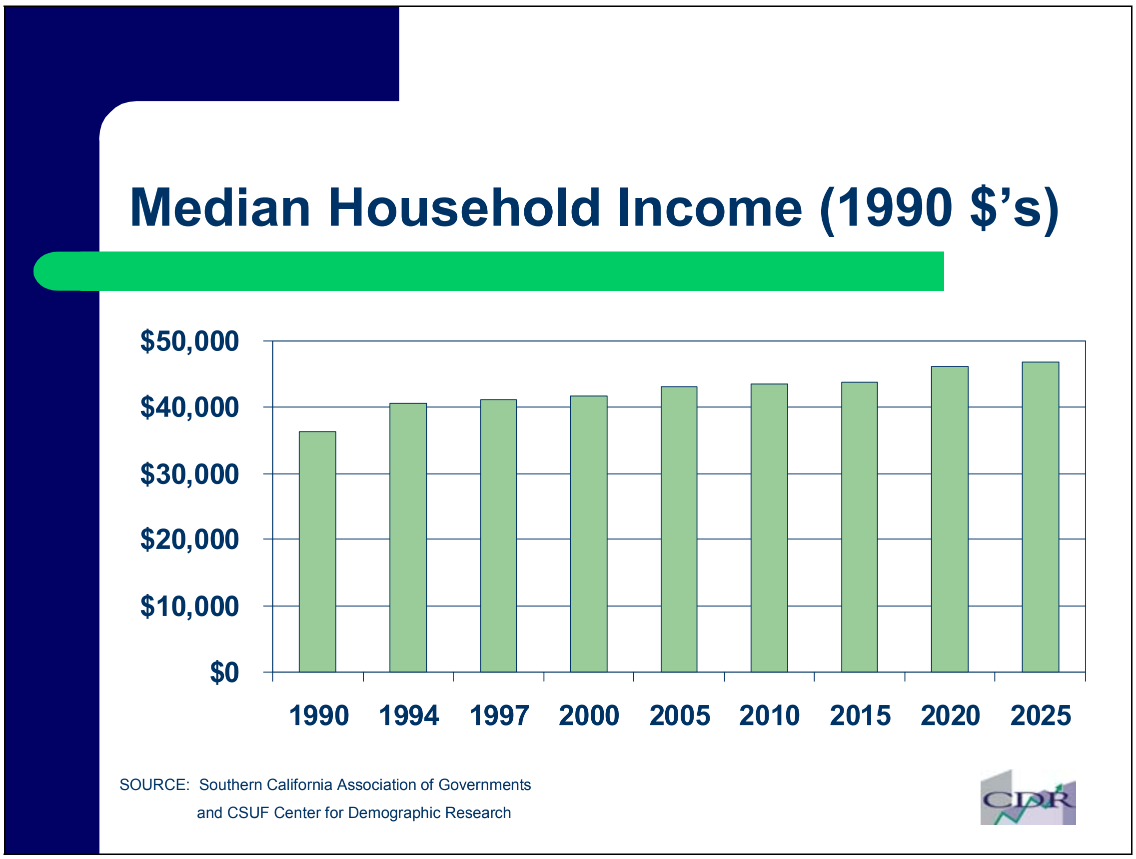
The split between single family and multiple family households is almost a constant. In 1990, 63.5% of the households were single-family households climbing slightly to an estimated 63.8% by 2000. Not much change is projected. By 2010, single-family households are projected to represent 64.4% of the households in the SAW region and 64.5% by 2025. See Figure 1.6 for the comparison of housing units vs. households from 1990 through 2050.

1.2.5 Income

Median household income, as measured in 1989 dollars, increased between 1990 and 2000. In 1990, the median household income level was measured at $36,390 and was estimated to have reached $41,672 by 2000. Some of the growth can be attributed to the economic boom of the late 1990s, following the recession of the early part of the decade. Another reason for the increase is the migration of mid-income level households into the Inland Empire, especially from Los Angeles and Orange County. This contributed to pushing the median upward.

As shown in Figure 1.7, the overall outlook is that median household income will continue to increase to 2025, reaching $46,885. Continued economic development in the region, rising income levels as more higher paying jobs are created and located in the Inland Empire, and migration of mid-income level households will push the median upward.

Figure 1.7

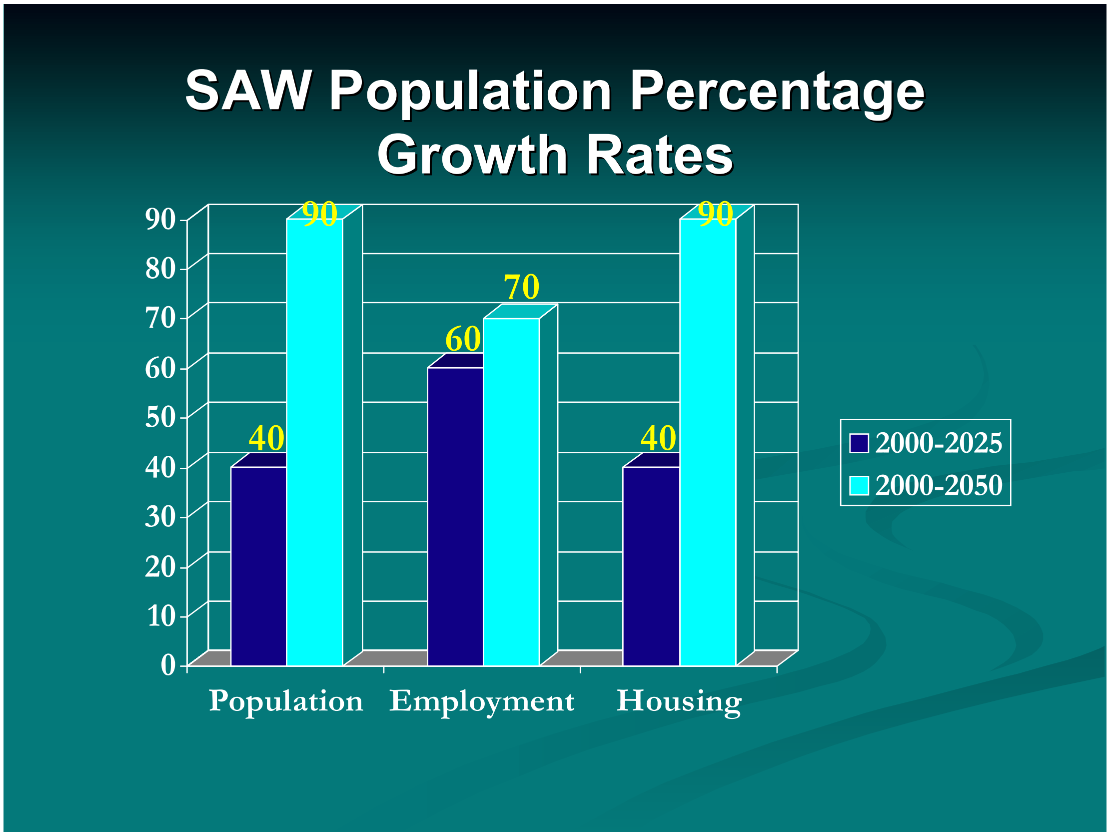


1.2.6 Conclusions

The SAW region is, and will remain, a major growth area over the next twenty-five years. Even beyond 2025, the region will grow. The area has a vast inventory of land that can and will be transformed to urban uses from agriculture and other non-urban uses. Much of this land is located inland in Riverside and San Bernardino Counties. In Orange County, as first stage build-out is rapidly approaching due to the absorption of most of the developable land over the past fifty years, redevelopment and infill are and will contribute to growth. It needs to be cautioned that these forecast are assuming some of the major issues are dealt with. Foremost among these issues is the expansion of the transportation network, especially between the coastal areas and the Inland Empire. Without such expansion, there will be an inability to move workers from home to jobs at the levels assumed in these projections.

Figure 1.8 further puts into perspective the tremendous projected growth rate of the SAW region. Population will grow 40% by 2025 and 90 % by 2050. Employment will grow 60% and 70% respectively, while Housing will grow by 40% and 90% respectively.

Figure 1.8



1.2.7 Methodology

The primary source data for these forecasts are the Southern California Association of Governments (SCAG) socio-economic forecast data sets used in the 1998 and 2001 Regional Transportation Plans. The 1998 socio-economic data set included 1990 census information, 1994 estimates, and forecasts of the socio-economic variables from 2000 to 2020. The 2001 socio-economic data set included 1997 estimates and forecasts to 2025. These data sets included forecast of socio-economic variables by partial census tract geography from the 1990 Census. A partial census tract is the whole or portion of a census tract in a jurisdiction.

An "overlay" methodology was employed to derive the data for the Santa Ana Watershed region. A map of the region was provided to the California State University, Fullerton Center for Demographic Research by the Santa Ana Watershed Project Authority (SAWPA). This boundary was overlaid on 1990 partial Census Tracts. A correspondence table was developed that assigned whole or portion of the 1990 partial census tracts to the Santa Ana Watershed.

Tables 1.1 and 1.2 were merged with the 1998 and 2001 SCAG Regional Transportation Plan (RTP) socio-economic data (SED). Each variable in these data sets was then aggregated to the SAW region. The 1990 and 1994 years were derived from the 1998 RTP SED, while the 1997 through 2025 years were derived from the 2001 RTP SED. The Median Household Income data in the 2001 RTP SED was in 1989 dollars while the 1998 RTP SED was not. The 1990 and 1994 Median Household Income were converted into 1989 dollars. 1990 and 1994 Single and Multiple Households were estimated based on 1990 Census rates and the 2001 RTP SED 1997 estimates. Similarly, the 1990 and 1994 Service and Other Jobs had to be derived from the Non-Retail job category in the 1998 RTP SED. Proportions from the 1997 year estimates in the 2001 RTP SED were used.

Population for 2030 to 2050 was forecasted based on 1998 DOF Population Projections for counties. The SCAG forecasts at the county level are lower than the DOF forecasts, especially for the post 2010 years. To develop the longer range forecast, the proportion of SCAG to DOF forecast by county were calculated for 2010 and 2020. The DOF 2030 and 2040 were multiplied by these proportions. The growth trend between 2010 and 2040 for these counties was then extended to 2050 and then used to project 2050. Proportions for the SCAG county level forecast to the SAW region forecast were then derived. The modified DOF projections for 2030 and 2040 and the derived 2050 projections were then multiplied by these proportions to derive the SAW 2030-2050 population forecasts. Both Households and Housing were projected based on the 2000 to 2025 trends in population to households and households to housing rates.

Employment was projected based on the 2000 to 2025 ratios of SAW region jobs to California jobs. Forecasts developed by the CSUF Institute for Economic and Environmental Studies were used for the ratios. These were also trended and then applied to post 2025 job projections for California.

Table 1.1

SANTA ANA WATERSHED SOCIO-ECONOMIC FORECASTS: 1990 - 2025

	1990	1994	1997	2000	2005	2010	2015	2020	2025
POPULATION	4,226,251	4,621,919	4,795,462	5,129,191	5,514,556	5,896,919	6,310,684	6,761,293	7,308,129
Housing	1,487,011	1,565,274	1,598,881	1,665,691	1,778,832	1,901,880	2,032,163	2,169,951	2,348,068
Households	1,395,395	1,479,672	1,519,784	1,591,664	1,707,705	1,833,791	1,963,557	2,101,991	2,273,458
Vacancy Rate	6.2%	5.5%	4.9%	4.4%	4.0%	3.6%	3.4%	3.1%	3.2%
Persons per Household	3.03	3.12	3.16	3.22	3.23	3.22	3.21	3.22	3.21
Single	813,271	862,390	885,768	929,855	988,198	1,059,016	1,127,338	1,206,121	1,288,935
Multiple	466,718	494,905	508,322	526,932	572,394	584,235	617,506	654,666	710,946
Total Jobs	1882456	1931648	1,964,403	2,210,628	2,559,940	2,865,994	3,110,270	3,354,957	3,490,274
Retail Jobs	332,593	331,501	327,976	359,726	424,384	483,267	520,948	553,773	594,309
Service	573,999	578,631	634,728	714,171	867,141	1,010,008	1,103,715	1,193,405	1,276,296
Other Jobs	978,864	1,021,516	1,001,691	1,136,651	1,268,409	1,372,719	1,485,607	1,607,779	1,619,669
K-12 School Enrollment	861,874	942,564	977,955	1,042,780	1,117,463	1,199,668	1,284,671	1,379,350	1,494,571
College/University Enrollment	241,729	264,360	274,286	293,696	324,173	453,530	453,530	453,530	453,530
Median Household Income	$36,390	$40,669	$41,171	$41,672	$43,089	$43,433	$43,801	$46,142	$46,885
Workers	1,924,347	2,066,527	2,256,233	2,257,718	2,503,932	2,738,049	2,895,565	3,027,774	3,187,196

Table 1.2

SANTA ANA WATERSHED SOCIO-ECONOMIC FORECASTS: 2025 - 2050

	2025	2030	2040	2050
POPULATION	7,308,129	7,806,000	8,851,000	9,918,000
Housing	2,348,068	2,506,000	2,843,000	3,191,000
Households	2,273,458	2,426,000	2,752,300	3,089,000
Total Jobs	3,490,274	3,594,000	3,774,000	4,007,000

CHAPTER 2 WATER DEMANDS AND SUPPLIES

2.1 Demands

As was the case with the 1998 SAWPA WRP, water demand projections were obtained from each member district's own internal planning departments and from the local retail water agencies within the SAWPA member districts, rather than from MWD's water demand projections for the SAWPA member districts. This method was used primarily because local agencies, serving customer demands and tracking industry water permits, were thought to have a more current feel of the growth rates than the projections of growth rates from SCAG, which MWD uses in its projections.

Many factors affect future demands such as population growth, economic conditions, and hydrologic conditions, to name just a few. By estimating water demands over the next 50 years, SAWPA member agencies are ensuring that reliable and economic sources of water are available to their customers while protecting the watershed itself. Table 2.1 lists the water demand projections of the SAWPA member districts from the year 2000 through the year 2050. It is important to note that demand refers to direct use water demands within each member agency. These direct demands are used to meet residential, municipal, commercial, and agricultural needs; recharge demands are not taken into account. Water demand forecasts were largely based upon planning tools, such as urban water management plans, water facility master plans, water master plans, as well as planning staff, from each of the individual SAWPA member agencies.

With regard to the raw data provided by the five SAWPA member agencies, only EMWD incorporated water conservation as an inherent part of their projected water demands, while the remaining water agencies did *not* incorporate conservation as part of their projected water demands (Table 2.1). Although several of the agencies do show conservation estimates up through 2020 in their own planning documents, the IWRP only considers conservation during the 2025 and 2050 drought year scenarios discussed in Chapter 11, where conservation is treated as a reliable supply source.

2.2 Supplies

Direct use supply sources are listed in four distinct categories: groundwater, imported water, surface water, and recycled water. Existing and projected supply source quantities for each SAWPA member district are listed in Table 2.2. All water supply source information, once again obtained from SAWPA member districts, is listed on an average annual basis and in AFY. Note that while the water demand totals included only direct use demands, the water supply values reflect both direct use and additional water accepted for recharge or storage, unless the latter quantity is expected to be used to serve a consumptive demand in the district the same year. Where available, a breakdown of the existing and projected quantities of each category of water supply for SAWPA member agencies may be found in Appendix A.

The following is a brief description of each agency's service area:

- EMWD provides both water and sewer service throughout its 555 square mile service area, where approximately 400,000 people reside. Major communities include Moreno Valley, Hemet, San Jacinto, Perris, Sun City, Menifee, Winchester, Temecula, and Murrieta. In addition to its approximately 80,000 retail customers, EMWD wholesales water through seven local water agencies.
- IEUA provides its services to a 242 square mile area in the western portion of San Bernardino, which includes the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, Upland, as well as Cucamonga County Water District and Monte Vista Water District. Approximately 650,000 people reside in IEUA's service area.
- OCWD supplies approximately 75 percent of its service area's water demand and imports the remaining 25 percent. The OCWD service area covers a land area of 355 square miles and 20 cities and water agencies, including the cities of Anaheim, Buena Park, Costa Mesa, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Irvine, La Palma, Los Alamitos, Newport Beach, Orange, Placentia, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster, and Yorba Linda. OCWD serves a population of approximately two million people.
- SBVMWD covers 325 square miles in southwestern San Bernardino County and holds a population of about 600,000. Major areas covered include the eastern two-thirds of San Bernardino Valley, Crafton Hills, and a portion of the Yucaipa Valley. Cities and communities include San Bernardino, Colton Loma Linda, Redlands, Rialto, Bloomington, Highland, Grand Terrace, and Yucaipa.
- WMWD's area consists of a 510 square mile area in western Riverside County, with a population of almost 500,000 people. Within its boundaries lie the communities of Jurupa, Rubidoux, Riverside, Norco, Corona, Elsinore Valley, and Temecula. WMWD serves imported water directly to more than 13,000 retail customers who are located in the unincorporated and non-water bearing areas around Lake Mathews and portions of the City of Riverside. Ten wholesale customers are also served by WMWD with Colorado River and State Water Project water.

2.2.1 Direct Use Water Supply Sources

Direct use water supply sources include groundwater, imported water, surface water, and recycled water. Together, they comprise the water supply sources to meet the direct use water demands discussed in Section 2.1. Water conservation was *not* considered as a source of supply for the purposes of this report, with the exception of the 2025 and 2050 scenarios discussed in Chapter 11. The conservation strategy is further discussed in Chapter 10 and primarily involves the implementation of cost-effective long-term programs that have long-lasting savings.

2.2.1.1 Groundwater

Groundwater continues to be the primary water supply source available to the SAW, accounting for approximately 67% of the total water demands, or 977,000 AFY for the year 2000. By the year 2025, groundwater is estimated to comprise approximately 61% of total water demands, or 1.15 million AFY, and by year 2050, those figures are 58% and 1.26 million AFY, respectively. This critical supply source, however, has been threatened by degraded groundwater quality, mostly due to high total dissolved solids (TDS) and nitrates. SAWPA and other agencies are currently implementing projects and programs to treat the groundwater supplies for drinking water quality and to help protect existing groundwater supply to meet future demands.

Groundwater production is supported by incidental and artificial recharge of recycled water, imported water, and storm water supplies. Groundwater production levels are expected to gradually increase by modification of operational rules of existing facilities, providing new facilities, salvaging presently impaired groundwater by installing well head and regional treatment systems, and new sources of water for replenishment (e.g., recycled water). Groundwater replenishment occurs both naturally and within constructed groundwater recharge and replenishment facilities within the watershed. Replenishment facilities percolate or inject storm water, recycled water, and/or imported water. Also, in some basins within the SAW, in-lieu replenishment may occur, i.e., available imported water is used in-lieu of groundwater, storing the groundwater for times when imported water is not available.

In all the water quantities listed in the previous tables, desalted water is included as part of the groundwater supply or recycled water supply, depending on the source of supply. This is done to avoid the potential double counting of desalted water that is not a new water supply but rather a form of advanced water treatment. For example, in OCWD, desalted water is obtained from treatment of Water Factory 21 recycled water and is injected back into the ground as a seawater intrusion barrier. In WMWD, desalted water is included in the groundwater supply quantity because it is obtained from the treatment of Arlington basin groundwater.

2.2.1.2 Imported Water

Imported water is the second largest water supply source to the SAW, accounting for approximately 23% of the total water demands, or 340,600 AFY for the year 2000. By the year 2025, imported water is estimated to remain at approximately 25% of total water demands, or 467,000 AFY, and by year 2050, those figures are 26% and 568,000 AFY, respectively. Metropolitan Water District's (MWD) Colorado River Aqueduct (CRA) and the Department of Water Resources' (DWR) California Aqueduct provide imported water to the SAW. Four of the five SAWPA member agencies (the exception being SBVMWD) have historically relied primarily on MWD for imported water. According to MWD, SAWPA agencies imported approximately 450,000 AFY, or 33% of total water consumption, in recent years. It is anticipated that MWD's IRP Update will emphasize the goals of reducing dry-year dependence on supplies from the California Aqueduct and increasing reliance on groundwater storage. These very goals are consistent with those of the SAW.

EMWD, IEUA, OCWD (through the Municipal Water District of Orange County, or MWDOC), and WMWD are all members of the Metropolitan Water District of Southern California (MWD). MWD is a public agency that provides supplemental imported water from Northern California (State Water Project) and the Colorado River to 26 member agencies located in portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties.

Nearly 90% of the population within these counties (about 16 million people), reside within MWD's 5,200 square mile service area. As a water wholesaler, MWD has no retail customers. It distributes treated and untreated water directly to its member agencies. MWD provides an average of 60% of the municipal, industrial, and agricultural water used within its service area. The remaining 40% comes from local wells, local surface water, recycling and from the City of Los Angeles' aqueduct in the eastern Sierra Nevada.

MWD's primary goal is to provide reliable water supplies to meet the water needs of its service area at the lowest possible cost. In the past, the delivery of water to the MWD's member agencies has been nearly 100 percent reliable; however, as existing imported water supplies from the Colorado River and State Water Project face increasing challenges, the reliability of deliveries from these sources continues to decline.

To address these challenges, MWD and its member agencies developed an Integrated Water Resources Plan (IRP) in 1996 and is scheduled to complete the 2002 IRP Update by July 2002. The overall objective of the IRP process is that "Metropolitan and its member agencies will have the full capability to meet full-service demands at the retail level at all times."

Finally, MWD provides financial support for local water projects implemented by its member agencies that contribute to an increase in the reliable water supplies available to the region. Currently, MWD sponsors two programs:

- The Local Resources Program (LRP), established in June 1998, encourages the construction of recycled water and recovered groundwater projects. It replaced the longstanding Local Projects Program (LPP) and the Groundwater Recovery Program (GRP), originally established in 1982, and 1991, respectively. MWD currently provides a financial contribution of $154 for each new AF of water developed from local water recycling that replaces a demand on MWD's system. Local agencies may receive up to a maximum of $250 per acre-foot of firm yield for groundwater recovery projects that treat contaminated groundwater and produce clean water. Participation in the program is through a competitive request for proposal (RFP) process that seeks to identify local projects that best meet the region's need and provide the greatest return on investment.
- MWD also provides financial and technical assistance to its member agencies for implementing the water conservation measures, known as Best Management Practices (BMP), contained in the Urban Water Conservation Best Management Practices Memorandum of Understanding. The Conservation Credits Program was established in 1988. MWD pays the lesser of one-half the program cost or the equivalent of $154 per acre-foot of water saved through conservation. A variation of this policy provides funding for ultra-low-flow toilet replacements programs at the flat rate of $60 per toilet.

With the approval of the California State Water Bond (Proposition 13), MWD is also responsible for distributing $45 million in funds for the development of conjunctive management programs in Southern California. Like the LRP, this program is administered through a competitive RFP process.

2.2.1.3 Surface Water

Surface water is the third largest water supply source to the SAW, accounting for approximately 5% of the total water demands, or 77,700 AFY for the year 2000. By the year 2025, surface water is estimated to remain at approximately 5% of total water demands, or 95,340 AFY. By year 2050, those numbers are 4% and 96,300 AFY. Sources of this local surface water include a vast network of rivers and streams, which themselves result from local rainfall, snowfall, and natural springs. Some of this flow is lost to storm drain channels during major storm events, but many facilities, such as dams and percolation ponds, also exist within the watershed to capture much of the water runoff. In fact, only a fraction of surface water is used directly; the remainder is used for additional recharge purposes.

2.2.1.4 Recycled Water

Recycled water currently represents the fourth largest water supply source to the SAW, accounting for approximately 4% of the total water demands, or 61,000 AFY for the year 2000. By the year 2025, recycled water is estimated to increase to approximately 9% of total water demands, or 179,000 AFY, and by year 2050, those figures should increase only slightly to 11% and 238,000 AFY, respectively. As shown in Table 2.2, recycled water is projected to surpass surface water to become the third largest supply source for the SAW. Note that the above statistics only represent direct use applications such as landscape and agricultural irrigation, as well as commercial and industrial uses.

2.2.2 Additional Recharge Water Supply Sources

Totals for additional recharge water supply sources are listed at the end of Table 2.2. Again, the sources are divided between imported, surface, groundwater, and recharge water supplies. Surface water currently comprises the majority of additional recharge; in fact, this is expected to continue over the next 50 years as more and more facilities are constructed for the purposes of capturing and storing more and more storm and river flows.

One example of surface water recharge would be a series of spreading basins currently being constructed by IEUA in order to capitalize on the precious resource of storm waters that would otherwise be lost flows to the ocean. The goal is to capture as much storm water as possible in existing and new basins and to hold that water in storage until it completely percolates in the basin and recharges underlying groundwater.

Imported water is currently the second largest water source used for additional recharge, though projections indicate that by 2050 its contributions will drop to last place. As mentioned earlier, MWD and DWR are the primary providers of imported water.

Recycled water today represents the third largest water source for recharge purposes, but by 2050 it is expected to surpass groundwater to represent the second most significant water source. An excellent example of recycled water is OCWD's Groundwater Replenishment System (GWRS), which is expected to recharge approximately 78,400 AFY of highly treated municipal wastewater during the project's first phase.

Table 2.1
Current and Projected Direct Use Water Demands in the Santa Ana Watershed (AFY)

Member Agency	2000	2005	2010	2015	2020	2025	2050
EMWD	179,000	196,580	219,461	239,000	255,100	261,000	326,600
IEUA	247,200	267,360	298,750	312,200	320,200	328,400	375,660
OCWD	525,000	548,500	571,000	591,500	612,000	622,250	627,875
SBVMWD	226,702	232,732	242,016	251,300	260,583	269,868	316,286
WMWD	277,842	322,758	354,158	376,432	397,634	410,237	513,320
Totals	**1,455,744**	**1,567,930**	**1,685,385**	**1,770,432**	**1,845,517**	**1,891,755**	**2,159,741**

Notes:

(1) Source: "EMWD Water Supply Spreadsheet." Average precipitation year.

(2) Source: "IEUA Water Demands and Supplies Spreadsheet," IEUA Urban Water Management Plan Year 2000 Update, and Draft IEUA Recycled Water System Feasibility Study, November 2001. 2050 figure was interpolated. Average precipitation year.

(3) Source: 2000 figures from OCWD 2020 Master Plan Report. 2005 - 2020 figures from "OCWD Water Demands and Supplies Spreadsheet" and OCWD computer model projection. 2025 & 2050 figures were interpolated. Average precipitation year.

(4) Source: SBVMWD Regional Water Facilities Master Plan - Draft EIR, October 13, 2000 and "SBVMWD Water Budget - Average Year" for ultimate water budget, taken from the "Regional Water Facilities Master Plan Reference Documents. Average precipitation year.

(5) Source: "WMWD Water Supply Sources Spreadsheet." Average precipitation year.

Total Water Demand Increases Compared with Year 2000

	2000	2005	2010	2015	2020	2025	2050
Percentage Increase	**0%**	**8%**	**16%**	**22%**	**27%**	**30%**	**48%**

Table 2.2
Current and Projected Water Supply Sources to Meet Demands in the Santa Ana Watershed (AFY)

Eastern Municipal Water District (1)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	85,000	89,500	91,500	94,300	94,700	94,700	94,700
Imported Water	64,400	72,000	80,700	89,000	100,800	106,700	172,300
Surface Water	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Recycled Water	25,600	31,080	43,261	51,700	55,600	55,600	55,600
Direct Use Water Total	179,000	196,580	219,461	239,000	255,100	261,000	326,600
Additional Recharge Water							
Imported Water	3,600	20,700	18,000	19,100	27,800	26,000	28,500
Recycled Water	10,122	11,900	6,200	6,200	6,900	6,900	6,900
Additional Water Recharge Total	13,722	32,600	24,200	25,300	34,700	32,900	35,400

Inland Empire Utilities Agency (2)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	182,800	183,700	184,600	186,700	188,800	190,900	201,756
Imported Water*	43,800	52,700	59,800	65,000	69,400	73,000	94,003
Surface Water	15,500	18,400	29,600	28,200	26,500	26,500	26,500
Recycled Water	5,100	12,560	24,750	32,300	35,500	38,000	53,402
Direct Use Water Total	247,200	267,360	298,750	312,200	320,200	328,400	375,660
Additional Recharge Water							
Imported (Replenishment) Water	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Surface (Storm) Water	18,790	18,790	23,700	23,700	23,700	24,500	29,400
Recycled Water	500	15,440	20,250	22,700	29,500	32,450	52,261
Additional Water Recharge Total	59,290	74,230	83,950	86,400	93,200	96,950	121,661

Orange County Water District (3)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	384,000	406,500	429,000	451,500	474,000	485,250	490,875
Imported Water	120,000	117,000	114,000	111,000	108,000	106,000	106,000
Surface Water	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Recycled Water	17,000	21,000	24,000	25,000	26,000	27,000	27,000
Direct Use Water Total	525,000	548,500	571,000	591,500	612,000	622,250	627,875
Additional Recharge Water							
Imported Water	111,000	41,750	17,500	18,250	0	0	0
Surface Water							
a. Stormflow	60,000	60,000	60,000	60,000	60,000	60,000	60,000
b. Base**	166,000	156,000	146,000	164,000	182,000	201,000	243,000

Table 2.2
Current and Projected Water Supply Sources to Meet Demands in the Santa Ana Watershed (AFY)

	2000	2005	2010	2015	2020	2025	2050
Additional Recharge Water (Cont.)							
Indirect Use Recycled Water (GWRS)	7,000	78,400	100,000	100,000	145,600	145,600	145,600
Additional Water Recharge Total	233,000	294,400	306,000	324,000	387,600	406,600	448,600

San Bernardino Valley Municipal Water District (4)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	132,205	132,205	132,205	132,205	132,205	132,205	132,205
Imported Water	42,297	48,327	54,358	60,388	66,418	72,449	102,600
Surface Water	52,200	52,200	52,200	52,200	52,200	52,200	52,200
Recycled Water	0	0	3,253	6,507	9,760	13,014	29,281
Direct Use Water Total	226,702	232,732	242,016	251,300	260,583	269,868	316,286
Additional Recharge Water							
Imported Water	0	0	0	0	0	0	0
Surface Water	0	0	5,250	10,500	15,750	21,000	21,000
Recycled Water	0	0	3,031	6,062	9,094	12,125	27,281
Additional Water Recharge Total	0	0	8,281	16,562	24,844	33,125	48,281

Western Municipal Water District (5)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	192,641	215,859	225,462	234,561	243,176	247,334	338,000
Imported Water	69,491	76,080	89,973	97,253	103,945	108,965	93,000
Surface Water	2000	3410	4820	6,230	7,640	8,640	9,640
Recycled Water	13,710	27,409	33,903	38,388	42,873	45,298	72,680
Direct Use Water Total	277,842	322,758	354,158	376,432	397,634	410,237	513,320
Additional Recharge Water							
Imported Water	5,000	15,000	40,000	40,000	40,000	40,000	40,000
Surface Water***	**	**	**	**	**	**	**
Recycled Water	1,000	1,750	2,500	3,125	3,750	5,000	10,000
Additional Recharge Water Total	6,000	16,750	42,500	43,125	43,750	45,000	50,000

Notes:

(1) Source: "EMWD Water Supply Spreadsheet." Average precipitation year.

(2) Source: "IEUA Water Demands and Supplies Spreadsheet," IEUA Urban Water Management Plan Year 2000 Update, Draft IEUA Recycled Water System Feasibility Study, November 2001, and OBMP Recharge Master Plan Phase II Report, WE, Inc. & Black & Veatch, August 2001. 2050 figure was interpolated. Average precipitation year.

(3) Source: 2000 figures from OCWD 2020 Master Plan Report. 2005 - 2020 figures from "OCWD Water Demands and Supplies Spreadsheet" and OCWD computer model projection. 2025 & 2050 figures were interpolated. Average precipitation year.

(4) Source: SBVMWD Regional Water Facilities Master Plan - Draft EIR, October 13, 2000 and "SBVMWD Water Budget - Average Year" for ultimate water budget, taken from the "Regional Water Facilities Master Plan Reference Documents. Average precipitation year.

(5) Source: "WMWD Water Supply Sources Spreadsheet."

*By 2010, imported water supply includes an increase of up to 15,000 AFY via the Baseline Feeder. 20,000 AFY would be provided to MWD by SBVMWD. MWD would then allcoate 15,000 AFY to IEUA.

**Figures from Table 7.1

***Included in SBVMWD

Table 2.2
Current and Projected Water Supply Sources to Meet Demands in the Santa Ana Watershed (AFY)
Total Current and Projected Direct Use Water Supply Sources to Meet Demands in the Santa Ana Watershed (AFY)

	2000	2005	2010	2015	2020	2025	2050
Groundwater	976,646	1,027,764	1,062,767	1,099,266	1,132,881	1,150,389	1,257,536
Imported Water	339,988	366,107	398,831	422,641	448,563	467,114	567,903
Surface Water	77,700	82,010	94,620	94,630	94,340	95,340	96,340
Recycled Water	61,410	92,049	129,167	153,895	169,733	178,912	237,963
Total	**1,455,744**	**1,567,930**	**1,685,385**	**1,770,432**	**1,845,517**	**1,891,755**	**2,159,741**

Total Direct Use Water Supply Increases Compared with Year 2000

	2000	2005	2010	2015	2020	2025	2050
Percentage Increase	**0%**	**8%**	**16%**	**22%**	**27%**	**30%**	**48%**

Total Current and Projected Additional Recharge Water Supply Sources to Meet Recharge Demands in the Santa Ana Watershed (AFY)

	2000	2005	2010	2015	2020	2025	2050
Imported Water	159,600	117,450	115,500	117,350	107,800	106,000	108,500
Surface Water	244,790	234,790	234,950	258,200	281,450	306,500	353,400
Recycled Water	18,622	107,490	131,981	138,087	194,844	202,075	242,042
Total	**423,012**	**459,730**	**482,431**	**513,637**	**584,094**	**614,575**	**703,942**

Total Additional Recharge Water Supply Increases Compared with Year 2000

	2000	2005	2010	2015	2020	2025	2050
Percentage Increase	**0%**	**9%**	**14%**	**21%**	**38%**	**45%**	**66%**

CHAPTER 3 WATER QUALITY

3.1 Water Supply Quality

A primary objective of the IWRP is to address water supply quality concerns in order that available supply is of adequate quality to ensure that beneficial uses can be met. As defined in the Water Quality Control Plan, Santa Ana River Basin (Basin Plan), "a beneficial use is one of the various ways that water can be used for the benefit of people and/or wildlife. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saline aquatic habitats."

Many of the water quality goals for the SAW are discussed in the Basin Plan, which was revised by the California Regional Water Quality Control Board (RWQCB), Santa Ana Region, in 1995. The Basin Plan specifies water quality objectives according to waterbody type: ocean waters; enclosed bays and estuaries; inland surface waters; and groundwaters. Water quality for each of the sources of water supply varies significantly, depending upon its source and its location in the system.

Sources of water quality degradation can be classified into point and non-point sources. Point sources are confined to point discharges to the soil, groundwater, or stream systems. Examples include conventional wastewater and industrial discharges to streams or ponds, and leaky underground storage tanks. Nonpoint sources are areal discharges to soil, groundwater, and surface waters, such as land application of waste and fertilizers and atmospheric deposition of contaminants to the soil and water bodies.

3.1.1 Groundwater Water Quality

A study has been initiated to evaluate the impact of Total Inorganic Nitrogen (TIN) and Total Dissolved Solids (TDS) on water resources in the Santa Ana Watershed. A TIN/TDS Taskforce, comprised of watershed stakeholders, meets on a monthly basis to discuss this complex topic. The scope of work includes:

1. Develop Surface Water Translator for meeting groundwater objectives that accounts for nitrogen losses during percolation.
2. Develop a new compliance metric and monitoring plan to replace the current August-Only Below Prado metric.
3. Develop updated boundary maps for groundwater sub-basins and new management zones.
4. Estimate regional TDS and Nitrogen concentration in groundwater.
5. Compute TDS and Nitrogen objectives for new groundwater basins and management areas.

3.1.1.1 TDS

Increases in groundwater TDS concentrations are a function of the recharge of saline water originating from storm flows, urban runoff, imported water, and incidental recharge. They are also attributed in part to the legacy of salt contamination from past agricultural and land uses. Figure 3.1 shows the groundwater basins within the SAW.

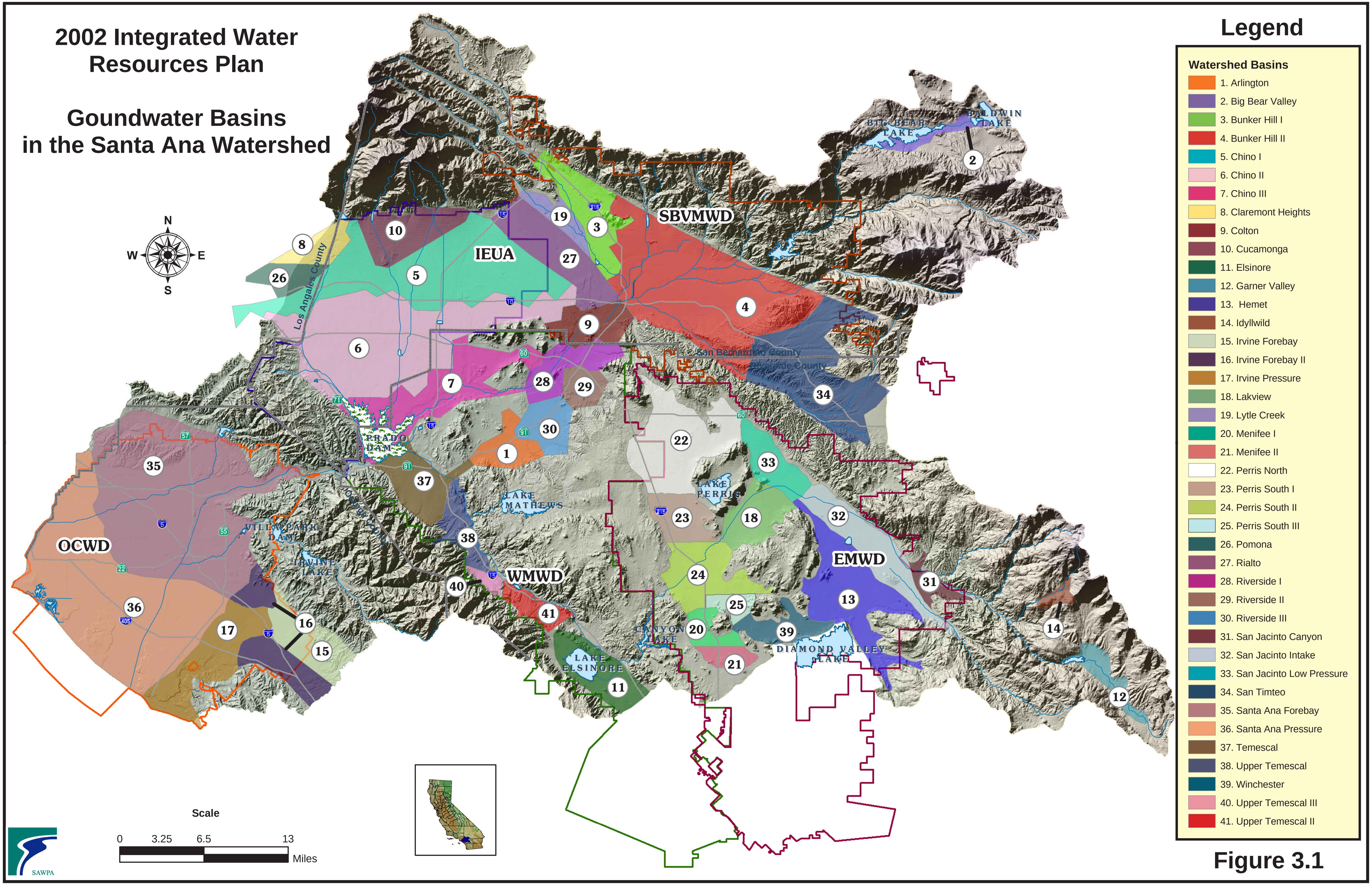
Chino Basin The Chino Basin Watermaster's Optimum Basin Management Program, Phase I Report (OBMP), shows that in the northeast part of the Chino Basin, TDS concentrations range from about 170 to about 300 mg/L for the period 1960 through 1990, with typical concentrations in the mid- to low-200s. With few exceptions, areas with significant irrigated land use or dairy waste disposal histories overlie groundwater with elevated TDS concentrations. The exceptions are areas where point sources have contributed to TDS degradation, such as the former Kaiser Steel site in Fontana and the former wastewater disposal ponds near IEUA Regional Plant No. 1 (RP1) in South Ontario.

The TDS impacts of agriculture on groundwater usually originate from fertilizer use on crops, consumptive use, and dairy waste disposal. The total amount of TDS from manure discharged to the southern half of the Basin that will reach groundwater is estimated to be about 1,200,000 tons through 1989 and averages about 29,000 tons per year.

The OBMP notes that while considered one basin from geologic and legal perspectives, the Chino Basin can be hydrologically subdivided into at least five flow systems that act as separate and distinct basins. Each flow system has a unique hydrology, and water resource management activities that occur in each flow system have little or no impact on the other systems. Each flow system can be considered a management zone, which can be subdivided further if necessary to define and manage flow systems at a finer scale. These five management zones, shown in Figure 3.2, are used to characterize the groundwater level, storage, production, and water quality conditions. Within the Chino Basin, TDS concentrations in groundwater have increased slightly or remained relatively constant in the northern parts of Management Zones 1, 2, and 3. TDS concentrations are significantly higher in the southern parts of Management Zones 1, 2, and 3, and all of Management Zone 5 where they typically exceed the 500 mg/L and frequently exceed the upper limit of 1,000 mg/L.

Orange County Basin In the Orange County groundwater basin, a salt imbalance has existed for several decades, where the average TDS concentrations of the recharge water exceed the average TDS of the groundwater extracted from the basin. It is estimated that 162,000 tons of salts are added to the basin annually, or an average TDS increase of 14 mg/L per year, due to the difference in TDS of the recharge water and produced groundwater. The primary reason for this imbalance is that significant coastal and central portions of the basin still contain older groundwater with TDS concentrations of less than 400 mg/L. Over time, the extracted low TDS groundwater will be replaced with recharge water with higher TDS. Water quality objectives set for Orange County's main groundwater basin range from 500 mg/L for the Pressure Area to 600 mg/L for the Forebay. Recent studies conducted by a regional task force on TDS and nitrogen indicate that there is no additional assimilative capacity for salts in Orange County's groundwater basin.

San Jacinto Watershed Basin With regard to the San Jacinto Watershed Basin, EMWD completed the Draft Regional Groundwater Model for the San Jacinto Watershed in February 2002. Three simulated projection scenarios were simulated by EMWD using Groundwater Modeling System software. In the first baseline scenario, high TDS groundwater was extracted by three desalter wells. In the second scenario, nine desalter wells (1 in Lakeview, 1 in Perris North, and 7 in Perris South subbasins) extracted high TDS groundwater. The third



2002 Integrated Water Resources Plan
Goundwater Basins in the Santa Ana Watershed
Legend
Watershed Basins
1. Arlington
2. Big Bear Valley
3. Bunker Hill I
4. Bunker Hill II
5. Chino I
6. Chino II
7. Chino III
8. Claremont Heights
9. Colton
10. Cucamonga
11. Elsinore
12. Garner Valley
13. Hemet
14. Idyllwild
15. Irvine Forebay
16. Irvine Forebay II
17. Irvine Pressure
18. Lakview
19. Lytle Creek
20. Menifee I
21. Menifee II
22. Perris North
23. Perris South I
24. Perris South II
25. Perris South III
26. Pomona
27. Rialto
28. Riverside I
29. Riverside II
30. Riverside III
31. San Jacinto Canyon
32. San Jacinto Intake
33. San Jacinto Low Pressure
34. San Timteo
35. Santa Ana Forebay
36. Santa Ana Pressure
37. Temescal
38. Upper Temescal
39. Winchester
40. Upper Temescal III
41. Upper Temescal II
SBVMWD
IEUA
OCWD
WMWD
EMWD
BIG BEAR LAKE
BALDWIN LAKE
PRADO DAM
LAKE MATHEWS
LAKE PERRIS
VILLA PARK DAM
IRVINE LAKES
CANYON LAKE
LAKE ELSINORE
DIAMOND VALLEY LAKE
Los Angeles County
Orange County
San Bernardino County
Riverside County
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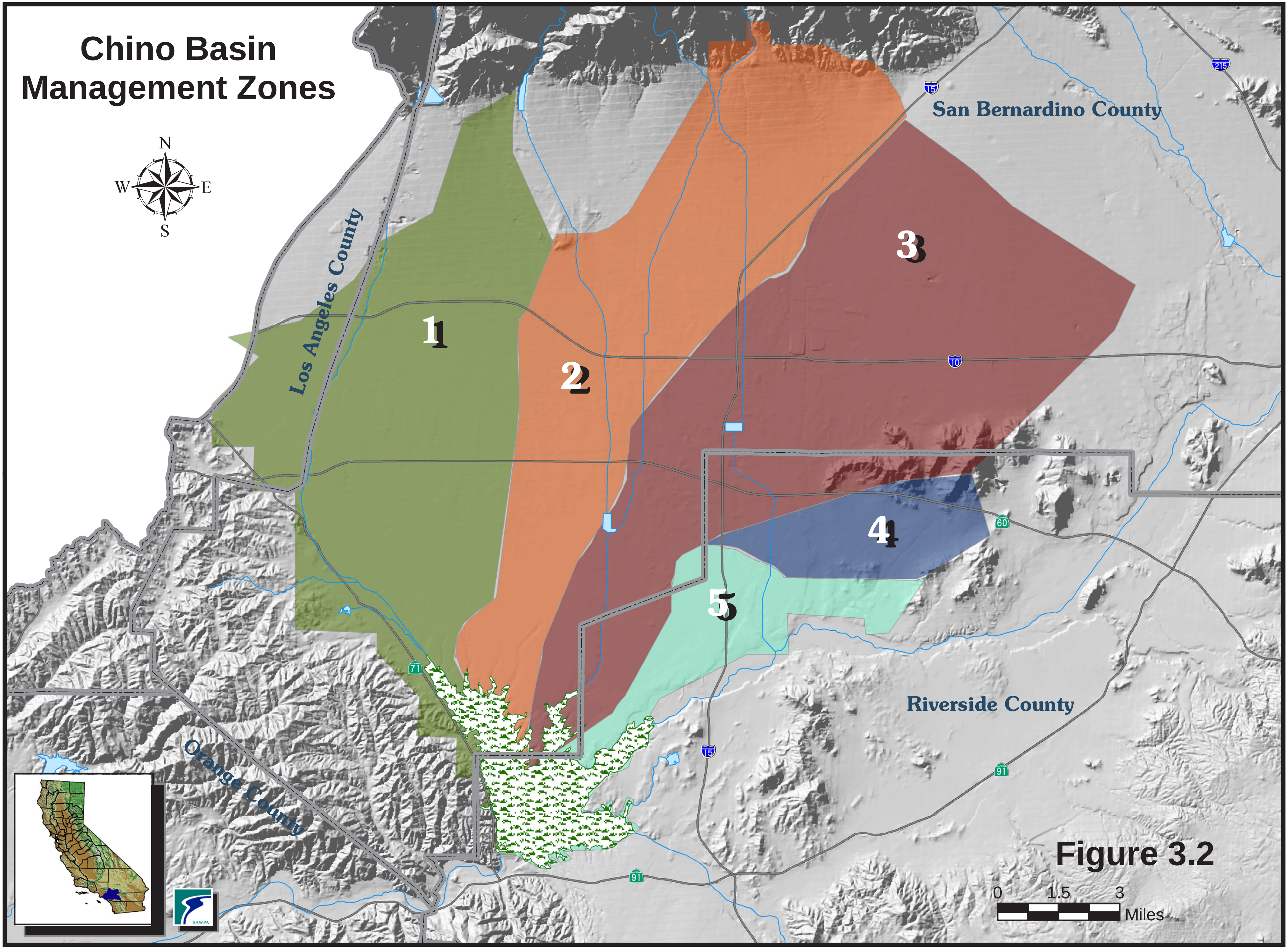
Figure 3.1



p:\projects\irp_larry\Chino_basin_mz.mxd scenario also simulated nine desalter wells, but placed 2 in Lakeview, 1 in Perris North, and 6 in Perris South subbasins.

Based on the computer runs, the draft document concludes lower groundwater elevations in the Lakeview Subbasin and rising groundwater levels in the Perris South Subbasin during the last two decades resulted in migration of a high TDS plume from the Perris South Subbasin into the Lakeview Subbasin. The desalter wells have a significant impact on rising groundwater levels in the western part of the San Jacinto Watershed Basin and also remove significant amounts of dissolved solids, resulting in a reduction of the area of the high TDS plume in the Perris South Subbasin. The desalter wells were not entirely successful in halting the migration of the high TDS groundwater from the Perris South Subbasin to the Lakeview Subbasin. To halt this migration, either additional desalter wells need to be relocated or new desalter wells installed. Additional desalter wells may be required to prevent local groundwater flooding in some areas.

3.1.1.2 Nitrates

The Federal water quality standard for nitrate-nitrogen is set at 10 mg/L. Water containing nitrate concentrations higher than 10 mg/L must either be treated or blended with another water source in order to reduce nitrate levels. Similar to TDS, areas with significant irrigated land use or dairy waste disposal histories overlie groundwater with elevated nitrate concentrations.

Chino Basin In Chino Basin, the primary areas of nitrate degradation are the areas formerly or currently overlain by the citrus and Dairy industries. Nitrate concentrations in groundwater have increased slightly or remained relatively constant in the citrus areas formerly occupied by citrus and vineyard land uses over the period 1960 to the present. Nitrate concentrations underlying these areas rarely exceed 20 mg/L (as nitrogen). Over the same period, nitrate concentrations have increased significantly in the areas where land use has progressively converted from irrigated/non-irrigated agriculture to dairy uses, and nitrate concentrations typically exceed the 10 mg/L MCL. It should be noted that in South Chino Basin, high nitrate levels are from not only overlying dairies, they are also due to the migration of nitrates from Upper Chino Basin as a result of agricultural practices.

Orange County Basin Nitrate-nitrogen concentrations in Orange County groundwater typically range from 1 to 4 mg/L in the Pressure Zone and from 4 to 7 mg/L in the Forebay. In selected areas of Irvine, Tustin, and Garden Grove, high nitrate concentrations may be observed primarily due to past agricultural activities. Wells impacted by nitrates are usually shallow wells that draw from groundwater that may receive incidental run-off from the Irvine and Tustin foothills or have been impacted from years of fertilizer use for agriculture.

Orange County's groundwater basin does not have assimilative capacity for nitrate. Therefore, nitrates in fertilizers and in run-off directly impact groundwater quality. OCWD is working closely with the Regional Board and upstream agencies in order to minimize the amount of nitrates contributed to the SAR from dairy manure/washwater releases and from wastewater treatment facilities. By lowering nitrate concentrations in SAR flows, OCWD directly reduces the amount of nitrate in groundwater recharged with SAR water. OCWD currently accomplishes this using the Prado Basin ponds.

3.1.1.3 Other Constituents

Perchlorate

Perchlorate has recently been detected in several wells in the SAW, in other basins in California, and other states in the West. The reason that perchlorate was not detected in groundwater until recently is that analytical methodologies did not previously exist that could detect perchlorate at low concentrations. Prior to 1997, the method detection limit for perchlorate was 400 ppb. By March 1997, an ion chromatographic method was developed with a detection limit of 1 ppb and a reporting limit of 4 ppb.

Perchlorate (ClO_4^-) originates as a contaminant in the environment from the solid salts of ammonium perchlorate (NH_4ClO_4), potassium perchlorate ($KClO_4$), or sodium perchlorate ($NaClO_4$). The perchlorate salts are quite soluble in water. The perchlorate anion (ClO_4^-) is exceedingly mobile in soil and groundwater environments. It can persist for many decades under typical groundwater and surface water conditions, because of its resistance to react with other available constituents. Perchlorate is a kinetically stable ion, which means that reduction of the chlorine atom from a +7 oxidation state in perchlorate to a - 1 oxidation state as a chloride ion requires activation energy or the presence of a catalyst to facilitate the reaction. Since perchlorate is chemically stable in the environment, natural chemical reduction in the environment is not expected to be significant. At very high levels, perchlorate interferes with the function of the thyroid gland and the production of hormones necessary for normal human development. In the extreme cases, it can cause brain damage in fetuses and a potentially fatal form of anemia in adults. However, effects of chronic exposures to lower levels currently detected in groundwater are not known.

Ammonium perchlorate is manufactured for use as an oxygenating component in solid propellant for rockets, missiles, and fireworks. Because of its limited shelf life, inventories of ammonium perchlorate must be periodically replaced with a fresh supply. Thus, large volumes of the compound have been disposed of since the 1950s in Nevada, California, Utah, and likely other states. While ammonium perchlorate is also used in certain munitions, fireworks, the manufacture of matches, and in analytical chemistry, perchlorate manufacturers estimate that about 90 percent of the substance is used for solid rocket fuel. Perchlorate is of concern because of the existing uncertainties in:

- The toxicological database documenting its health effects at low levels in drinking water
- The actual extent of the occurrence of perchlorate in ground and surface waters, which is compounded by some uncertainty in the validation of the analytical detection method
- The efficacy of different treatment technologies for various water uses such as drinking water or agricultural application
- The extent and nature of ecological impact or transport and transformation phenomena in various environmental media.

A recent development concerning the provisional action level (PAL) for perchlorate will likely have tremendous impacts on the SAW. In January 2002, the United States Environmental Protection Agency (USEPA) dropped their provisional standard for perchlorate from 18 ppb to 1 ppb, which is the first step in the process to establish a mandatory federal limit on the amount of perchlorate in the nation's drinking water supplies. Also in January 2002, California's DHS reduced the provisional action level (PAL) for perchlorate from 18 ppb to 4 ppb. While the new PAL is strictly advisory and will not be regulated by the state, local governments must be notified if levels are higher than 4 ppb, and the state also recommends notifying consumers about the health risks.

On March 12, 2002, the Office of Environmental Health Hazard Assessment (OEHHA), part of California's EPA, took the first step toward establishing a maximum perchlorate level, by recommending a concentration of 6 ppb.

To understand the scope of the PAL reduction, more that 75 drinking water wells in Riverside and San Bernardino counties alone now exceed the newly established PAL. Riverside has perchlorate in 23 of 48 wells, where the highest level is 65 ppb. In the Riverside/Colton Basin, the City of Rialto has one well offline and two others out of service. Rialto Well #2 has a capacity of 2,000 GPM and average perchlorate readings of 57 ppb. Rialto Well #6 and Chino Well #1 also pump approximately 2,000 GPA and show perchlorate readings of about 6 to 14 ppb. These latter two would only be used if needed, and the perchlorate levels would first have to be mitigated through blending. Officials believe they were contaminated from a now-closed plant where Goodrich conducted research on solid rocket propellants and Kwikset later made flares for pistols and parachutes. The wells had perchlorate levels of 6 and 14 ppb.

The Redlands-Crafton plume, located in the San Bernardino Basin, has levels as high as 77 ppb. In the Jurupa area, contamination is believed to have come from Stringfellow acid pits, a former chemical waste disposal site. Treatment for contaminated wells is typically achieved through water blending and ion exchange. The latter technology is planned for the Redlands-Crafton plume.

As a final note, while California EPA's recommended level is 6 ppb, DHS's PAL stands at 4 ppb, and USEPA's health risk assessment is 1 ppb, the final revised MCL will likely require drastic planning efforts within the watershed. Should wells be required to shut down due to more stringent contaminant regulations, projected supplies from groundwater could be significantly impacted.

Arsenic

On October 31, 2001, the United States Environmental Protection Agency (USEPA) adopted a new final drinking water MCL for arsenic of 10 ug/L (ppb). The previous MCL for arsenic of 50 ppb was developed by the United States Public Health Service in 1942. The 50 ppb MCL did not reflect current information on the health effects of arsenic, including bladder, lung and skin cancer, inhibition of tissue respiration, skin and mucus membrane irritation and necrosis, central and peripheral neurotoxicity, peripheral vascular disease, and reproductive and developmental toxicity. In January 2001, USEPA adopted the new federal MCL for arsenic of 10 ug/L. But in May, USEPA delayed the effective date of the new standard in order to conduct reviews of the scientific and economic analyses on which the new MCL was based.

In September 2001, a subcommittee of the National Research Council (NRC) released their review of the toxicologic basis for the new drinking water standard. The NRC report confirmed the finding that recent studies of arsenic in humans, taken together with earlier studies, "provide a sound and sufficient database showing an association between bladder and lung cancers and chronic arsenic exposure in drinking water, and they provide a basis for quantitative risk assessment." In addition, recent studies increase the weight of evidence for an association between internal cancers and arsenic exposure through drinking water. Taiwanese and other human studies include data on exposures at arsenic concentrations relatively close to some U.S. exposures. Consequently, the extrapolation is over only a relatively small range of arsenic concentrations. Shorter extrapolations decrease the uncertainty of numerical cancer risk estimates. The report also cited increasing evidence that chronic exposure to arsenic in drinking water may also be associated with health effects other than cancer.

The subcommittee concluded that recent studies and analyses enhance the confidence in risk estimates that suggest chronic arsenic exposure is associated with an increased incidence of bladder and lung cancer at arsenic concentrations in drinking water that are below the current MCL of 50 ppb. The results of the subcommittee's assessment suggest that the risks for bladder and lung cancer incidence are greater than the risk estimates on which EPA based its January 2001 pending rule. The subcommittee found that men and women who daily consume water containing 3 ppb of arsenic have about a 1 in 1,000 increased risk of developing bladder or lung cancer during their lifetime. At 10 ppb, the new drinking water standard adopted by USEPA, the risk is greater than 3 in 1,000.

California legislation recently signed into law requires the OEHHA to adopt a Public Health Goal (PHG) for arsenic in drinking water by the end of 2002 and requires DHS to adopt a revised Primary MCL for arsenic no later than 30 June 2004. PHG are levels of drinking water contaminants at which adverse health effects are not expected to occur from lifetime of exposure. The California Safe Drinking Water Act of 1996 (Health and Safety Code Section 116365) requires OEHHA to adopt PHG based exclusively on public health considerations. PHG adopted by OEHHA will be considered by DHS in establishing or revising primary drinking water standards (California MCLs). DHS is required by the same law to review their MCLs every five years and to revise them to as close to PHG as is practicable, considering economic factors and technical feasibility.

OEHHA is already in the process of preparing the draft PHG, which will consider the same epidemiologic studies cited in the NRC report. The high cancer potency from these studies "yields a 1-in-a-million risk level in the low part per trillion range," according to Dr. Robert Howd, Chief of the Water Toxicology Unit of OEHHA. "Protection against all other effects (particularly stroke, heart disease, and hypertension), including an adequate margin of safety, requires a level in the low part per billion range. It should be noted that the arsenic level that would be protective against cancer is far below the limit of detection, which is about three parts per billion." The new PHG and the new drinking water standard adopted by USEPA will be factored into the development of the revised California drinking water standard by DHS.

In short, the water industry may likely face the MCL dropping well below 10 ppb, to as low as 5, or 3 ppb.

Pharmaceutical and Personal Care Pollutants (PPCP)

A USGS report, released on March 13, 2002, shows results from water sample tests taken in 30 states for 95 common compounds, an emerging class of contaminants known as pharmaceutical and personal care pollutants (PPCP). Among the substances are caffeine, contraceptives, painkillers, insect repellent, perfumes, and nicotine. The study also focused on 11 compounds linked to birth control and hormone supplements. The results, which mirror similar studies of PPCP in both Europe and Canada, show that the chemicals persist in the environment in concentrations as low as one part per billion or less.

During 1999 and 2000, USGS researchers collected samples in 36 states from 142 streams, 55 wells, and seven effluent sources as part of a "national reconnaissance effort." In California, six rivers and streams were sampled, including the Sacramento River at Freeport, Cucamonga Creek in Upland, a Turlock Irrigation District Lateral near Patterson, San Timoteo Creek, and Cucamonga Creek near Edison.

Because the use and disposal of 81 of the 95 compounds in the study are entirely unregulated, little is known about PPCP potential health and environmental effects. PPCP represent the "next big unknown" in environmental contamination and it is likely that the EPA will decide over the next few years how to regulate PPCP. Wastewater treatment technologies using biological methods or exposure to ultraviolet light are the most probable methods to break down many of the chemicals.

MTBE

Methyl tertiary butyl ether (MTBE) is a gasoline additive used to improve air quality by reducing emissions and increase octane ratings. There is statewide concern that groundwater contamination could occur due to the widespread use of MTBE in gasoline. Lawrence Livermore National Laboratory's (LLNL) June 1998 report on "An Evaluation of MTBE Impacts to California Groundwater Resources" found MTBE detected in groundwater at 78 percent of the leaking underground fuel tank (LUFT) sites. Many LUFT sites are under passive bioremediation to address the hydrocarbon release. However, two additional LLNL findings indicate MTBE poses a threat to potable supplies: (1) the primary attenuation mechanism for MTBE is dispersion and (2) MTBE has the potential to impact regional groundwater resources and may present a cumulative contamination hazard. These findings encourage water utilities to manage groundwater resources with consideration of the mobility and recalcitrant nature of MTBE.

Effective May 2000, DHS adopted a primary drinking water standard MCL of 13 µg/L. DHS had previously adopted a secondary drinking water standard MCL, effective January 1999, of 5 ppb. Treatment options for the removal of MTBE from water include air stripping, carbon or synthetic resin adsorption, advanced oxidation using ultra violet (UV), ozone, or hydrogen peroxide, reverse osmosis, and microbial degradation.

Contaminant Plumes

TCE and PCE were/are widely used as industrial solvents. TCE was commonly used for metal degreasing and was also used as a food extractant. PCE is commonly used in the dry-cleaning industry. About 80 percent of all dry cleaners used PCE as their primary cleaning agent (Oak Ridge National Laboratory, 1989). 1,1-Dichloroethane, 1,1-Dichloroethene, cis-1, 2-dichloroethene, 1,2-dichloroethane, and vinyl chloride are degradation byproducts of PCE and TCE.

Within the Santa Ana Watershed, the RWQCB has identified several contaminant plumes that are considered a threat to groundwater supply quality. A number of these plumes, which have impacted some of the highest producing well fields in the watershed, exist within the Bunker Hill groundwater basin. Approximately 45 municipal wells within the SAW contain traces of perchlorate, of which 11 previously exceeded the prior PAL of 18 ppb. Now, all of these wells exceed the current PAL of 4 ppb.

Chino Basin Within the Chino Basin, the OBMP reports that volatile organic chemicals (VOC) have been detected in the SAW. Though the below list is not exhaustive, some of the volatile organic chemicals (VOC) detected at or above their MCL in several wells within the Chino Basin are:

- 1,1-dichloroethene
- 1,2-dichloroethane
- Benzene
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)
- Vinyl chloride

The spatial distributions of TCE and PCE appear to be correlated to identify point sources in the Chino Basin. The areal distributions of 1,2-dichloroethane and vinyl chloride appear to be more extensive. 1,2-Dichloroethane is used as a lead-scavenging agent in gasoline (Oak Ridge National Laboratories, 1989) and the greater areal distribution of 1,2-dichloroethane and vinyl chloride may reflect numerous minor releases from gasoline stations, automobile service stations, etc. This hypothesis appears to be corroborated, in part, by the distribution of benzene, which is a minor contaminant in gasoline. Gasoline used in the United States contains between 0.8 and 2 percent benzene (Oak Ridge National Laboratories, 1989).

The primary site locations and toxic constituents identified in the OBMP are:

- Chino Airport – Primarily TCE
- California Institute for Men – Primarily PCE and TCE
- General Electric Flatiron Facility - Primarily TCE
- General Electric Test Cell Facility - Primarily TCE
- Kaiser Steel Fontana Steel Site – Primarily TDS & total organic carbon (TOC)
- Milliken Sanitary Landfill – Primarily TCE, PCE, and dichlorodifluoromethane
- Municipal Wastewater Disposal Ponds - Primarily TDS and nitrates

- Upland Sanitary Landfill – Primarily dichlorodifluoromethane, PCE, TCE, and vinyl chloride. Other VOCs that have been periodically detected above MCLs include methylene chloride, cis-1,2 dichloroethene, 1,1-dichloroethane, and benzene
- National Priorities List Sites
    - Stringfellow
    - Dodson Brothers
    - Pacific Polishing
- TCE/PCE Anomaly – South of the Ontario Airport – Primarily TCE and PCE

Cucamonga County Water District (CCWD) currently has six wells with perchlorate levels at or slightly above the PAL of 4 ppb. CCWD also has 21 wells that show nitrate levels at or above the MCL of 10 mg/L, with levels ranging from 10 mg/L to 95 mg/L.

Orange County Basin Within the Orange County groundwater basin, chlorinated VOC have been detected in several areas. For example, in both the Santa Ana Forebay and the Irvine Forebay groundwater basins, traces of TCE, PCE, dichloroethylene (DCE) and dichloroethane (DCA) have been identified in approximately 66 water supply wells. The majority of these contaminants were found to be in shallow aquifers. Most of the contamination has originated from contaminant plumes formed by past discharges of industrial solvents from the many industries that have resided in the basin.

In 1984, the OCWD initiated an intense monitoring program for synthetic organics in the groundwater, taking annual samples from all active productions wells for analysis at the OCWD lab. In 1989, OCWD accepted responsibility for all sampling and testing required of its large-system water purveyors under the new regulations. This arrangement allows OCWD to detect and act on water contamination in its earliest stages. Additionally, OCWD completed an extensive soil gas investigation that included 425 samples of gas extracted from the soil over an 89 square mile area. Shallow monitoring wells are also being drilled to determine the vertical and horizontal extent of groundwater contamination.

Typically, sources of the contaminants are difficult to ascertain. Following a $1,000,000 investigation to determine the extent of TCE contamination in the Irvine area, OCWD was able to trace the TCE plume to the El Toro Marine Corps Air Station. To provide interim containment of the TCE plume, the OCWD has been active in initiating a pump-out project which delivers groundwater pumped from the contaminated wells into the IRWD recycled water system for use in landscape irrigation. OCWD is currently initiating a regional groundwater extraction and treatment system in the Anaheim-Fullerton area of the Santa Ana Forebay. Many industrial sites in the basin are investigating and remediating site-specific groundwater impacts under the oversight of the Regional Board.

OCWD's <u>2020 Master Plan Report</u> focused on methyl tertiary butyl ether (MTBE), a gasoline additive used to improve air quality by reducing emissions and increase octane ratings. Use of MTBE in California began in the late 1970s and its year-round use as a fuel oxygenate is mandate by State law to comply with the Clean Air Act. Although studies have shown an improvement in air quality, MTBE has become a significant groundwater problem primarily due to leaking underground fuel tanks and pipelines. Unlike other chemicals in gasoline, MTBE is fairly soluble in water and is readily dispersed in groundwater, does not adsorb to soils, and is extremely slow to degrade in the environment.

Drinking water wells containing MTBE have been shut down in Santa Monica, South Lake Tahoe, and Santa Clara Valley. Although MTBE has been found in a few monitoring wells in Orange County, there has been no widespread contamination or need to shut down production wells. In February 1997 DHS began requiring monitoring for MTBE in water systems.

Since the publishing of OCWD's master plan, DHS adopted a secondary drinking water standard MCL, effective January 1999, of 5 µg/L. Effective May 2000, DHS adopted a primary drinking water standard MCL of 13 µg/L.

San Bernardino Basin Within the City of San Bernardino, the Newmark plume and the Muscoy plume consist primarily of PCE that most likely originated from an old World War II Army camp located to the north of San Bernardino. The plumes have impacted water supply wells belonging to the City of San Bernardino. The Newmark and Muscoy plume cleanup, being implemented by USEPA under the federal Superfund Program, consists of groundwater extraction and treatment using granulated activated carbon (GAC). The treated groundwater is used to supplement the City of San Bernardino's potable water supply. The plumes were originally expected to impact up to 32 additional downgradient water supply wells; however, it appears that cleanup efforts will be adequate to protect these wells.

Another major contaminant plume, consisting primarily of TCE and PCE, is the Norton Air Force Base plume located just to the southwest of Norton Air Force Base in the City of San Bernardino. The plume has impacted 10 wells owned by the City of Riverside and the City of San Bernardino. The Air Force has initiated cleanup efforts consisting of soil removal, soil gas extraction, and ground water treatment. Both the on-base plume and the off-Base plume have been significantly reduced. The treatment plants are now often in a stand-by mode.

In the Bunker Hill Basin, two plumes have impacted water supply wells for the cities of Riverside, Redlands, and Loma Linda. The plumes have also impacted water supply wells belonging to Loma Linda University. One plume is composed of TCE and the other plume is composed of perchlorate. Both plumes originated from a Lockheed Martin Corporation solid propellant rocket motor production facility in Mentone.

The TCE plume and the perchlorate plumes are present in the upper 300 to 400 feet of groundwater. The plumes affect dozens of wells in the area. Although TCE was previously present in water supply wells (above its drinking water MCL of 5.0 ppb) at concentrations over 100 ppb, TCE is currently present in water supply wells at concentrations up to 7 ppb.

Perchlorate is currently present in water supply wells at concentrations up to 77 ppb. As required by the RWQCB, Lockheed has prepared water supply contingency plans to address the impacts of the plume on water supply wells. The plans include blending, treatment, and/or providing alternative water supply sources. The plumes are currently being captured by the City of Riverside's Gage wellfield. Lockheed has installed GAC treatment units at some of the Gage wells to remove TCE, and intends to install ion exchange units on some of these wells in the near future for the removal of perchlorate.

Riverside County In Riverside County, a contaminant plume has been identified originating from March Air Force Base. The primary contaminants are TCE and other chlorinated volatile hydrocarbons. A groundwater extraction and treatment system was installed to slow the migration of the plume in 1992. The contaminated groundwater is extracted and cleaned through activated carbon filters. In addition to the primary groundwater contaminant plume, the Air Force has also identified two smaller plumes in the area composed of floating fuel and TCE. A treatment facility using a dual-phase treatment process with carbon filters has been established to treat the pollutants.

In conjunction with the described ongoing remediation and monitoring at March Air Force Base, a Regional Basin Evaluation was completed by the Air Force in 1998 to investigate the geology and hydrology of the base and surrounding area. The evaluation included the development of a model to simulate the groundwater model plume movement. EMWD is cooperating with a Regional Basin Evaluation team, acting as contractor for the U.S. Air Force, in monitoring the contaminants off base.

3.1.2 Imported Water Quality

MWD provides water to southern California from the Colorado River Aqueduct (CRA) and the State Water Project (SWP). The CRA is a significant source of salt to Southern California. Salinity in CRA water averages around 700 mg/L and during drought years is expected to increase to above 900 mg/L, according to the 1998 USBR/MWD Salinity Management Report (SMR). The SMR projects CRA water salinity through the year 2015 to be above 800 mg/L under dry year conditions. Salinity projections made during wet year conditions still show TDS values between 650 and 800 mg/L.

In order to reduce salinity in CRA water, the 1998 USBR/MWD Salinity Management Report recommended accelerating implementation of action items set forth in the CRA Salinity Control Program. Management of upstream agricultural practices has been identified as a method to achieve salinity criteria levels. Reductions in State and Federal funding, however, have directly impacted progress in the CRA Salinity Control Program. Historically, CRA water was blended with SWP water in order to reduce salinity. Due to the lack of availability of SWP water, however, imported water into the SAW often is CRA water that exceeds the MWD TDS objective of 550 mg/L. MWD began blending CRA water with low TDS SWP water in the early 1970's. In the Chino Basin, for example, CRA Water is essentially no longer used due to high TDS concentrations, as the high TDS water makes it difficult for wastewater treatment operators to comply with waste discharge requirements in their National Pollutant Discharge Elimination System (NPDES) permits.

Blending of the CRA and SWP supplies became policy for some MWD member agencies. However, as SWP water became less available due to environmental constraints in the Bay-Delta, Basin Plan water quality objectives became more difficult to meet. The 1998 USBR/MWD report suggests that in certain areas, Basin Plan water quality objectives may have been set assuming that low TDS SWP water would be readily available on a long-term basis. Although SWP water is typically low in TDS (200 to 300 mg/L), salinity rapidly increases due to drought conditions, flood events, reservoir management practices, and salt input from local streams.

Although SWP water is highly desirable due to its low TDS, it typically has relatively high bromide concentrations, resulting in the formation bromate, a specific disinfection by-product. In November 1998, bromate concentrations were regulated at the federal level and MWD may have to develop blending strategies in order to reduce bromate concentrations. Despite the disinfection by-product formation potential, SWP water is still a desirable, low TDS water source for the SAW.

3.1.3 Surface Water Quality

As defined in the Basin Plan, inland surface waters include streams, rivers, lakes, and wetlands in the Region. In very broad terms, the Santa Ana Watershed is a group of connected inland basins and open coastal basins drained by surface streams flowing generally southwestward to the Pacific Ocean. In the southeastern part of the watershed, the San Jacinto River originates in the San Jacinto Mountains near Lake Hemet and normally terminates in Lake Elsinore.

Near Corona, the Santa Ana River has made its way through the Santa Ana Mountains and flows down onto the Orange County coastal plain. The Pacific Ocean coast of the SAW extends from just north of Laguna Beach up to Seal Beach and the Los Angeles County line. Other features of the coast include Newport Bay, Anaheim Bay-Huntington Harbour, and the major coastal wetlands areas associated with those bays.

The mainstem of the Santa Ana River is divided into six reaches, with each reach generally considered a hydrologic and water quality unit. The River provides water for recreation and for aquatic and wildlife habitat. River flows are a significant source of groundwater recharge in the lower basin, which provides domestic supplies for more than two million people. These flows account for about 70% of the total recharge.

As a result of the Santa Ana River Stipulated Judgement (overseen by the Santa Ana River Watermaster), minimum average annual flows and guaranteed total dissolved solids (TDS) quality from the San Bernardino area to and through the Riverside Narrows were required, as well as flows from the upper basin to the lower basin (Orange County), measured at Prado Dam. The water required to meet the Stipulated Judgement can be made up of wastewater, imported water, dry weather runoff, or some combination of these. TDS is considered the measure of minimum acceptable quality.

The dividing line between reaches 2 and 3 of the SAR, and between the upper and lower Santa Ana Basins, is Prado Dam, a flood control facility built and operated by the U.S. Army Corps of Engineers. The dam includes a subsurface groundwater barrier, and as a result all ground and surface waters from the upper basin are forced to pass through the dam (or over the spillway). For this reason, it is an ideal place to measure flows and monitor water quality.

The United States Geologic Survey (USGS) operates a permanent continuous monitoring station immediately below Prado Dam. Data collected there are utilized by the Watermaster. OCWD samples the river monthly at the USGS gage and determines the water quality. Compliance with the objectives for reaches 2 and 3 is monitored by the RWQCB, using the data and information available from the USGS gage, plus the data from its own specific sampling programs.

The RWQCB notes, "the quality of the SAR is a function of the quantity and quality of the various components of the flows." Three components make up the flow of the water in the SAR, and the ratio of these components varies throughout the year. The first component is "storm flows," directly resulting from rainfall, usually between the months of December and April. The rainfall and surface water runoff from the storms is captured and percolated into the groundwater basins.

The "baseflow" makes up the second component of water supply, a large portion of which comes from the discharges of treated wastewater into the river, in addition to rising groundwater in the basin. This baseflow includes the non-point source discharges, as well as the uncontrolled and unregulated agricultural and urban runoff.

The third component of the water supply is imported water, which is characterized by the RWQCB as "nontributary flow." Water from the CRA is brought into the watershed and released into Lake Matthews and Diamond Lake in the upper sub-basin. As mentioned earlier, CRA water generally has a very high mineral content of dissolved solids, which limits its uses in the watershed. Additional imported water of substantially higher quality comes from the State Water Project, which is transported from Sacramento-San Joaquin Delta in northern California.

The Santa Ana River Watermaster calculates the amount and quality of total flow for each water year (October 1 to September 30). The Watermaster's Annual Report is used to determine compliance with the stipulated judgement referred to earlier, which set quality and quantity limits on the river. The Watermaster's report presents summary data compiled from the continuous monitoring of flow in CFS and salinity as E.C. (electrical conductivity) at the USGS Prado Gaging Station. The Watermaster's annual determination of total flow quality is used to determine compliance with the total flow objectives in the Basin Plan. In years of normal rainfall, most of the total flow of the river is percolated in the Santa Ana Forebay, and directly affects the quality of that groundwater. For that reason, compliance with the TDS water quality objective for Reach 2 is based on the five year moving or "rolling" average of the annual TDS content of total flow. Use of this moving average allows the effects of wet and dry years to be smoothed out over the five-year period.

The three flow components are present in varying amounts throughout the year, and the contributions and quality of each can be affected by the regulatory activities of the RWQCB. The quantity of storm flow is obviously highly variable, thus water quality objectives for controllable constituents are set based on the base flow of the river, rather than on total flow.

The regulatory activities of the Regional Board include setting waste discharge requirements on point source discharges. Waste discharge requirements are developed on the basis of the limited assimilative capacity of the river. Nonpoint source discharges, generally urban runoff (nuisance water) and agricultural tailwater, are regulated by requiring compliance with Best Management Practices (BMPs), where appropriate. The rising water component of base flow is affected by the extraction of brackish groundwater in several subbasins by regulation of wastewater discharges, and other activities.

The quantity and quality of base flow is most consistent during the month of August. At that time of year the influence of storm flows and nontributary flows is at a minimum. The volumes of rising water and nonpoint source discharges tend to be low during that time. The major component of base flow in August, therefore, is municipal wastewater. For these reasons, this period has been selected as the time when base flow will be measured and its quality determined. This information will subsequently allow the evaluation of available assimilative capacity, which serves to verify the accuracy of the wasteload allocation. In order to determine whether the water quality and quantity objectives for base flow in Reach 3 are being met, the RWQCB collects a series of grab and composite samples during August of each year. The results are also compared with the continuous monitoring data collected by USGS and data from other sources. Additional sampling in Reach 3 helps evaluate the effects of the various constituents of base flow.

3.1.4 Recycled Water Quality

One of the factors that contributes to the high levels of dissolved minerals in the SAW is the fact that this water is used, recycled, and used again. The level of TDS rises with each use of water, as solids are added, or increase due to the reduction in volume in water from evaporation. All uses of water, residential, commercial, industrial, and agricultural contribute to this problem as the water in the region is used, treated, recharged into the groundwater basins, extracted, and used again. Many agencies in the watershed have joined together in a task force called the Nitrogen TDS Task Force to address this problem of increasing salt concentrations in the regions water supply. The agencies include SAWPA, Santa Ana River Dischargers Association (SARDA), MWD, and the RWQCB.

The United States Department of the Interior Bureau of Reclamation's 2001 Southern California Comprehensive Water Reclamation and Reuse Study, Phase II Executive Summary (SCCWRRS) states that, with regard to water quality, salinity was selected as the constituent of concern as representative for the reuse types and supplies. In the report, the costs associated with water quality were based on meeting the specified targets for each demand. Title 22 of the California Administrative Code (Title 22) specifies a range of treatment options for varying degrees of public contact. For the purposes of the SCCWRRS analysis, recycled water supplies were assumed to meet a minimum of full Title 22 requirements for disinfected tertiary recycled water. "Full Title 22 treatment" corresponds to the most stringent degree of public contact, including irrigation of food crops, irrigation for parks and playgrounds, etc. For disinfected tertiary recycled water, Title 22 requires that the level of wastewater treatment include biological oxidation (secondary treatment), filtration, and disinfection. Most of the identified municipal treatment facilities included in the SCCWRRS analysis provide a minimum of secondary treatment and many treatment facilities provide tertiary treatment for some or all of their flow.

The report acknowledges that in order to sell recycled water, it must also meet the standards set by the regulatory agencies. The California Water Code provides for the California RWQCB to establish water quality standards that protect surface and groundwater quality, which is typically outlined in each region's "Basin Plan." Additionally, state and federal recycling guidelines recommend average maximum salinity concentrations for uses such as irrigation and landscaping. These guidelines generally recommend less than 1,000 mg/L of TDS. Customer needs, however, will typically dictate the ultimate TDS target concentration.

CHAPTER 4 BIOSOLIDS

4.1 Introduction

As detailed in Chapter 1, population and urbanization within the Santa Ana Watershed (SAW) are projected to dramatically increase over the next 50 years. This regional growth is typically accompanied by a substantial increase in the amount (tons) of biosolids produced. Because biosolids are a natural by-product of treated wastewater, biosolids production is expected to increase at roughly the same rate as recycled water production. How to effectively dispose of and efficiently utilize this by-product poses a significant challenge to the SAW. Regional solutions to this significant growth, which must be part of an integrated watershed management plan, are addressed in this chapter.

Biosolids are nutrient-rich organic materials resulting from the treatment of domestic sewage in a treatment facility. Biosolids often contain approximately 93 to 99 percent water, as well as solids and dissolved substances present in the wastewater or added during waste-water or biosolids treatment processes. Also known as sewage sludge, biosolids must be carefully treated and monitored in accordance with regulatory requirements. Local governments are now required to treat wastewater and to either dispose the biosolids through incineration, landfill disposal, or recycle them as fertilizer. Most biosolids undergo additional treatment on site before they are used or disposed of to in order to meet regulatory requirements that protect public health and the environment, facilitate handling, and reduce costs. After treatment and processing, biosolids can be recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth. The controlled land application of biosolids completes a natural cycle in the environment. By utilizing biosolids as valuable fertilizer, precious space in landfills or other disposal facilities is unnecessary.

There are different regulations for different classes of biosolids. Class A biosolids contain no detectible levels of pathogens. Class A biosolids meet strict vector attraction reduction requirements and low levels metals contents and only have to apply for permits to ensure that these very tough standards have been met. Class B biosolids are treated but still contain detectible levels of pathogens. Virtually all forms of Class B biosolids must meet buffer requirements, public access, and crop harvesting restrictions.

Table 4.1 lists both the biosolids projections and the method of disposal for the SAWPA member districts for years 2000, 2010, 2025, and 2050. Projections for biosolids were based upon the percentage increases obtained from the recycled water total production projections in Table 7.1. Due to lack of information, biosolids data for the City of Rialto was not included in Table 4.1. No biosolids data is included for OCWD because they do not collect or treat biosolids. For the agencies shown in Table 4.1, biosolids production was 381,770 tons/year for 2000, 522,586 tons/year for 2010, 661,283 tons/year for 2025, and 856,294 tons/year for 2050. This represents an overall biosolids increase of 37%, 73%, and 124% (from the base year 2000) for 2010, 2025, and 2050, respectively.

4.2 Challenges

4.2.1 General Challenges

Agencies within the SAW face a number of common problems related to biosolids production. Some of the most prevalent issues are as follows:

Odor - This is the most frequent complaint encountered in the management of manure and wastewater treatment plants within the SAW, although it is possible to minimize nuisance impacts with present-day technology. Biosolids have their own distinctive odor depending on the type of treatment undergone. Biosolids may range from having only a slight musty, ammonia odor, to smelling like moist soil, to being very odorous. Compounds containing sulfur and ammonia, both of which are plant nutrients, cause much of the odor from biosolids.

Public Perception **-** The topic of biosolids is not a topic that is well known to the public. People are typically uncomfortable with treated sewage as a fertilizing material and fear that it could impact their health, the environment, and their property's value. Wastewater professionals also have a challenge to be more customer service oriented and to be less technical when communicating with the public, as well as more inclusive of stakeholders in decision-making processes that impact the public. In addition, lack of accurate information influences the publics' real or perceived perception of health effects relating to organics reuse operations.

Perceived Health Issues - Many people in the SAW are very concerned with the health issues related to biosolids. The public is not very well informed and seldom understands the facts about how biosolids are disposed of and how they are handled. Also, they typically believe that biosolids are unclean and full of bacteria. Although there has been extensive research suggesting the material is safe and beneficial for the soil, people are still concerned.

Location **–** Closely related to the above three challenges, selecting the proper location(s) for biosolids facilities, becomes more and more of a quandary as population and housing developments have dramatically increased throughout the SAW. Composting sites and land availability for specific recycling practices, such as agricultural land application, are also challenges because many people do not want biosolids reused in their neighborhood. Noone, it seems, wants such facilities anywhere near their community. This problem will only intensify in the future, based on the population growth projections discussed in Chapter 1.

Rules and Regulations - There are a host of rules and regulations that come with the disposal of biosolids. Those that use biosolids for land application must comply with all relevant federal and state regulations. In some cases, a permit may be required. The federal biosolids rule is contained in 40 Code of Federal Register (CFR) Part 503. Biosolids that are to be land applied must meet these strict regulations and quality standards. The Part 503 rule governing the use and disposal of biosolids contains numerical limits for metals in biosolids, pathogen reduction standards, site restrictions, crop harvesting restrictions and monitoring, record keeping, reporting requirements for land applied biosolids, as well as similar requirements for biosolids that are surface disposed or incinerated. Most recently, standards have been proposed to include requirements in the Part 503 Rule that limit the concentration of dioxin and dioxin-like compounds in biosolids to ensure safe land application.

Groundwater Quality - Groundwater quality has been threatened from salts, nitrogen, and organic materials originating from biosolids. To protect groundwater quality and public health, biosolids must be expeditiously removed and either hauled from the basin or processed in a manner that eliminates its impact on groundwater.

Landfills – A number of agencies, such as the City of Redlands, dispose of their biosolids in landfills. This may not be a viable option in the near future, however, as the federal government has issued a regulation requiring that all landfills reduce the incoming amount of biosolids by 50%. In addition, some counties have already completely banned biosolids from entering landfills, and it seems reasonable that others will follow.

Land Application – Orange, Riverside, and San Bernardino Counties all allow for the land application of Class A biosolids. Class B biosolids may also be land applied, with the exception of Riverside County, which recently banned this activity. A very possible scenario in the future is that all three counties may ban Class B biosolids from land application. Unless agencies start planning now for these looming more stringent regulations, many may find themselves in the midst of a biosolids crisis.

Biosolids Exportation – Like the City of San Bernardino, a number of SAW agencies export their biosolids to counties outside the SAW, where biosolids are not yet as controversial. The hauling fees vary, as they are dependent on both hauling distance and fuel prices. Once again, the reliability of outside counties accepting SAW biosolids may no longer be an option, as more and more counties scrutinize their own biosolids policies.

Diversification - Many of the agencies within the watershed rely on only one method of biosolids disposal. Even if an agency relies on a combination of landfill, spreading, and/or exportation methods, none of these options seem to be long-term reliable options, perhaps even in the very near future.

4.2.2 Challenges Specific to SAW Agencies

Orange County - Orange County does not have an official ban on or ordinance against the land application of Class A or Class B biosolids. Class B biosolids can only be used to grow animal feed like alfalfa and fiber like cotton crops. The county, however, has very little agricultural land available, and what is still in agricultural production is mostly used for food crops, such as strawberries. Class A biosolids, which are marketed as bagged soil amendment products, are sold in many home improvement stores.

One major issue that Orange County may have to face is that OCSD could be forced to dispose of biosolids into the landfills, should outside counties choose to no longer accept OCSD biosolids. Thus far in Orange County, biosolids are neither being land applied nor land filled.

- ***Orange County Sanitation District –*** OCSD faces many challenges in recycling biosolids, though their greatest challenge is the publics' negative perception regarding the origin of the material. In addition, politics, economics, and technology all "weigh in" as impacting biosolids recycling. OCSD has a policy of 100% recycling of their biosolids. Their Biosolids Management Program is responsible for the management of biosolids, grit, screenings, and related residuals. The recycled biosolids are used as fertilizers and soil amendments in land applications. They are then treated and loaded onto trucks and sent to agricultural farmland in several counties. These counties include Kern, King, San Diego, and some San Bernardino County Tribal Land. As mentioned earlier, this may pose a problem in the future because some of these counties are thinking of banning Class B and perhaps even Class A biosolids from being land applied.

Riverside County - Land spreading of Class B biosolids is banned in Riverside County. The County is also considering banning Class A biosolids, which means that they would only accept Class A compost. Class A compost is different from biosolids in that it is changed into something organic, like pasteurization or pelletizing. One of the County's challenges is solving the issues surrounding Synagro. Synagro is one of the region's largest organizations that accepts and processes biosolids from wastewater treatment facilities around the county. The Temescal site, where Synagro is currently located, was originally permitted as an open-air facility to Recyc, Inc. During their operations, they had to cope with conflicting regulations from different agencies, which caused a number of compliance problems. In order to resolve the situation, Synagro offered to buy the site from Recyc, Inc., with assurances to the County that they would be able to satisfy all parties involved. By the time Synagro assumed control of the site, Recyc had left stockpiles of biosolids material waiting to be composted.

The County set stringent regulations for Synagro when it took over the facility. Synagro, nevertheless, continued to have odor problems. When Synagro did not rectify the problems, the County shortened their permit, which effectively limited the amount of biosolids entering the facility. Synagro in turn sued the County. Synagro also wants to re-locate and remodel their facility, but the County has stopped the relocation process in hopes that the neighboring wastewater agencies can come up with their own solutions for the SAW region. Finding a solution is an urgent matter because so many agencies rely upon Synagro to dispose of their biosolids. Should the County completely shut down Synagro, many agencies are not prepared to dispose of their biosolids.

- ***Eastern Municipal Water District*** - As a result of current regulations banning Class B sludge application in Riverside County and actions against the Synagro Facility in Corona, sludge-hauling costs have increased approximately 25% over last year and will probably continue to increase. This is a major concern to EMWD. Roughly 22% of EMWD's biosolids are composted at the Synagro Facility, while 78% is land applied in the Needles area.

- ***Western Municipal Water District*** - Synagro composts 100% of Western Municipal Water District's biosolids; consequently, WMWD's primary challenge centers on disposing of biosolids should Synagro no longer be an option.

San Bernardino County - San Bernardino County follows the Santa Ana Regional Water Quality Control Board standards in dealing with biosolids and water. With regard to landfills, the County follows the California Integrated Waste Management Board standards. Permits obtained from the Board state that the landfills are allowed to accept biosolids, but not sewage sludge.

- ***Inland Empire Utilities Agency*** - IEUA's primary concerns are the same that most agencies face that produce biosolids: relying too heavily on any one source to dispose of and/or haul away their biosolids. For example, if IEUA relies too heavily on land applying their biosolids within a specific county, IEUA would not have a place to dispose of their biosolids should the county decide to ban biosolids land application.

  IEUA is also concerned with the challenge of manure, which originates from the many dairies within the Chino area. These dairies produce tons of manure annually, thus creating challenges in terms of disposal. In terms of long-term planning, this is a diminishing challenge, as increasing urbanization will result in the dairy's relocating to more remote areas. This in turn will greatly reduce the amount of manure produced over the next 50 years.

- ***City of Colton*** - The City of Colton's immediate challenge is that their relatively old facility that needs to be updated. The biosolids drying beds are not drying up as efficiently as intended; consequently, the biosolids take twice as long to dry during the wet weather season than expected.

- ***City of Redlands*** - The City of Redland's top area of concern is the need for land in order to develop more drying beds for their biosolids. Currently, the City runs out of drying space for the sewage sludge during the wet weather season. The City operates a wastewater treatment plant and disposes their biosolids in a City-owned landfill.

- ***City of San Bernardino*** - The City of San Bernardino currently disposes of its biosolids in a remote disposal location in Bakersfield, where they are land applied. The City's main challenge is the cost of hauling their biosolids to this remote location.

- ***Yucaipa Valley Water District*** - Yucaipa Valley Water District's most challenging concern is the possibility of San Bernardino County banning Class B biosolids, and perhaps even Class A biosolids, from being land applied. YVWD currently sells their biosolids to a private contractor, who hauls them to Redlands to be composted.

4.3 Solutions

4.3.1 Planning Options Considered by Counties and SAW Agencies

Orange County - Orange County does not currently have major problems dealing with biosolids. In the future, however, OCSD has indicated that they may consider landfilling their biosolids. Should Orange County implement new regulations that ban biosolids from landfills, OCSD would have to come up with alternate solutions. Many of the solutions considered by OCSD to address future biosolids challenges are included in the Regional Solutions section of this chapter.

Riverside County – As mentioned in Section 4.2.2, Synagro and the County have considered moving Synagro's existing facility to the Lamb Canyon Landfill, which is located near Beaumont. The new facility would be an indoor and bio-filtrated composting facility. Before a decision is made, the Riverside County Board has asked the various wastewater agencies to come up with a plan of their own for Lamb Canyon. The county believes that the individual water agencies should solve their own problems, instead of having a private organization handle their biosolids output.

- ***Eastern Municipal Water District*** - To solve their biosolids hauling cost challenges, EMWD has hired engineers to evaluate five different sludge disposal alternatives: pasteurization, two composting options, thermal dryers, mineralogy, and hydro-gasification. Producing Class A biosolids is being evaluated along with the ability to sell and/or dispose of it in an ever-increasing regulatory environment. EMWD and Riverside Public Utilities have teamed up to fund scientists at the University of California, Riverside's Center for Environmental Research and Technology to develop a way of converting 'wet waste,' such as sewage sludge and grass clippings, into synthetic diesel fuel and electricity. The process would use high temperatures and pressure to harness gases for fuel synthesis or to generate power. EMWD's daily output of 140 tons of sludge could produce 1,092 gallons of synthetic diesel fuel and generate up to 34 megawatts of electricity per day. Should this project be fully realized, it could potentially reduce the need for landfill space and provide a cost-effective alternative to increasingly restricted land application. This experimental project is expected to operate in 2004 and represents a potential alternative to Synagro's Lamb Canyon proposal.

  Another proposed project proposed by a private company named Calpine, is the Inland Empire Energy Center, which would be located in EMWD's Perris area. This 600 megawatt natural gas power plant would use recycled water for both its cooling and steam cycle. The plant would also generate a great amount of waste heat, which could perhaps be used to process biosolids.

San Bernardino County - Should the RWQCB Standards and the California Integrated Waste Management Board Standards change, the county may ultimately face the banning of Class B and/or Class A biosolids in landfills. Below are examples of solutions that individual agencies are considering and/or implementing.

- ***Inland Empire Utilities Agency*** - As a long-term solution, IEUA plans to turn all 170 tons/day of biosolids that they collect, into recycled products. Some methods of biosolids recycling are composting, palletizing, and pasteurizing. These methods are ways of converting biosolids into organic substances that can be used in place of fertilizers. IEUA concluded that disposing biosolids into the land faces a number of challenges; consequently, IEUA decided to first turn the biosolids into compost. This solution is discussed in their Chino Basin Organics Management Strategy Business Plan, which describes the proposed enclosed facilities that would turn biosolids into useful forms of organic substances, such as compost.

  IEUA's Business Plan lists three important services: water supply, wastewater treatment, and water quality production. Currently, IEUA's Class A biosolids are either sent to their agency-owned Co-Composting Facility or trucked to Synagro. The composting process transforms the biosolids into high quality soil amendments and fertilizers. The facility is located in the Chino area, and can process approximately 55,000 tons/year. The RWQCB and the Milk Producers' Council endorse the facility, which was built to recycle biosolids generated at the IEUA's water reclamation facilities. The facility also helps with the removal of dairy manure that contributes to the contamination of the Chino groundwater basin. IEUA composts manure and biosolids together, hence the name Co-Composting Facility.

  The Business Plan was designed to solve two major problems: the disposal of biosolids from treatment plants and cow manure from dairy farms. IEUA is concerned with cow manure primarily because of air quality issues such as odor, dust, ammonia, and hydrocarbons. Cow manure also causes water quality problems in the area. Salts from the cow manure sometimes leach into and contaminate the groundwater. Rain runoff from the dairies sometimes flows to nearby water basins, which contaminates the surface water. By removing some of the manure from these dairy farms, both surface waters and groundwater are protected. It is also less expensive to remove salt using the Co-Composting Facility than it is to construct desalination plants to remove salt from contaminated water supplies.

  IEUA's Business Plan states that IEUA intends to close the existing open-air facility and construct four enclosed facilities. The enclosed facilities would virtually eliminate stray odors and dust from the composting process, including the loading and unloading operation, which would also be enclosed. High quality fertilizers created at these facilities would be available for sale in the market place. The four facilities are the RP-1 Enclosed Aerated Static Pile (ASP) Project, the Inland Empire Regional Composting Facility, the California Institution for Men, and the Colton Composting Facility.

  The Business Plan lays out the framework to combine and compost the biosolids from the treatment facilities and about 60% of the manure from the dairy farms in order to produce Class A quality fertilizers. IEUA believes this plan can help them control their own destiny of waste management, produce methane gas and turn it into electricity, produce compost and fertilizer products, and provide water quality and supply benefits to the region. The type of method they plan to use for the production of the fertilizers and electricity comes from the co-composting plan and facility.

The Business Plan also includes a plan for the energy crisis. IEUA wants to expand the anaerobic digestion at the co-composting facilities with dairy cow manure, green material, food waste, and possibly other organics to increase the production of methane gas that can be converted into an environmentally clean source of power for the region. This method protects public health, the groundwater basin, and the environment. They believe that this method can also help them both save and make money.

The Business Plan includes the cost and issues with the composting, and goals IEUA has for the treatment plants and desalters. Some benefits of this program include the following: groundwater clean-up, help in drought proofing the region, air quality improvement, wastewater self-reliance, water self-reliance, reduction of green material, implementation of goals of the Chino Basin Peace Agreement, and regulatory control. As a result of the Business Plan, IEUA is one of the leading agencies that is very proactive in dealing with biosolids issues.

- ***City of Colton*** - The City of Colton's solution to the drying challenges is to expand their dewatering area. An expansion of the facility will help to improve the drying conditions of the biosolids. They may also implement new methods of drying like mechanical dewatering.

- ***City of Redlands*** - Redlands is currently developing a Solids Handling Master Plan, which will outline a better way to handle their biosolids. The City also plans to solve their lack of land space by purchasing more property in order to develop more drying beds for their biosolids.

- ***City of San Bernardino*** - San Bernardino intends to add cogen to the sewage sludge in order to further dry the sludge. This process reduces the weight of the sludge by 20%, thus helping to control hauling costs.

- ***Yucaipa Valley Water District*** - YVWD foresees an effective public relations program as a major solution in coping with biosolids issues, coupled with plans to produce on-site Class A biosolids in the future.

4.3.2 Regional Solutions

Wastewater agencies within the SAW region will likely have to join forces to develop a disposal plan for the biosolids. The plan should include one or more Organic Management Facilities to dispose of all the biosolids within the region. The Organic Management Facility should turn the biosolids into some type of organic substance that could be safely applied to the land. This facility, as well as the other solutions listed below, would solve most of the region's problems related to the disposal of biosolids.

Organic Management Facilities - One possible solution to the challenges agencies within the SAW face is to build enclosed Organic Management Facilities (OMF). OMFs could be centralized facilities that help to recycle and to dispose of biosolids, as well as solve other problems by following standards established by the federal government.

- ***Groundwater Clean Up*** - OMFs would be a major step towards cleaning up the SAW region's groundwater basins and preventing future contamination. Comprehensive and ongoing removal of biosolids generated annually in the region would prevent harmful percolation into the groundwater basins.

- ***Maintain Regulatory Control*** - OMFs would help to maintain control of how and where biosolids and manure are disposed. This would also help to avert potential waste disposal crises as the regulatory environments change.

- ***Reduction of Green Material*** - OMFs would provide disposal and composting for significant amounts of the SAW region's green material, including grass clippings and tree trimmings. Green waste has become a major burden that could severely impact the life expectancy of landfills in the region and throughout the state. The State of California has instituted regulations mandating a 50% reduction of all community wastes, including green material, being place into landfills. OMFs would aid in meeting this reduction goal, enhance the environment locally, and prevent premature retirement of the Inland Empire's landfills.

Odor Control - The most likely solution to the odor problem is for all biosolids treatment facilities to be completely enclosed. The technology for this exists, although it is clearly more costly than open facilities. Increasing urbanization within the SAW makes enclosed facilities a likely key solution.

Educating the Public - A strong biosolids public relations program is of paramount importance, as it would result in the public better understanding how each facility functions in order to dispose of biosolids. Educational courses that have features such as organic demonstration gardens, overviews of the region's water, wastewater and environmental issues, complete explanations of Organics Management Centers, and the composting process would help to further inform the public with regard to biosolids and other processes.

Any public relations program must be implemented on an ongoing basis in simple and specific ways with regard to the beneficial qualities of the material, the need to recycle, and the scientific and practical research showing that the material is safe. It is also important to have reputable agency and associations publicly support the recycling of biosolids.

Addressing Health Issues - The National Academy of Sciences has reviewed current practices, public health concerns, and regulatory standards, and has concluded that "the use of [biosolids] in the production of crops for human consumption, when practiced in accordance with existing federal guidelines and regulations, presents negligible risk to the consumer, to crop production, and to the environment." Providing the SAW public this kind information should further educate them and inform them of how biosolids are not hazardous to their health.

Facility Location - The solution to the limited available land area for composting and land application is to focus on areas where industries are located, or areas that are in very remote regions, thus creating good buffer zones between the facility and the surrounding community. The host county should receive some sort of benefit for supporting the project within their jurisdiction. Also, the community should be fully involved during the project development stage, so they feel a degree of ownership in it and can give their input.

New Technology - Developing new technology would help to solve some of the problems that come with biosolids. Developing new methods of disposal would assist wastewater treatment facilities to cut down on cost. Also, by developing new technologies, biosolids-related problems could be solved. An example of developing new technology is the idea of converting wet waste, such as sewage sludge and grass clippings, into synthetic diesel fuel and electricity. Scientists at the University of California, Riverside are currently developing and studying this alternative process of disposal for biosolids. Proposed power plants, such as the gas-to-power plant planned in the Good Hope region in EMWD, could then consider alternative energy sources like biosolids for production of their electricity.

Several other types of new biosolids processing and energy production technologies, all listed in IEUA's Business Plan, include: the RP-5 Energy Recovery Project, RP-1 Manure Digester Pilot Project, RP-4 Microturbine Project, RP-5 Renewable Energy Project, High-Tech Manure Digester Project, Dairy Digester Pilot Project, and Advanced Technology Manure Pyrolysis Process. Biosolids processing and energy production and the RP-4 Microturbine Project are projects that incorporate turning methane gas, from biosolids, into sufficient energy. The RP-1 Manure Digester Pilot Project, High-Tech Manure Digester Project, Dairy Digester Pilot Project, and Advanced Technology Manure Pyrolysis Process are different types of methods to handle manure.

Biosolids Marketing - The solution to finding a stable market for the recycled material is to increase the market for the material. This can be done through advertising, conducting tours of recycling sites, donations to agricultural organizations and horticultural companies, aggressive promotion of the material, and selling the product instead of giving it away. Tailoring the product for specific purposes is also important.

Table 4.1
BIOSOLIDS FACILITIES' EXISTING AND PROJECTED PRODUCTION IN THE SANTA ANA WATERSHED

				2000		2010*		2025*		2050*	
Operating Agency	**Disposal Method**	**Disposal Area**	**Class**	**Wet Tons/Day**	**Wet Tons/Year**	**Wet Tons/Day**	**Wet Tons/Year**	**Wet Tons/Day**	**Wet Tons/Year**	**Wet Tons/Day**	**Wet Tons/Year**
City of Beaumont	Landfilled	On site	B	1.56	570.00	2.60	950.19	4.16	1,520.19	8.31	3,038.10
Big Bear Area Regional Wastewater Agency	Composted and Incineration	Synagro and Mitsubishi Plant	B	20.00	7,300.00	25.00	9,125.00	30.00	10,950.00	40.00	14,600.00
California Department of Corrections	Soil Enhancement	On site	B	0.53	192.00	0.55	198.34	0.57	198.34	0.58	198.34
City of Colton	Land Applied	Synagro	B	6.48	2,365.00	12.03	4,392.04	12.03	4,392.04	12.03	4,392.04
City of Corona	Land Applied		B	60.00	21,900.00	60.00	21,900.00	60.00	21,900.00	60.00	21,900.00
Eastern Municipal Water District	78% Land Applied	Needles area for farming	B	80.34	29,399.76	108.94	39,866.07	149.89	54,850.53	149.89	54,850.53
Eastern Municipal Water District	22% Composted	Synagro	A	22.66	8,292.24	30.73	11,243.95	42.28	15,470.21	42.28	15,470.21
Elsinore Valley Municipal Water District	Composted	Synagro	B	25.00	9,100.00	44.78	16,298.10	69.70	25,370.80	69.70	25,370.80
Inland Empire Utilities Agency	Composted	Co-Composting facility, Synagro, and Earthwise	A	170.00	62,050.00	237.76	86,783.13	344.75	125,835.54	457.69	167,057.50
Irvine Ranch Water District	Goes to OCSD to be treated	OCSD	B	5.50	2,000.00	7.88	2,866.00	12.51	4,550.00	12.51	4,550.00
Lee Lake Water District	Composted	One Stop Landscape Supply in Redlands	B	0.50	150.00	1.77	531.30	1.77	531.30	1.77	531.30
Orange County Sanitation District	Land Applied	Sent to Kern, King, San Diego, and some San Bernardino County Tribal Land	B	530.00	193,450.00	721.33	263,285.45	774.33	282,630.45	1,035.62	378,001.30
City of Redlands	Landfilled	City owned landfill	B	8.00	2,300.00	8.00	2,300.00	8.00	2,300.00	8.00	2,300.00
City of Rialto						0.00	0.00	0.00	0.00	0.00	0.00
City of Riverside	Composted and Land Applied	Synagro and One Stop Landscape Supply	B	17.00	6,351.00	18.68	6,985.46	18.70	6,985.46	18.70	6,985.46
Running Springs Water District	Composted	Synagro	B	0.50	180.00	0.59	212.72	0.68	245.45	0.77	278.17
City of San Bernardino	Land Applied	McCarty Farm	B	100.00	26,000.00	132.00	34,320.00	239.99	62,399.97	239.99	62,399.97
Western Municipal Water District	Composted	Sent to Synagro	A	18.00	6,570.00	40.68	14,848.20	89.64	32,718.60	228.96	83,570.40
Yucaipa Valley Water District	Composted	One Stop Landscape Supply in Redlands	B	10.00	3,600.00	18.00	6,480.00	23.43	8,434.23	30.00	10,799.93
Totals				**1,076**	**381,770**	**1,471**	**522,586**	**1,882**	**661,283**	**2,417**	**856,294**
% increase from 2000				0%	0%	37%	37%	75%	73%	125%	124%

*The projections made for the 2010, 2025, and 2050 are based on the total wastewater production estimates in Table 7.1

CHAPTER 5 WATER STORAGE

Water storage in the SAW is still largely reliant on large reservoirs and dams, such as the Diamond Valley Reservoir, Seven Oaks Dam, Prado Dam, and Bear Valley Dam, to name just a few. This surface storage helps to meet demands during times of short-term drought, when local water is not as readily available. Recently, however, lower costs of groundwater banking have become an economically attractive option for Southern California. Each area of the watershed is unique in its soil, geography, and history, and there is a wealth of knowledge amongst SAWPA's member agencies as to what steps can be taken for a comprehensive and region-wide water banking strategy. The primary goal of the IWRP is to ensure that a safe and clean water supply will be available to watershed residents and industries during all years, wet or dry. There is even potential for the SAW area to store water for other regions of Southern California as well. The full utilization of regional aquifers will enable us to meet our own needs and even make some storage capacity available to other urban areas in Southern California.

In order to ensure adequate water supplies in times of severe drought, sufficient water storage must be implemented. With Southern California's dependence on imported water to serve water demands, the need for local storage intensifies. One of the most effective forms of storage in a highly dry and arid climate such as ours, is conjunctive use wherein water is stored under ground during wet periods and pumped out during dry or drought periods. Limitations to such storage are available resources such as basin storage capacity, recharge capacity, water quality, and institutional constraints. Despite these challenges, conjunctive use storage is cost effective and non-intrusive alternative to surface water storage. The following 2010 projects, shown in Figure 5.1 and listed in Table ES.1, serve to further the IWRP's objective of increasing SAW storage capacity.

As the SAW urbanizes and drainage systems are improved, imperviousness in the watershed increases, causing increased runoff due to precipitation. In the Chino Basin Watermaster's Optimum Basin Management Program Recharge Master Plan, Phase II Report, for example, it is projected that by 2020, virtually none of the land in the Chino Basin will be used for irrigated agriculture. Water used for recharge typically comes from three different sources: storm water, recycled water, and imported water. In IEUA, storm water is considered the primary source of water for recharge into recharge basins. In OCWD, recycled water is the primary source of water for the Groundwater Replenishment System (GWRS).

5.1 Eastern Municipal Water District

EMWD's Year 2000 Urban Water Management Plan (UWMP) states that over 75% of the District's current and future water supply is and will continue to be imported water purchased from MWD. On average, 75% of imported supplies will consist of State Water Project (SWP) water from Northern California and 25% will be delivered via the Colorado River Aqueduct. Currently, virtually all imported water purchased by the District is treated at two (2) water filtration plants operated by MWD: the Mills Filtration Plant serving the northern portion of the District and the Skinner Filtration Plant serving the southern portions of the District. In addition to treated imported water, the District has developed a 3,000 AFY seasonal storage demonstration program. Untreated SWP water is purchased from MWD during periods of seasonal or hydrologic surplus (primarily winter months) and used to recharge a local groundwater basin. This stored water is then extracted by the District's wells and used in-lieu of treated imported water. Current plans call for the expansion of the seasonal storage program to 20,000 AFY by 2020. In fact, EMWD is currently constructing the Perris Valley Water Microfiltration Plant that will serve the western half of its service area. The seasonal storage program expansion, however, will require adoption of a groundwater management plan and resolution of local tribal water rights claims. If these issues are not resolved, the District will construct its own water filtration plant for the Hemet San Jacinto area (i.e., the eastern half of EMWD) in-lieu of expanding the seasonal storage program.

As mentioned above, EMWD has developed and is implementing conceptual plans to recharge local groundwater basins with imported water during hydrologic "wet years." The District's intent is to ultimately expand this program to a level that allows significant reliability improvements through in-lieu use of stored imported water during periods of drought. The ability to store imported water during periods of hydrologic surplus will improve the reliability of the District's water supply. Even greater benefits will be realized if the District is successful in the development of true conjunctive use of the San Jacinto subbasin, where up to 75,000 AF of water could be stored for drought relief.

5.1.1 Projects: 2010

Hemet/San Jacinto Conjunctive Use Cross Basin & Pipeline – This project would construct a pipeline to convey untreated State Water Project (SWP) water from EM-17 to 100 acres of recharge ponds to be constructed in the bed of the San Jacinto River. Up to eight recovery wells would be constructed as well. A transmission pipeline to tie the distribution system in the Hemet-San Jacinto area to transmission pipelines that are connected to the Western portions of the district would result in up to 40,000 AF of seasonal storage and 45,000 AF of long-term storage for drought relief.

Mills 2 Intertie East **-** This project would construct a major (60"+) pipeline to link MWD's Mills filtration Plant with the conjunctive use project planned for the Hemet/San Jacinto area (see above project). The Mills 2 Intertie East would increase the District's access to high-quality SWP water, which is essential for the continued expansion of water

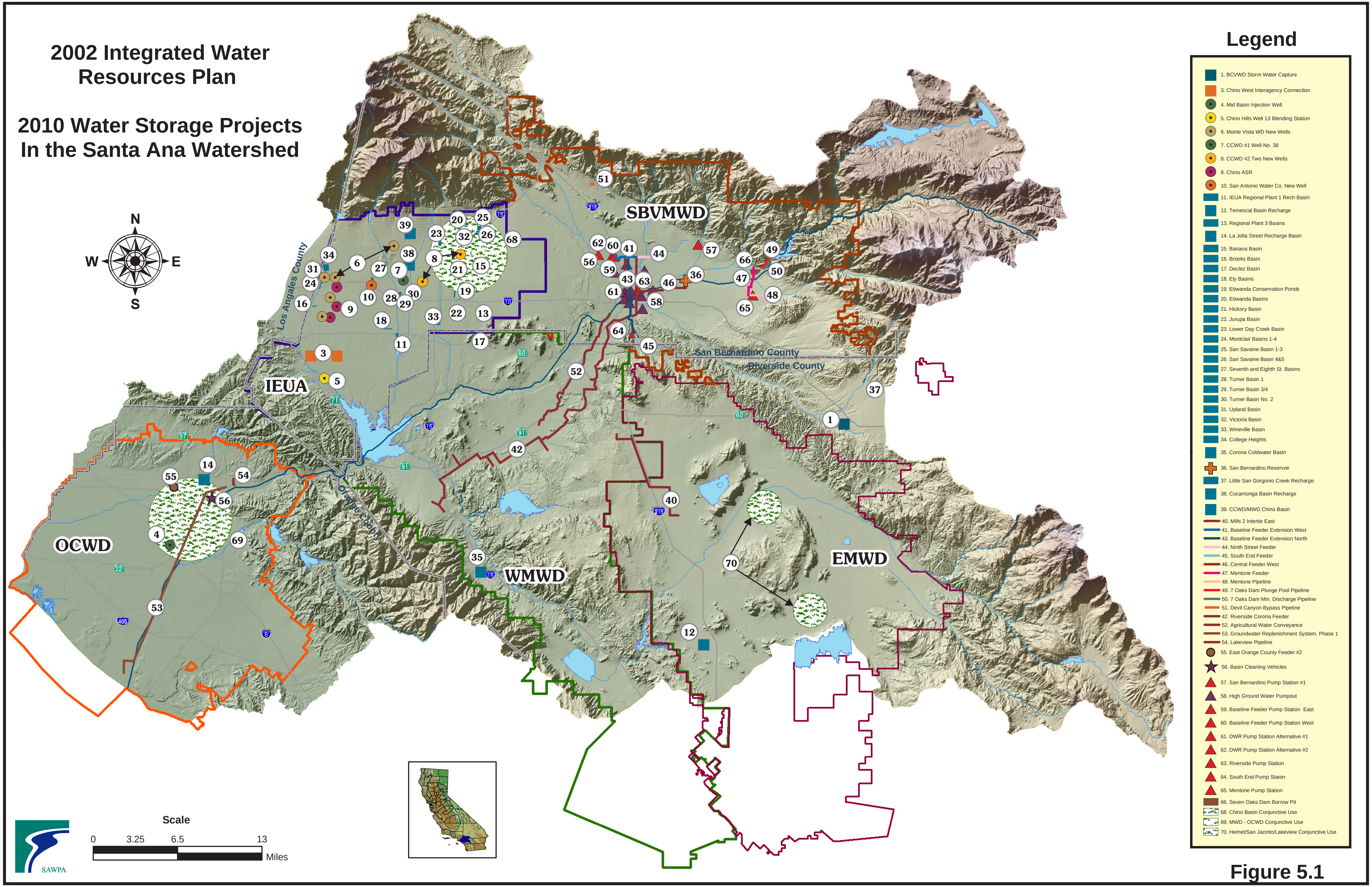


Figure 5.1

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recycling and would allow stored water from the recharge project to be used in the western portions of the District's service area during periods of drought.

Hemet Conjunctive Use/Long Term Shift – This project could develop up to 25,000 AF of long term seasonal storage in the Hemet subbasin through the construction of a feedwater pipeline and injection recovery wells. The project would provide drought relief (in-lieu use of stored water to reduce demands on MWD) as well as helping to control salinity intrusion from the Winchester area from impacting higher quality local wells.

***Lakeview Conjunctive Use/Long Term Shift* -** This project would construct pipelines and injection/recovery wells in the Lakeview subbasin. Up to 10,000 AFY of filtered water from MWD's Mills filtration Plant would be used to recharge the Lakeview subbasin and provide regional long-term drought relief. In conjunction with the Perris Desalters, this project would help control salinity intrusion, which currently threatens high quality groundwater in Lakeview.

5.2 Inland Empire Utilities Agency

One of the most attractive locations to implement water storage is the Chino Basin, located largely within the service area of IEUA. Chino Basin has an estimated available storage capacity of approximately 5 million AF, with an additional unused storage capacity based upon historic water levels in the basin of about 1,000,000 AF. The adjudicated average safe yield of Chino Basin is 140,000 AFY. Chino Basin's high recharge rate, good quality water, and easy access to major MWD water conveyance facilities provide several attractive features for implementation of conjunctive use storage.

In November of 1998, the Chino Basin Watermaster parties commenced work on the development of an optimum basin management plan for Chino Basin. The plan, completed in August 1999, outlines the current state of the basin, develops components of the Optimum Basin Management Program (OBMP), and defines an implementation plan. As stated within the OBMP itself, "The purpose of the Optimum Basin Management Program is to develop a groundwater management program that enhances the safe yield and the water quality of the Basin, enabling all groundwater users to produce water from the Basin in a cost-effective manner." The first management goal of the OBMP is to enhance management of the basin, with emphasis on the following activities:

- Develop policies and procedures that will encourage stable, creative, and fair water resources management in the Basin.
- Optimize the use of local groundwater storage. Policies and procedures for local storage, cyclic storage and other types of storage accounts will be created to maximize drought protection and improve water quality, and to create an efficient system to transfer water from producers with surplus water to producers that need water.
- Develop and/or encourage production patterns, well fields, treatment and water transmission facilities, and alternative water supply sources to ensure maximum and equitable availability of groundwater and to minimize land subsidence.
- Develop conjunctive-use programs with others to optimize the use of the Chino Basin for in-basin producers and the people of California.

The development of conjunctive use storage in Chino Basin is a major component of this plan. The initial storage volume target of 150,000 AF to 300,000 AF is proposed to realize operational storage in times of drought and assure adequate water availability to meet water demands without dependence on imported water. To achieve this goal, a 20 year time frame is proposed with work beginning on aspects of the plan immediately.

The goal for Local Chino Basin Conjunctive Use is to construct drought-proof, emergency supply, and clean-up projects for all of the Chino Basin area. This would be accomplished by constructing new wells, interconnections between utilities, injection/recovery wells, and provide well head treatment to remove salts (TDS), nitrates, volatile organic compounds (VOC), and arsenic constituents within the basin.

The goal for Regional and Statewide Conjunctive Use is to initially develop 500,000 AF of regional and statewide storage through MWD and CALFED/DWR feasibility studies. This will be discussed further in Chapter 11 - Long-Term Regional Planning.

The OBMP also addresses the goal of enhancing basin water supplies. The activities to achieve this cover several categories within this IWRP, and are listed below:

- Enhance recharge of storm water runoff. Increasing the recharge of storm water in the Basin will increase the water supplies in the Chino Basin. The relatively low TDS and nitrate concentrations of storm flow will improve groundwater quality.
- Increase the recharge of recycled water. The recharge of recycled water above that required for replenishment obligations can be used for safe yield augmentation and/or conjunctive use.
- Develop new sources of supplemental water. New sources of supplemental water, including surface and groundwater from other basins, can be used to meet Chino Basin area demands, reduce dependency on MWD supplies, and improve drought reliability.
- Promote the direct use of recycled water. Promoting the direct use of recycled water for non-potable uses will make more native groundwater available for higher-priority beneficial uses.
- Promote the treatment and use of contaminated groundwater. Groundwater in some parts of the Basin is not produced because of groundwater contamination problems and thus the yield of the Basin may be reduced. The yield of the Basin can be maintained and enhanced by the production and treatment of these contaminated waters.
- Reduce groundwater outflow. Increasing groundwater production near the Santa Ana River will increase the streambed percolation of the Santa Ana River into the groundwater basin, and reduce groundwater outflow from the Basin and thereby increase the supply of groundwater in the Basin.
- Re-determine safe yield. Recent studies suggest that the safe yield may be greater than the adjudicated average safe yield of 140,000 AF as stated in the Judgment. The activities listed above will cause the yield to increase further. Continuing to operate the Basin at 140,000 AFY will cause groundwater in the Basin to be lost to the Santa Ana River. The safe yield will be re-determined on an as needed basis to maximize the current yield and to cause future increases in yield.

In August 2001, the Chino Basin Watermaster published the Optimum Basin Management Program Recharge Master Plan, Phase II Report. The purpose of the report was to update and expand opportunities for groundwater recharge within the Chino Basin. The physical ability to recharge water from three potential water sources was assessed: storm water, recycled water, and imported water. The assessment of average annual storm water recharge capacity estimated that the ultimate (Year 2020) capacity ranged between 18,790 and 23,700 AFY. The potential recycled water recharge capacity that could be developed through the implementation plan ranged from 18,790 to 23,700 AFY. Finally, the potential imported water recharge capacity that could be developed through the implementation plan presented in this Phase II Report ranged from 81,800 to

122,100 AFY. The source of imported water used for recharge in the Basin was assumed to be the State Water Project (SWP).

The combined potential recycled and imported water recharge capacity ranged from 100,590 to 145,800 AFY. Based on current and future pumping, the replenishment obligation is estimated to be about 63,000 AFY. Thus, excess recharge capacity could be available. If this capacity were fully developed, it would provide greater flexibility in managing recharge in general (e.g., maintaining hydrologic balance), and could be used for conjunctive use.

This report also identified storm water and imported water recharge facilities improvements that could be implemented immediately. Also identified were recycled water recharge facilities improvements that could be implemented as part of IEUA's recycled water program. Improvements to increase storm water recharge consisted mainly of earthwork to improve percolation and increase basin storage capacity, new basin inlets, or modification to existing inlets, and new outlets or modifications to basin outlets. Improvements for recycled water recharge included the construction of inlet structures, conveyance facilities, and turnouts from the proposed IEUA Regional Recycled Water Distribution System. Improvements for imported water recharge included the construction of inlet structures, conveyance facilities, and turnouts from MWD's Foothill Feeder, also referred to as the Rialto Pipeline. One of the outcomes of the report consists of the Recharge Basin Projects (20), which is further described below.

5.2.1 Projects: 2010

Cucamonga County Water District (CCWD) Project 1 - Well No. 36 – This project would include well rehabilitation to meet Health Department requirements. Improvements include installation of pumping equipment and appurtenances and construction of a discharge pipeline to Reservoir 1C. Well No. 36 is currently not in use due to lack of compliance with Health Dept. requirements.

CCWD Project #2 – Two New Wells – This project includes construction of two wells at the District's Reservoir 1C site, which would enable the District to reduce demands on the State Water Project system. The wells would be located within the Chino Basin.

City of Chino Project 5 - West Chino Basin Interagency (Chino Hills, MVWD, and Ontario) Interagency Connections - This project covers transmission and distribution system and interconnections to enable regional distribution of Chino Basin groundwater. A production of 5377 AFY is proposed.

City of Chino Project 1 Benson/Palo Verde ASR - This project covers the development of a high volume well, which is an integral element of a basin-wide water management program and regional project. The project consists of ASR wells, associated pipelines, and anion exchange facilities and is estimated to increase dry-year yield of 5,040 AFY and enhance groundwater quality.

City of Chino Project 2 State/Benson ASR - This project includes modifications to existing groundwater production facilities, which are integral elements of basin-wide water management programs and regional projects. The project consists of ASR wells, associated pipelines, and anion exchange facilities and is estimated to increase dry-year yield of 4,480 AFY and enhance groundwater quality.

City of Chino Project 3 Phillips/Central ASR - This project includes modifications to existing groundwater production facilities, which are integral elements of basin-wide water management programs and regional projects. The project consists of ASR wells, associated pipelines, and anion exchange facilities and is estimated to increase dry-year yield of 4,480 AFY and enhance groundwater quality.

City of Chino Hills Well 13 Blending Station - This project provides increased dry-year yield and basin cleanup for up to 2,100 AFY for Well 13, which produces water with a high nitrate concentration. The water from this well will blend with low nitrate water prior to entering distribution system.

City of Ontario #1 - 4 New Wells – All four of these projects include construction and equipping a new well.

City of Ontario Project 5 - Well 15 Blending Station - This project provides increased dry-year yield and basin cleanup for up to 2,000 AFY. Well 15 produces water with a nitrate concentration of approximately 34 mg/L. The water from this well (approx. 1660 gpm) would blend with low nitrate water prior to entering distribution system.

City of Ontario Project 7 - Jurupa Connection - This project would construct an 18" interconnection (pipe, meter, valves, and vault) between the City of Ontario and JCSD distribution system. The project would also provide conjunctive use connection for water produced by the regional Chino 11 Desalter.

City of Ontario Project 8 - Chino II Desalter Transmission Facilities - This project would construct approximately 2,600 feet of 20"pipeline and booster station. These facilities would transmit water from the JCSD interconnection to the northern portion of Ontario's system. The water could be used throughout Ontario and/or make water available for agencies to the north.

IEUA Reactivate MWD Connections - This project covers the construction of facilities to reactivate dismantled connections and will allow imported MWD water to recharge the Chino Basin, via creeks to recharge basins, throughout the Chino Basin. It would also enhance the Chino Basin groundwater quality.

Chino Basin Groundwater Conjunctive Use Program – This project, sometimes referred to as the Chino Basin Groundwater Storage Project, would be capable of providing 33,000 AFY (of dry-year yield) over a 25 year term. The project design includes 25,000 AFY of put capability with 100,000 AF of allocated storage capacity. The facilities necessary to implement the program include six ion exchange treatment plants (18,000

AFY) and eight new wells (15,000 AFY). During years of surplus, MWD would deliver water for storage into the basin either by direct recharge or in-lieu deliveries. The stored water will be recovered during drought or emergency condition to meet overlying demand. The project would provide the Southern California region with increased water supply reliability while protecting the water quality and enhancing the management of the Chino Basin. The project represents the consensus of the Chino Basin Watermaster and the basin stakeholders and collectively provides both local and regional benefits.

The additional groundwater well production would be drilled and installed in the general geographic area defined by the following boundaries: west of the I-15, east of Euclid Avenue, north of SR-60, and south of MWD's Upper Feeder. This area was selected because existing sampling data indicate that nitrate concentrations are below the current regulated levels, thus allowing groundwater to be pumped into the distribution system without installing nitrate removal facilities. Additionally, the likelihood of increased nitrate concentrations in the future is relatively low. The wells would be selected based on the expected well capacity, groundwater quality, availability of land, and distribution hydraulics. The project would be funded using Proposition 13 funds, MWD funds, and other sources.

Monte Vista Water District (MVWD) Project 1 New Well - This project is a component of the Groundwater Injection/Nitrate Remediation Project and includes construction of an injection/extraction well at an existing plant site where groundwater nitrate levels are high. The project would also construct pipeline facilities, as the site is near the Benson Feeder, which can deliver imported water from the WFA treatment plant. The project is estimated to increase dry-year yield of 2,167 AFY, enhance groundwater quality, and provide supplemental water supply to the cities of Chino and Chino Hills during drought periods.

MVWD Project 2 New Well - This project is a component of the Groundwater Injection/Nitrate Remediation Project and includes construction of an injection/extraction well at an existing plant site where groundwater nitrate levels are high. The project would also construct pipeline facilities, as the site is near the Benson Feeder, which can deliver imported water from the WFA treatment plant. The project is estimated to increase dry-year yield of 2,167 AFY, enhance groundwater quality, and provide supplemental water supply to the cities of Chino and Chino Hills during drought periods.

MVWD Project 3 New Well - This project is a component of the Groundwater Injection/Nitrate Remediation Project and includes construction of an injection/extraction well at an existing plant site where groundwater nitrate levels are high. The project would also construct pipeline facilities, as the site is near the Benson Feeder, which can deliver imported water from the WFA treatment plant. The project is estimated to increase dry-year yield of 2,167 AFY, enhance groundwater quality, and provide supplemental water supply to the cities of Chino and Chino Hills during drought periods.

MVWD Project 4 New Well - This project includes an injection/extraction well at an existing plant site where groundwater nitrate levels are high. The site is near the Ramona

Feeder, which can deliver imported water from the WFA treatment plant. The project is estimated to increase dry-year yield of 2,167 AFY, enhance groundwater quality, and provide supplemental water supply to the cities of Chino and Chino Hills during drought periods.

San Antonio Water Company Project 1 New Well - This project, located on Council Avenue just south of the I-10 freeway in the City of Ontario, includes constructing and equipping a new well (injection and extraction) with a future connection to the MWD Upper Feeder. The project is estimated to increase dry-year yield by 3,000 AFY and enhance groundwater quality.

CCWD Project 7 Cucamonga Basin Recharge Project - This project would primarily increase the District's water production capabilities from new groundwater sources within the Chino Basin for the purpose of delivering groundwater to MWD via facilities located at the District's Reservoir 1 site. Required facilities for this project include the drilling and equipping of 3 water production wells, the acquisition of land for three well sites, miscellaneous piping, and the construction of an additional water storage tank. Facilities associated with this project will be used to increase the scope of the District's current "mini conjunctive use agreement" with MWD.

Recharge Basin Projects (20) - This project would implement storm water and imported water recharge and related infrastructure improvements for 20 recharge basin sites located within the Chino Basin. Improvements to increase storm water recharge consist mainly of earthwork to improve percolation and increase basins' storage capacity, new basin inlets or modification to existing inlets, and new outlets or modifications to basin outlets. Improvements for imported water recharge include construction of inlet structures, conveyance facilities, and turnouts from MWD's Foothill Feeder, also referred to as the Rialto Pipeline. The potential storm water and imported water recharge capacities range from about 18, 790 to 23,700 AFY and 81,800 to 122,100 AFY, respectively. The basins are described as follows:

- ***Regional Plant No. 3 (RP-3) Basins*** - This project would integrate the RP-3 Basins (approximately 30 acres) into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. The RP-3 Basins are intended to be percolation basins for storm flow captured from the areas tributary to the DeClez Channel. The storm water would be blended with other water, such as nuisance flow from the channel, to achieve the TDS and other goals of OBMP. The anticipated recycled water recharge is 8,650 AFY.
- ***Turner Basin No. 1*** - This project would integrate Turner Basin No. 1 into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Turner Basin No. 1 is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the Total Dissolved Solids (TDS) and other goals of the OBMP within the Program EIR.

- ***Turner Basin Nos. 2, 3, and 4*** - This project would integrate Turner Basin Nos. 2, 3, and 4 into the Chino Basin Regional Recycled Water Recharge System as groundwater replenishment or storage facilities. Turner Basin Nos. 2, 3, and 4 are intended to be percolation basins for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR.
- ***Hickory Basin*** - This project would integrate Hickory Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Hickory Basin is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 4,600 AFY.
- ***Wineville Basin*** - This project would integrate Wineville Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Wineville Basin is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 1,500 AFY.
- ***Ely Basins*** - This project would integrate the Ely Basins into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. The Ely Basins are intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the Chino Basin OBMP. The anticipated water recharge is 6,800 AFY.
- ***Jurupa Basin*** - This project would integrate Jurupa Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Jurupa Basin is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 1,600 AFY.
- ***Etiwanda Basins*** – This project is an effort to explore the viability of the concept of using the 'very high percolation rate soils' under the transmission lines, located above the Etiwanda Basins, as groundwater replenishment sites. The Etiwanda Basins are a series of San Bernardino County Flood Control District percolation basins that are situated below a section of SCE high voltage electrical power transmission lines near the intersection of Etiwanda Avenue and Fourth Street. The acreage within the transmission corridors could provide valuable space for future percolation basins. SCE's transmission corridors crisscross the entire IEUA service area. The opportunity for multiple beneficial uses such as habitat creation also provides an incentive for this project. Anticipated Recycled Water Recharge would be 8,650 AFY.

- ***Montclair Basins*** - This project would integrate the Montclair Basins into the Chino Basin Regional Recycled Water Recharge System as groundwater replenishment or storage facilities. The Montclair Basins are intended to be percolation basins for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 14,900 AFY.
- ***Upland Basin*** - This project would integrate Upland Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Upland Basin is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 8,250 AFY.
- ***Brooks Street Basins*** - This project would integrate the Brooks Street Basins into the Chino Basin Regional Recycled Water Recharge System as groundwater replenishment or storage facilities. The Brooks Street Basins are intended to be percolation basins for recycled water, State Project Water, and stormwater captured from the local mountain water sheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 4,450 AFY.
- ***College Heights Basins*** - This project would integrate the College Heights Basins into the Chino Basin Regional Recycled Water Recharge System as groundwater replenishment or storage facilities. The College Heights Basins are intended to be percolation basins for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 6,700 AFY.
- ***Banana Basin*** - This project would integrate Banana Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. Banana Basin is intended to be a percolation basin for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge is 3,700 AFY.
- ***7th & 8th Street Basins*** - This project would integrate the 7th & 8th Street Basins into the Chino Basin Regional Recycled Water Recharge System as groundwater replenishment or storage facilities. The 7th & 8th Street Basins are intended to be percolation basins for recycled water, State Project Water, and stormwater captured from the local mountain watersheds. Water from these three sources would be blended to achieve the TDS and other goals of the OBMP within the Program EIR. The anticipated recycled water recharge would be 3,100 AFY.
- ***Lower Day Creek Basin*** – This project is located south of Highland Avenue, east of Rochester Avenue, and west of the Day Creek channel in the City of Rancho Cucamonga.

- ***San Sevaine Basins 1-3*** – This project consists of a series of three recharge basins located north and west of Interstate 15, south of Summit Avenue, and west of Cherry Avenue. The San Sevaine channel is located along the east side of this recharge area.
- ***San Sevaine Basins 4 & 5*** – This project consists of two recharge basins located north and west of Interstate 15, south of Summit Avenue, and north of Interstate 210 in the City of Rancho Cucamonga. The San Sevaine channel is located east of this recharge area .
- ***Victoria Basin*** – This project is located north of Victoria Avenue, west of Interstate 15, East Avenue, and the Etiwanda and San Sevaine channels in the City of Rancho Cucamonga.
- ***Declez Basin*** – This project is located east of Mulberry Avenue, south of Philadelphia Street, and north of the Jurupa Mountains in an unincorporated portion of Riverside County. This basin receives its storm water from the Declez Channel that enters the recharge basin from the north.
- ***Etiwanda Conservation Ponds*** – This project consists of a series of shallow basins/ponds that are located at the southeast corner of the intersection of Etiwanda Avenue and San Bernardino Avenue in an unincorporated portion of San Bernardino County. These basins occupy approximately 40 acres and can receive runoff from Etiwanda Creek and the San Sevaine Channel.

IEUA Regional Plant No. 1 (RP-1) Basin – This project would integrate the RP-1 Basin into the Chino Basin Regional Recycled Water Recharge System as a groundwater replenishment or storage facility. The RP-1 Basin is intended to be a percolation basin for recycled water produced at RP-1. The recycled water would be blended with other water, perhaps nuisance flow from the Cucamonga Creek flood control channel, to achieve the TDS and other goals of OBMP. The anticipated recycled water recharge is 300 AFY.

5.3 Orange County Water District

In November 1998, OCWD published the 2020 Master Plan Report, in which were listed the following goals:

- Estimate the basin's annual recharge and extraction potential and estimate the optimum amount of future basin production.
- Determine the associated capital projects to support that amount of pumping.
- Estimate the necessary funding levels, optimum funding mix, and the associated impact to the Replenishment Assessment (RA).
- Predict/Estimate the source of future water supplies.
- Provide a strategic basin management/business plan to help guide OCWD into the future.
- Provide information on annexation issues to assist the OCWD Board in considering potential changes to its annexation policy.

The most significant local water supply to OCWD is SAR flows. A minimum SAR base flow of 42,000 AFY is required as a consequence of litigation between OCWD and agencies in the upper SAR watershed. OCWD currently holds rights to all SAR flow that reaches Prado Dam and operates 1,200 acres of spreading basins to capture river runoff and to percolate imported water supplies. Water enters the recharge facilities from the SAR downstream of Prado Dam. Flows are controlled at OCWD's main control facility, the Imperial Highway Inflatable Dam and Bypass Structure. From there, water flows by gravity between the various recharge basins, either by pipeline or by overflow weir (the few exceptions to this are lift stations and de-watering pump stations). Over the long-term, base flow into Prado Dam and treated wastewater discharges into the SAR upstream of Prado Dam have a direct correlation. Releases to the SAR and base flow show a historical correlation of almost one-to-one, i.e., a given increase in wastewater discharged into the SAR in the upper watershed causes an equivalent increase in base flow at Prado Dam.

The spreading grounds consist of four major components: the Main River System, the Off-River System, the Deep Basin System, and the Burris Pit/Santiago System. Each system consists of a series of spreading basins, either shallow or deep, whose side-walls and bottoms allow for percolation into the underlying aquifer. This connection is the avenue for the transfer of water from the surface into the ground.

The main function of the District's Forebay facilities is to recharge (refill) the aquifer or groundwater basin. The rate at which water enters from the surface into the ground is called the percolation rate (or recharge rate) and is the main factor in determining the effectiveness of the recharge facilities. Percolation rates tend to diminish with time as the spreading basins develop a thin clogging layer either from fine grain sediment deposition or from biological growth. Percolation rates are restored by routinely cleaning the basins and removing the clogging layer. The higher the percolation rate, the greater the quantity of water that can be put back into the groundwater basin. SAR flows change throughout the year, with extremely high flows possible during the winter months. With this in mind, it is crucial to maintain high percolation rates at all recharge facilities so that the District can capture and recharge as much water as possible.

OCWD's current recharge capacity is approximately 320,000 AFY. Additional recharge capacity will be necessary to meet increased demands on the basin. Numerous potential options and projects to increase replenishment of the groundwater basin were identified. Up to approximately 75,000 AFY of additional capacity is required.

OCWD currently artificially recharges at their Forebay spreading facilities by injecting water on the Orange County side of the Alamitos seawater barrier and at the Talbert seawater intrusion barrier. Storm and base flows of the Santa Ana River serve as the primary source of recharge in the Forebay. Both the Alamitos seawater barrier and the Talbert seawater intrusion barrier prevent ocean seawater from contaminating basin potable water. The Alamitos seawater barrier is composed of a series of injection wells that span the Los Angeles/Orange county line and is operated by the Los Angeles County Department of Public Works in cooperation with OCWD and the Water Replenishment District of Southern California (WRD). OCWD's Talbert seawater intrusion barrier is composed of a series of injection wells that span the 2.5-mile wide Talbert Gap, between Newport and Huntington mesas.

One of the conclusions of the 2020 Master Plan is that in order to allow increased basin production in the future, OCWD will need to implement new projects that will increase its ability to recharge water into the basin.

5.3.1 Projects: 2010

Basin Cleaning Vehicles – This project would construct four basin cleaning vehicles, which remove silts from the bottom of recharge basins. This would allow for the capture of additional SAR water that is projected to increase due to increased urbanization of the upper SAR Watershed. OCWD staff projects that the Orange County Basin could eventually hold approximately 200,000 AF of water for conjunctive use storage. The District, however, needs increased basin recharge capacity to implement additional conjunctive use programs. The Basin Cleaning Vehicle (BCV) would provide up to 30,000 AFY of additional recharge capacity. The BCV removes the clogging layer that forms on the bottom of the recharge basins as they are used.

The District has spent approximately $2 million developing the BCV and expects to have a working unit by the spring of the Year 2001. It is envisioned that a fleet of six BCV would be continually operated in the primary recharge basins of the District. With the BCV, the District would be in a position to receive additional conjunctive use supplies for later use during a drought. The prototype is currently being tested.

East Orange County Feeder Number Two/Inland Well Field – This project would construct well fields in the cities of Anaheim and Orange to convey groundwater to the coastal portions of Orange County. The Feasibility Report is completed and CEQA documents are to be prepared in 2002.

MWD – OCWD Conjunctive Use Storage – This MWD funded program would allow MWD to store an additional 60,000 AF in the OCWD basin. OCWD and MWD anticipate that the historic agreement should be finalized by summer 2002. When MWD needs the water, it could extract up to 20,000 AFY. MWD would fund the following facilities:

- Construct eight extraction wells that could be used by Orange County water producers when not needed by MWD;
- Construct eight new seawater barrier injection wells and necessary piping;
- Construct the Diemer Bypass Pipeline to directly provide higher-quality replenishment water to the District; and,

The program would benefit OCWD considerably, allowing the District to provide producers with better quality water. The program provides additional benefits to OCWD's participating producers, allowing them to use new wells as backup to their current systems. In addition, the wells would become the property of the producers when the agreement expires in 25 years.

Lakeview Pipeline – This project would construct a 66" pipeline from Mills pond to Atwood Channel to increase the amount of Santa Ana River Water that can be captured and spread into the OCWD Anaheim Lake and Miller basin recharge facilities. Currently, the OCWD spreading facilities have a hydraulic "bottleneck" in getting SAR flows from the river to the Anaheim and Miller basins. The feasibility report is completed and CEQA and final design documents are to be prepared in 2002.

La Jolla Street Recharge Basin – This project would purchase land near the existing Santa Ana River recharge facilities to allow for the capture of additional river water, which, is projected to increase due to increased urbanization of the upper SAR Watershed. The Feasibility Report is currently being prepared.

Miraloma Avenue Recharge Basin - This project would purchase land near the existing Santa Ana River recharge facilities to allow for the capture of additional river water, which, is projected to increase due to increased urbanization of the upper SAR Watershed. The Feasibility Report is currently being prepared.

Mid Basin Injection Wells – This project would construct injection wells along the Santa Ana River, near the middle part of the groundwater basin, to mitigate for increased pumping in this area. The Feasibility Report is currently being prepared.

Groundwater Replenishment System (GWRS), Phase I - This project, developed jointly by the Orange County Water District and Orange County Sanitation District, would develop a new source of reliable, high quality, low salinity potable water that would be used to replenish the Orange County groundwater basin and expand the existing seawater intrusion barrier. The project would collect highly treated municipal wastewater, approximately 75,000 AFY, which would normally be discharged to the ocean, and treat it to levels that exceed current drinking water standards by using microfiltration, reverse osmosis, and ultraviolet disinfection. The treated wastewater would then be sent to seawater intrusion barrier wells and to recharge basins along the Santa Ana River. Water that is recharged would blend with groundwater from other sources, including Northern California and Colorado River water, for at least one year, and in most cases longer, before being extracted by wells into the drinking water supply. CEQA compliance has been completed.

The GWRS would provide the following benefits to Orange County and California:

- Supply a significant amount of imported water required by OCWD to maintain a high basin production percentage in the year 2020
- Provide a reliable water supply in times of drought
- Expand the seawater intrusion barrier to sustain additional groundwater production in the coastal zone
- Reduce the frequency of emergency wastewater discharges in the near shore and surf zone under wet weather conditions
- Defer the need to expand the capacity of deep ocean outfall
- Production of GWRS water uses 50% of the energy required to import an equivalent volume of water to southern California
- Assists the CALFED process by reducing the region's dependence on water transferred through the Sacramento – San Joaquin Delta

The GWRS water would be used to augment the recharge operations at the Anaheim recharge facilities, the Talbert seawater intrusion barrier served by Water Factor 21 Treatment Facility (WF-21) and the Green Acres Project (GAP), which supplies recycled water to industrial and landscape irrigation customers. The project would be built in three phases, beginning in the year 2002, with Phase I having an initial production capacity of 75,000 AFY

GWRS water would be produced at an advanced water treatment (AWT) facility located on the sites of WF-21 and OCSD Plant No. 1 in Fountain Valley. Project water would be delivered to the recharge basins in the city of Anaheim via a 13-mile pipeline to be located in the SAR right-of-way. A series of 20 new injection wells would be used to inject project water into the Talbert seawater intrusion barrier currently served by WF-21.

GWRS water would also be used to supplement GAP during the peak summer months. Currently, the GAP provides approximately 7,000 AFY of recycled water to industrial process water and irrigation of gold courses, parks, and businesses in and around Fountain Valley, Santa Ana, and Costa Mesa. Further expansion of the GAP distribution system into the city of Newport Beach and Huntington Beach would be served by the GWR system.

Once the GWR System is on-line, it is possible that demand for water for non-potable use would increase in parts of the SAR basin adjacent to the GWR System pipeline. The availability of a reliable source of low salinity water would be marketed to create a water recycling enterprise zone for interested non-potable water customers such as industrial operations, golf courses, and parks.

Another potential location is an inland wellfield located near the Santiago Creek recharge basins. Both proposed wellfields are located near the EOCF#2 pipeline and could pump approximately 30 CFS each. Only one of the wellfields would initially be constructed. Construction of the second wellfield would depend upon the success of the first project.

5.4 San Bernardino Valley Municipal Water District

In the development of regionwide conjunctive use storage for the SAW, the basins located within the boundaries of SBVMWD show great potential for major water storage areas. These basins, collectively comprising the largest basin in Southern California, include the Bunker Hill Basin, San Timoteo Basin, Lytle Creek Basin, and the Rialto Basin. The most productive of the water bearing basins in the valley are the Bunker Hill Basin and Lytle Creek Basin, also known as the San Bernardino Basin Area. The San Bernardino Basin Area has a combined storage capacity of approximately 5,500,000 AF. In order to accomplish conjunctive use storage in these basins, several management and policy issues would need to be addressed and negotiated. In the recently completed Regional Water Facilities Master Plan Draft EIR, some of the District's management strategies include:

- Managing groundwater basins to maximize yield, while minimizing the impacts of high groundwater and addressing water quality. The goal here is to seek an optimum balance between maintaining desired water levels and storage volumes, and increasing the basin yield and maximizing groundwater production. Basin management must take into account any impacts of conjunctive use on groundwater levels and quality to local pumpers
- Managing surface water from rainfall and snow melt runoff to allow for diversion to spreading basins for capture and groundwater recharge, as well as natural recharge into the alluvial washes and streambeds of the valley floor.
- Managing imported water through the California State Water Project, with which SBVMWD has obtained delivery contracts. The primary purpose of these contracts is to store surplus water during wet periods and distribute it to contract agencies in need.
- Managing spreading operations in order to sustain future levels of extraction from the groundwater basins. According to the Master Plan, there will ultimately be a need to recharge an average of 120,000 AFY of additional water above the 65,000 AFY historically spread. Spreading operations and groundwater recharge from a variety of sources is needed to implement the Groundwater Management Program and will require a major coordination effort among a number of agencies to make maximum effective use of all recharge areas.
- Increasing the reliability and flexibility of supply sources of the regional water distribution system and to provide purveyors with multiple sources of supply.
- Appropriate basin management to assure that adequate supplies are provided for increasing local demands prior to any outside transfers
- Full local stakeholder support of San Bernardino Basin conjunctive use
- A parallel negotiation process with local interests to resolve management issues

Locating storage water in the valley provide several key benefits as listed:

- Location – San Bernardino basins are located in the upper elevations of the watershed and can more readily provide supply water with less pumping costs for delivery to, and adjacent to, downstream agencies.
- Water Supply Access – Recharge water for the basins is readily available due to the current recharge activities of SBVMWD and the San Bernardino Valley Water

Conservation District (SBVWCD). SBVMWD is a State Water Project Contractor and can deliver significant quantities of imported State Water or water obtained through water transfer programs and delivered in the State system to the San Bernardino basins for recharge and distribution. SBVWCD provides recharge operations of local stormwater from the SAR and tributary streams.

- Good Water Quality in Upper Basin Sources - The water obtained from the local runoff and the State Water Project is the best water available to the watershed. TDS and nitrate concentrations are low enough to allow downstream agencies receiving the water in most cases to develop supplementary recycling programs and still satisfy their local discharge standards in accordance with RWQCB requirements.
- Connections to MWD Conveyance Pipeline –Water stored in the San Bernardino Valley basins can be readily distributed to other agencies through existing MWD pipeline connections in the area such as the Devil Canyon Forebay and the proposed Inland Feeder pipeline.

Another important conjunctive use conveyance component could be the utilization of the captured flood flows behind Seven Oaks Dam. SBVMWD's 1995 Regional Water Facilities Master Plan indicated that approximately 11,000 AFY would be available between the months of March and September. Of the 11,000 AFY, approximately 7,900 AFY would go to SBVMWD to serve their needs. The remainder of the conservation pool, 3,100 AFY, would go to the WMWD adjudicated parties in the WMWD/SBVMWD Judgment. These parties include the City of Riverside, Riverside Highland Water Co., Agua Mansa Water Co., Meeks and Daley Water Co. and the Regents of the University of California. The captured surface water could be used for recharge at spreading basins in the Bunker Hill Basin or released down the SAR for recharge of the Riverside/ Colton Basins as part of the conjunctive use plan in that location. Other use possibilities include the marketing of the conservation pool waters to MWD or SAWPA member districts. Three party agreements could be established to purchase these new waters by the SAWPA member districts for sale to MWD in exchange for MWD imported water. The conveyance of these captured flows to MWD could be accomplished by either new facility connections such as pipeline between the proposed Inland Feeder pipeline and Dam or by using SBVMWD's Foothill pipeline for delivery to the Devil Canyon Forebay or Inland Feeder pipeline.

Over the past 25 years, SBVMWD has replenished varying quantities of State Project water depending on the extraction demands from the Bunker Hill. While SBVMWD has an entitlement to State imported water for 102,600 AFY, SBVMWD has typically only used approximately a third of its State Contract entitlement in any one year. It is anticipated that as water demands in the future increase in the San Bernardino Valley, a greater use of the State Project Water entitlement will become necessary.

On May 14, 2001, MWD an SBVMWD entered into a historic "Coordinated Use Agreement for Conveyance Facilities and State Water Project Water Supplies." The primary objectives of this agreement are to:

- Maximize the beneficial use of SWP water supplies to achieve greater water supply reliability in the Southern California region
- Maximize the value of the existing SWP contracts
- Improve the reliability of existing conveyance systems to move SWP water from the DWR Devil Canyon Power Plant Afterbay to both the MWD and SBVMWD service areas.
- Share facilities, whenever feasible.

The importance of this agreement cannot be understated, as it resolves decades of old litigation between DWR, MWD, and SBVMWD relating to state water contract rights.

5.4.1 Projects: 2010

Beaumont- Cherry Valley Water District (BCVWD) Storm Water Capture and Recharge Project – This project would construct approximately 80 acres of spreading grounds to harvest and recharge stream flows from Noble Creek Canyon in the Beaumont Cherry Valley Pass area. Construction of this facility would result in a decrease of about 4,100 AFY in imported water. This planned program would provide the ability to harvest additional stream flows and would ultimately result in development of additional water in the area with a resultant reduction in requirements for imported State Project water.

Beaumont- Cherry Valley Water District (BCVWD) Bogart Park Recharge Facilities Study – This project consists of study efforts that would evaluate the expansion of the BCVWD Recharge Facilities in Noble Creek adjacent to Bogart Park. This necessary study would investigate the development of lands that would provide further abilities to harvest additional stream flows. The ultimate goal is to develop additional water in the area with a resultant reduction in requirements for imported State Project water.

Supplemental Water Conveyance and Conjunctive Use Project Investigation for the San Timoteo Watershed Project Authority (STWMA) - This project includes the planning, engineering and environmental efforts to develop the regional supplemental water conveyance and groundwater storage program that would:

- Maximize the use of recycled water throughout the STWMA service area;
- Provide access to treated imported water when available;
- Recharge imported and recycled water in the Beaumont and Yucaipa groundwater basins when such water is available;
- Provide groundwater supplies to STWMA member agencies when supplemental water is of limited availability; and
- Provide for in-stream flows in San Timoteo Creek to maintain existing riparian areas.

When implemented, all future water demands would be met, and demands for state project water would be reduced or eliminated in critical dry years, thus making imported water available to other water purveyors and/or environmental uses. In addition to providing reliable supplies for all local uses, this project would produce significant state and national benefits. Some of the infrastructure needed for this program is in some state of planning, design, and construction. The proposed program would integrate this infrastructure to meet the STWMA area water supply needs and provide benefits outside the STWMA area.

The STWMA service area is one of the most rapidly growing areas in Southern California. The table below shows the demand for water, available local supplies and the demand for supplemental water. Supplemental water demand is the difference between total water demand and proven local supplies and equal to the demand for imported and

Year	Proven Native Supplies	Total Demand	Total Demand for Supplemental Water for Banning and STWMA
2000	29,000	35,900	6,900
2010	33,100	49,100	16,000
2020	33,100	64,400	31,300
2050	33,100	99,300	66,200

recycled water. Proven local supplies are about 29,000 AFY and will increase to about 33,100 AFY with an aggressive storm water recharge program. The need for supplemental water is currently about 6,900 AFY, and in the future will reach about 16,000 AFY in 2010, 31,300 AFY in 2020, and about 66,200 AFY in 2050 (ultimate build out). The California legislature passed SB222 (a.k.a. the Kuehl Bill) that, among other things, requires that a reliable water supply be demonstrated prior to allowing new home construction to proceed. This new legislative requirement can be met by maximizing the use of recycled and imported (when available) water for direct uses and groundwater recharge, and by conjunctive use of the unused vacant groundwater storage in the Beaumont and Yucaipa groundwater basins – about 200,000 to 400,000 AF.

Seven Oaks Dam Borrow Pit Spreading Facilities - This San Bernardino Valley Water Conservation District (SBVWCD) project would transform the Seven Oaks Dam borrow pit into a spreading basin for percolation purposes. When major storm events occur, the Seven Oaks Dam (SOD) operator (San Bernardino County Flood Control District) may be mandated to make releases of water to simulate natural, pre-dam flooding conditions for habitat preservation purposes. The goal of such controlled releases would be to have the simulated floodwater carry pre-positioned sediment to a U.S. Army Corps of Engineers-constructed diversion, which would cause the water to overflow the riverbanks and make sediment deposits in the Woolley Star Preserve Area. As much as 70,000 acre-feet of water could be mandated for release through the SOD for this purpose in one year, depending on habitat requirements. In years that 70,000 acre-feet of water is mandated for habitat release, and 80,000 acre-feet is also diverted pursuant to historical rights, the total of 150,000 AF of water could be available for recharge in one year.

To accept Santa Ana River flood releases from the SOD, other than for habitat preservation releases, SBVWCD would use its main diversion facility in the Santa Ana Canyon, which has a design capacity of 1,000 CFS. The diverted water would be conveyed to the District Spreading Grounds (DSG) in the Santa Ana River Wash where water would flow to a series of basins. By gravity flow, the water is conveyed to basins where it ponds to a depth of 3-10 feet. The water then percolates into the ground, recharging the Bunker Hill Groundwater Basin at the eastern end of the San Bernardino Basin. The DSG would consist of canals for moving water, spreading basins for groundwater recharge, and surface storage for subsequent movement of water to spreading basins, as detailed below:

- Canals. The main canal entering the DSG from the diversion facility would be split (bi-furcated) into a north and a south canal to provide maximum flexibility and redundancy for moving water. The two canals would convey water to and around the Seven Oaks Dam borrow pit (SOD pit) in Section 8, which resulted from the U.S. Army Corps of Engineers excavating materials for construction of the dam. Unless otherwise stated, these are open, earthen canals.

  The North Canal would carry 500 CFS from the bifurcation of the North and South Canals westerly to Cone Camp Road. Various outlet works would allow water to be conveyed from the North Canal into the pit or to existing and future basins in Sections 7 and 12.

  The South Canal would carry 500 CFS from the bifurcation of the North and South Canals, to a second bifurcation. The north leg of this second bifurcation would be a pipeline to convey 250 CFS of water into the SOD pit. The south leg would continue along the south side of the pit carrying 250 CFS and connect to existing canals conveying water to various percolation basins. An outlet would also permit water to return to the River, which provides blend water for a regional, pressure zone pump-out project.

- Basins. SBVWCD currently has 16 percolation basins in Sections 7 and 12 of the DSG with a wetted area of approximately 60 acres. SBVWCD would reconstruct approximately 24 spreading basins in the SOD pit in Section 8 to replace and supplement basins whose operation was interrupted during the construction of Seven Oaks Dam. The wetted area of these basins would be approximately 145 acres.

- Surface Storage. SBVWCD would have surface storage available for water released through the Dam. There are three circumstances that would result in the use of this storage. First, a major prolonged storm event could temporarily exceed the infiltration rate in the spreading basins. Second, in the rare instances that the groundwater basin is adequately full and water must still be released through the Dam to make room for another storm event, surface storage would be used. Third, should a storm event or releases from the Dam occur while

SBVWCD is doing repair or maintenance work on a series of basins or canals, surface storage would be used until the repairs are completed.

Little San Gorgonio Creek Recharge Facilities - This San Gorgonio Pass Water Agency project would provide groundwater banking and conjunctive use of State Project Water and local water for the Beaumont Storage Unit. The project consists of six surface recharge basins for surface spreading of State Project Water and local water from the Little San Gorgonio Creek. The Beaumont Storage Unit is in overdraft by more than 25% each year and this project will reduce and eliminate overdraft. The construction of the spreading ponds provides a delivery location for State Project Water and a recharge site for groundwater storage.

Below is a comprehensive list of the projects listed in the SBVMWD's Regional Water Facilities Master Plan, Draft EIR. **Seventeen of these projects (four are alternative projects), designated by an asterisk (*), received CEQA clearance as a result of the Final EIR. Three of the projects are listed in Chapter 11 under the 2025/2050 time horizon.**

****Baseline Feeder Extension West*** - This project would construct the facilities required to transport groundwater from the Bunker Hill Basin west into the SBVMWD service area and the Chino Basin. This segment would be comprised of 10,300 feet of 48 inch pipeline with a capacity of 100 CFS. Groundwater would be produced within the Bunker Hill Basin and transported west to be used by the West San Bernardino County Water District, City of Rialto, City of Chino, Cucamonga County Water District, Fontana Water Company, City of Ontario, and Monte Vista Water District or stored underground within the Chino Basin.

This project would also construct an additional 6,700 feet of 48 inch pipeline with a capacity of 100 CFS. This segment, referred to as the Baseline Feeder Extension West/East Alignment, would extend the existing Baseline Feeder east to connect it to the proposed 9th Street Feeder. San Bernardino Basin groundwater pumped from wells along this pipeline reach would be connected to this line for water to be transported to the west, east, and south.

****Baseline Feeder Extension North/South Alignment*** – This project would construct 15,100 feet of 48 inch pipeline with a capacity of 100 CFS. This segment would extend south to connect to the South End Feeder and the Central Feeder. The connection to the South End Feeder would allow the District to convey San Bernardino Basin groundwater south to Colton and to unincorporated sections of Reche Canyon. Connections to the City of Loma Linda and the Riverside Highland Water Company would also be available. Connections to the Central Feeder would allow the District to convey San Bernardino Basin groundwater to the Loma Linda, Redlands, and Yucaipa areas.

****Baseline Feeder Pump Station West Alternative and East Alternative*** – This project would construct a 100 CFS capacity pump station for the purpose of boosting water from the City of San Bernardino system and the EPA 36 inch pipeline, located within 10th Street, into the existing Baseline Feeder. The pump station would be located either on a private parcel south of 9th Street between I-215 and "H" Street or at another location south of 9th Street between I-215 and "H" Street.

9th Street Feeder - This project, which would serve as an easterly extension of the Baseline Feeder, would construct 10,500 feet of 16 inch pipeline with a capacity of 5 CFS. The pipeline would convey San Bernardino Basin groundwater to the eastern portion of the District for possible connection to the East Valley Water district.

South End Feeder - This project would construct 20,600 feet of 36 inch pipeline with a capacity of 30 CFS. The pipeline would convey San Bernardino Basin groundwater to the south end of the District's service area, including Colton and unincorporated sections of Reche Canyon. Connections to the City of Loma Linda and the Riverside Highland Water Company would also be available.

Central Feeder West 9 (West of San Bernardino PS) – This project would construct 11,000 feet of 48 inch pipeline with a capacity of 100 CFS. The pipeline would initially transport State Water Project water to the east. Ultimately, the pipeline may allow SBVMWD to convey San Bernardino Basin groundwater east to the Yucaipa area and to the San Gorgonio Pass Water Agency.

DWR Pump Station Alternatives 1 and 2 – This 100 CFS capacity facility would pump up to 25,000 AFY of San Bernardino Basin groundwater into the DWR California Aqueduct. The pump station would be located at one of two potential sites.

Riverside Pump Station – This 50 CFS capacity facility would convey well water into the Central Feeder. The wells, located at the City of Riverside Public Golf Course, currently pump into a gravity-flow transmission pipeline that runs along Waterman Avenue. The new pump station would help to maximize this water's use and distribution.

South End Pump Station – This 10 CFS capacity pump station would pump San Bernardino Basin groundwater to the upper portion of Reche Canyon.

High Groundwater Pump Out - Based on potential demands, a full-scale high groundwater pump out program is proposed for the Pressure Zone in the Bunker Hill Basin, which is renowned for its high groundwater levels and susceptibility to liquefaction during a significant seismic event. This program would pump out a peak flow of 25,000 AFY. In order to pump the 25,000 AFY, the construction of several additional wells is anticipated to extract the planned flow quantities. Assuming the new well pump capacities of 2,000 GPM per well, 15 additional wells beyond the existing well capacity currently serving the pilot scale high groundwater pump out project are assumed to be needed to extract the water for the full-scale high groundwater pump out program.

Another major component of the San Bernardino high groundwater pump out would be pipeline and pumps to convey the pumped flow to the Santa Ana River. As indicated in the Pilot Scale project, significant flow can be discharged from the existing wells using the storm drain facilities such as the Riverside Canal. Because the Riverside Canal is also used for storm drain purposes, any discharge into the Riverside Canal must be shut off when storms are imminent. The City of Riverside already notifies the canal users when to shut down operations to accommodate storm flows, and would simply add the operators of the dewatering program to their list of people to notify. The maximum flow from the dewatering program in the Riverside Canal would likely not exceed 35 CFS. The Riverside Canal has a design capacity of 100 CFS and typically operates at less than 45 CFS. Therefore, the additional water from the dewatering program should not cause flows in the canal to exceed its capacity.

Since the 15 new wells need to be located at strategic locations throughout the Pressure Zone to most effectively draw down the groundwater levels, a series of interconnected pipelines to the new wells are proposed to deliver pumped water to the nearest storm drain or channel of sufficient capacity or to the river itself. Additionally, new pumping facilities may be necessary depending on the topography of the new well locations. Some minor well rehabilitation costs are anticipated to occur as part of the pilot-scale dewatering program. Other additional costs are included in the full-scale program such as modification and improvement to existing drainage channels and storm sewers to convey flow to the Santa Ana River.

Upon implementation of the major infrastructure necessary to establish the full scale San Bernardino High Groundwater Pump Out program, it is anticipated that the ongoing operating, maintenance, and sampling costs will be covered by the sale of the pumped groundwater to downstream agencies such as the OCWD. Based on demand projections prepared by OCWD, the proposed pumped quantity of 20,000 AFY to be discharged to the SAR would be a valuable additional flow which can supplement the OCWD river recharge operations, especially during summer periods.

Seven Oaks Dam Plunge Pool Pipeline – This project would construct 4,900 feet of 96 inch pipeline with a capacity of 300 CFS. The pipeline would convey local surface water from the Seven Oaks Dam Plunge Pool to the existing Foothill pipeline for regional distribution.

Seven Oaks Dam Minimum Discharge Pipeline – This project would construct 5,800 feet of 48 inch pipeline with a capacity of 100 CFS. The pipeline would utilize the static head of water stored behind the Seven Oaks Dam to minimize pumping at the Greenspot pump station for delivery of local surface water east to Redlands, Yucaipa, and the San Gorgonio Pass Water Agency.

Groundwater Management Program – This program would implement strategies to maximize yield, lower dangerously high groundwater levels, and address water quality issues. SBVMWD proposes establishing a network of 19 monitoring wells involving both existing and new wells to gather data related to groundwater.

Mentone Feeder – This project would construct 12,000 feet of 78 inch pipeline with a capacity of 288 CFS. The pipeline would connect the Foothill feeder pipeline to the Mentone Reservoir, thus allowing imported SWP water and local surface water from the Seven Oaks Dam to be distributed eastward to Yucaipa and to the San Gorgonio Pass Water Agency.

Mentone Pipeline – This project would construct 11,700 feet of 60 inch pipeline with a capacity of 128 CFS. The pipeline would connect the Central Feeder with the Yucaipa Connector pipeline so that San Bernardino Basin groundwater could be pumped to the Yucaipa area.

Devil Canyon Bypass Pipeline – This project would construct approximately 400 feet of 48 inch pipeline with a capacity of 110 CFS. The pipeline would connect the Foothill Feeder to the Devil Canyon-Azusa Pipeline and allow water to continue westward for groundwater recharge into the Colton-Rialto basin or for direct delivery to west-end agencies.

San Bernardino Pump Station #1 – This 20 CFS capacity pump station would pump water to the City of Redlands.

Mentone Pump Station – This 100 CFS capacity facility would pump water in the Mentone Pipeline from the Mentone Reservoir to the Crafton Hills Pump Station Forebay Tank as part of the system that will distribute San Bernardino Basin groundwater to the Yucaipa area and to the San Gorgonio Pass Water Agency.

San Bernardino 5 MG Reservoir – This project would construct a five million gallon covered steel tank reservoir that would provide additional regulatory storage for the cities of Loma Linda, Redlands, and Yucaipa, and Eastern Valley Water District.

5.5 Western Municipal Water District

WMWD’s primary source of water is MWD. Water purchased by WMWD is from either the Colorado River Aqueduct or from the California State Water Project. All of WMWD’s retail domestic water is from MWD’s Henry J. Mills Filtration Plant, which is supplied with Northern California water via the State Water Project. The retail domestic portion of WMWD's business accounts for about 20% of total sales and includes approximately 7% of the General District's residents. WMWD supplies water directly to agricultural and domestic users in the areas near Woodcrest, Orangecrest, and Lake Mathews areas. Most of WMWD’s retail customers are located in the non-water bearing areas between Riverside, Moreno Valley, and Lake Elsinore. In recent years, WMWD has constructed interties with the City of Riverside to purchase supplemental water. Riverside’s water is from local ground water sources.

WMWD’s Cajalco Intake and Treatment Plant (CITP) was taken out of service in June 1993 to comply with the USEPA’s Surface Water Treatment Rule. The Hardinge Sand Filter is maintained as an emergency standby source to treat water from the Colorado River Aqueduct as it enters Lake Mathews. Presently, this water is entirely Colorado River flow. However, it is likely that in the future the aqueduct will consist of a blend of Colorado River and State Water Project supplies

Due to the dry nature of the area (24-year average rainfall is 11.5") and the topography, it is not considered feasible to create any locally derived off-stream storage. Presently, WMWD has a steel tank storage capacity, including the irrigation system, of 196 AF.

MWD and DWR have major regional storage facilities within a few miles of WMWD’s service areas. MWD’s Lake Mathews, which is the terminal storage reservoir for the Colorado River Aqueduct, has a usable capacity of 178,500 AF to meet regional storage needs. MWD’s new Diamond Valley Reservoir has recently been completed (May 2000) and will store 800,000 AF of Colorado Aqueduct and State Water Project supplies. Water stored in the new reservoir will be delivered into WMWD’s service area and onward to the majority of MWD’s service area through the Colorado River Aqueduct and Lake Mathews. A new pipeline also being constructed by MWD, the Inland Feeder, will carry additional water from DWR’s Devil Canyon Power Plant to MWD’s system and the new reservoir. The new feeder will add redundancy to the regional distribution system. DWR's State Water Project's Lake Perris has a usable capacity of 120,000 AF for regional storage needs. WMWD’s primary conjunctive use efforts center primarily on the Riverside - Corona Feeder.

5.5.1 Projects: 2010

Coldwater Basin Conjunctive Use Project – This project would transport water from Bunker Hill to the City of Corona through a 23 mile pipeline. EVMWD and the City of Corona have an agreement to develop a project to transport and treat Elsinore’s water from the Colton and Bunker Hill area. EVMWD and/or Corona would use treated water in their domestic water systems. Excess water would be used to recharge the Coldwater

Basin to provide a consistent and drought resistant supply of domestic water for both agencies. This project has been deferred for approximately 5 years by agreement of both parties to accommodate an exchange agreement for State Project Water between EVMWD and WMWD.

City of Corona - Temescal Basin Recharge - This project is a component of the City of Corona Recycled Water Distribution System, Phases 1 – 5, and would construct facilities to convey recycled water from the City's WWTP No. 1 and WWTP No. 2 to groundwater recharge basins. Approximately 3,000 AFY could be recharged without additional treatment beyond filtration. As a follow-up document to the Recycled Water Master Plan and Market Study in June 2001, the "Temescal Basin Groundwater Recharge Feasibility Study" should be complete by October 2002.

EVMWD Elsinore Basin Conjunctive Use Study - This project would be a Study and Pilot Project to evaluate the viability of groundwater recharge in the Elsinore Basin. Through conjunctive use storage (approximately 60,000 AF), sufficient water supply could be developed to assure that water demands are met under drought conditions.

Jurupa Community Services District Water Import Facilities – This project would enhance conjunctive use storage in the Riverside basin. The purpose of this project is to import excess groundwater from the Riverside Groundwater Basin into the Chino Basin, which would decrease the demand for Chino Basin groundwater. The project is to purchase 1,000 to 2,000 AFY from West San Bernardino County Water District (WSBCWD) and 2,500 AFY from Rubidoux Community Services District (RCSD). The WSBCWD project includes the construction of 11,600 feet of 12" CML/CMC pipeline and 6,200 feet of 16" CML/CMC pipeline to connect to WSBCWD's 1,192' Pressure Zone. RCSD's portion of the project is to obtain water from Rubidoux's system into the Jurupa Community Services District 1,110' Pressure Zone by constructing 1,800 feet of 12" CML/CMC pipeline.

Riverside South Basin Agriculture Water Conveyance – This project involves the construction of approximately 36,500 linear feet of pipeline and three pump stations to convey non-potable groundwater via existing canals to WMWD's pipelines and reservoirs. The proposed improvements involve the use of both the Riverside Canal and the Gage Canal to convey water from wells within the Riverside North groundwater basin to existing District non-potable water facilities at the intersection of McAllister Street and El Sobrante Road.

Presently, existing agricultural customers in portions of the District's service area, including Rancho El Sobrante, Lake Matthews, and Woodcrest, are supplied imported Metropolitan Water District water for agricultural purposes due to the lack of an alternate non-potable water supply and/or lack of a separate conveyance system for agricultural deliveries. The project would extract non-potable water from either the Riverside Canal or the Gage Canal to supply the District's service area.

The proposed improvements involve use of the Riverside Canal and the Gage Canal to convey water from wells within the Riverside North groundwater basin to existing District non-potable water facilities at the intersection of McAllister Street and El Sobrante Road. Anticipating some reduction in the area devoted to agriculture over the years and conveyance restrictions presented by the existing March Air Force Base pipeline (non-potable conveyance facility), a capacity of 6,000 acre-feet per year has been established for the proposed improvements.

Riverside - Corona Feeder – This project consists of groundwater production wells and a major feeder pipeline capable of delivering 40,000 acre feet per year of groundwater from the Bunker Hill Basin in San Bernardino to water purveyors in the northern part of Western's district. Such purveyors are primarily dependent on imported water from the MWD Mills Treatment Plant for water needed to support future growth. A major goal and purpose of the project is to reduce the dependence on direct delivery of imported water and thereby contribute to the Upper Santa Ana Watershed effort to "drought proof" or be self-sufficient under conditions of dry year hydrology.

One source of water supply for the feeder would be Bunker Hill groundwater, which has been recharged using imported State Project Water when available pursuant to agreements between SBMWD, WMWD, and MWD. The Seven Oaks Reservoir would be another source of water supply, while new conservation water would be made available to owners of water rights through capture of storm water and other water efficiency management programs or projects. During periods of wet hydrology both native and imported water are abundantly available in the San Bernardino Basin (Bunker Hill). Through agreement with SBVMWD and MWD, high quality State Water Project water can be purchased during periods of surplus at reduced rates and recharged. In exchange groundwater can be produced in the pressure zone to consistently meet demands irrespective of the periodic shortages due to dry hydrology. Similarly, abundant rainfall in the watershed can be recharged in replenishment basins or reservoirs when available and produced on demand from wells in the pressure area. In effect, this project banks water available during wet periods for domestic and municipal purposes.

The facilities associated with this project include the following:

- Approximately 20 wells located in the pressure zone of the Bunker Hill Basin.
- 28 miles of feeder pipeline generally paralleling the 91 Freeway from San Bernardino to Corona.
- Intertie with the Mills Gravity Pipeline near La Sierra Avenue in Riverside.
- Intertie with the Arlington, Temescal, Chino I and Chino II Desalter piping system near Home Gardens.
- Intertie with the Elsinore Valley MWD Temescal Valley Pipeline at its terminus in Corona.
- Delivery and metering facilities at connections to each participating purveyor.

The primary project beneficiaries include the cities of Riverside, Norco, and Corona, Lee Lake Water District, Rubidoux Community Services District, Jurupa Community Services District, Home Gardens County Water District, Elsinore Valley Municipal

Water District, and WMWD. Other beneficiaries include Colorado River water users, other MWD water users, residents of San Bernardino Valley, and water-dependent areas in Northern California.

Riverside Groundwater Basin Improvements – This project consists of implementing the results of a study focused on increasing production in the Riverside South Basin from 18,000 AFY to a total of 45,000 AFY. The study would address the following issues:

- Identify the sources of recharge to the Riverside area and how these sources are affected by climate and production. Identify how much artificial recharge could be developed to improve reliability.
- Determine whether the Riverside area could sustain groundwater production levels at 45,000 AFY and how this will impact groundwater levels at the City's wells. If production is not sustainable at 45,000 AFY, determine how often production levels of 45,000 AFY may be achieved, as well as the sustainable production.
- Determine how production south of the Highway 60 affects production at other wells, specifically in the North Orange area.

CHAPTER 6 WATER QUALITY IMPROVEMENTS

Almost a century of agricultural and industrial use has resulted in salts and other pollutants infiltrating many aquifers and streams within the SAW. These sources of water quality degradation can be classified into point and non-point sources. Point sources are confined to point discharges to the soil, groundwater, or stream systems. Examples include conventional wastewater and industrial discharges to streams or ponds, and leaky underground storage. Non-point sources are area-wide discharges to soil, groundwater, and surface waters, such as land application of waste and fertilizers and atmospheric deposition of contaminants to the soil and water bodies.

As the SAW continues to grow, cities encroach ever closer in proximity to dairies and other agricultural operations. To counter this added stress to the stream and groundwater supplies, producers have developed advanced methods of reducing potential conflicts. Technologically advanced wastewater control techniques have been rigorously employed and negative impacts from agricultural runoff continue to be minimized. Nevertheless, the existing salts and contaminants present in the SAW from past practices still need to be removed, as improving water quality is inextricably linked to improving water supplies and implementing a comprehensive groundwater storage program. As regional water leaders seek to develop storage in the Santa Ana Watershed, steps must be taken to pump contaminated water out and purify it.

The SAW's potential for groundwater banking is substantial, but the volume of clean water that can be stored is commensurate with the amount of salty water that can be removed, and the process of pumping and desalting this salty water takes time. Before the task can be undertaken, the necessary infrastructure must be constructed. Two desalters are already operational in the Arlington and Chino areas and are processing 14 million gallons per day (MDG). There are numerous additional desalters that will be installed as part of the SAWPA program and when these are fully operational the basin's cumulative production of purified water from these facilities will be 95 MGD. Some other components relating to the transportation of purified water, including 22 miles of pipeline and 10 pumping stations will also need to be installed in order to get the usable resources to the entities that can best use them.

One of the biggest problems associated with maximizing the use of local water resources in the basin will continue to be water quality constituents, which violate public health or public acceptance standards. The water quality problems can be addressed in a variety of strategies including wellhead treatment, blending, dilution or flushing or even by natural processes such as wetlands. Wellhead treatment can include a variety of approaches including desalination, anion exchange, and carbon absorption to name a few. In many cases, multiple contaminants can be addressed through a single treatment strategy. This section is divided into two areas. The first area focuses on projects with one of the most effective and immediate forms of treatment to address increasing salt balance in the watershed: desalination, and brine disposal. The second area focuses a broader range of water quality improvement projects that include ion exchange, lake quality improvements and specialize treatment processes at wastewater treatment facilities. The following 2010 projects, shown in Figure 6.1 (Desalination and Brine Disposal Projects) and Figure 6.2 (Groundwater and Lake Water Cleanup Projects), and listed in Table ES.1, serve to further the IWRP's objective of improving SAW water quality.

6.1 Desalination and Brine Disposal

6.1.1 Eastern Municipal Water District

EMWD will implement a phased desalination program, ultimately constructing three desalination plants capable of producing up to 12,000 AFY of treated water for potable use. EMWD has already constructed a 3.0 MGD brackish groundwater desalination plant, located at the Sun City Regional Water Reclamation Facility (RWRF) in Menifee and is currently in the design phase of the program's second desalter, planned for construction in the Perris area. These plants are intended to manage salinity and rising groundwater in the Perris South sub-basin, to provide a reliable potable water supply form otherwise unusable brackish groundwater and to generate salinity and nitrate off-sets need for the expansion of water recycling in the project area.

EMWD's water resource management is set forth in the 2000 West San Jacinto Groundwater Basin Management Plan Annual Report. The desalination program will optimize the use of available water resources in the Perris South sub-basin, protecting adjacent higher quality basins from salinity intrusion and fully integrating recycled water use to achieve the goal of long term salinity management.

6.1.1.1 Projects: 2010

4.5 MGD Perris Desalter – This desalter will be the second in a series of three Desalters constructed as part of the Perris South Desalination Program. The goal of the program is to control rising groundwater in the Perris South subbasin, develop salinity offsets for water recycling, protect adjacent higher quality groundwater subbasins, and develop a reliable local water resource from otherwise unusable local groundwater. The Perris Desalter will be located at the Sun City RWRF and include a 4.5 MGD reverse osmosis unit and up to four brackish groundwater extraction wells. Construction on this project is estimated for completion by late 2003.

4 MGD Perris II Desalter – This desalter, to be constructed at the Perris Valley RWRF, would be the last in a series of three Desalters as part of the Perris South Desalination Program. The goal of the program is to control rising groundwater in the Perris South subbasin, develop salinity offsets for water recycling, protect adjacent higher quality groundwater subbasins, and develop a reliable local water resource from otherwise unusable local groundwater. The Perris II Desalter would include a 4 MGD reverse osmosis unit, up to four brackish groundwater extraction wells, a feedwater pipeline, and portions of a brineline to connect to existing brine disposal facilities at the Menifee Desalter.

Moreno Valley Brine Line - This project would be one of three regional brinelines planned to connect to the District's non-reclaimable waste pipeline at the Menifee Desalter. Along with the Temecula Valley and Winchester Brine Lines, these facilities would provide for the cost-effective disposal of non-reclaimable brine wastes from industry and water treatment facilities. This system would protect the District's water recycling program from high salinity wastes and assist in long-term salinity management in the District's service areas. The Moreno Valley Brine Line would link the Moreno/Perris Valley area to Regional facilities at the Menifee Desalter.

2002 Integrated Water Resources Plan

2010 Desalination and Brine Disposal Projects in the Santa Ana Watershed

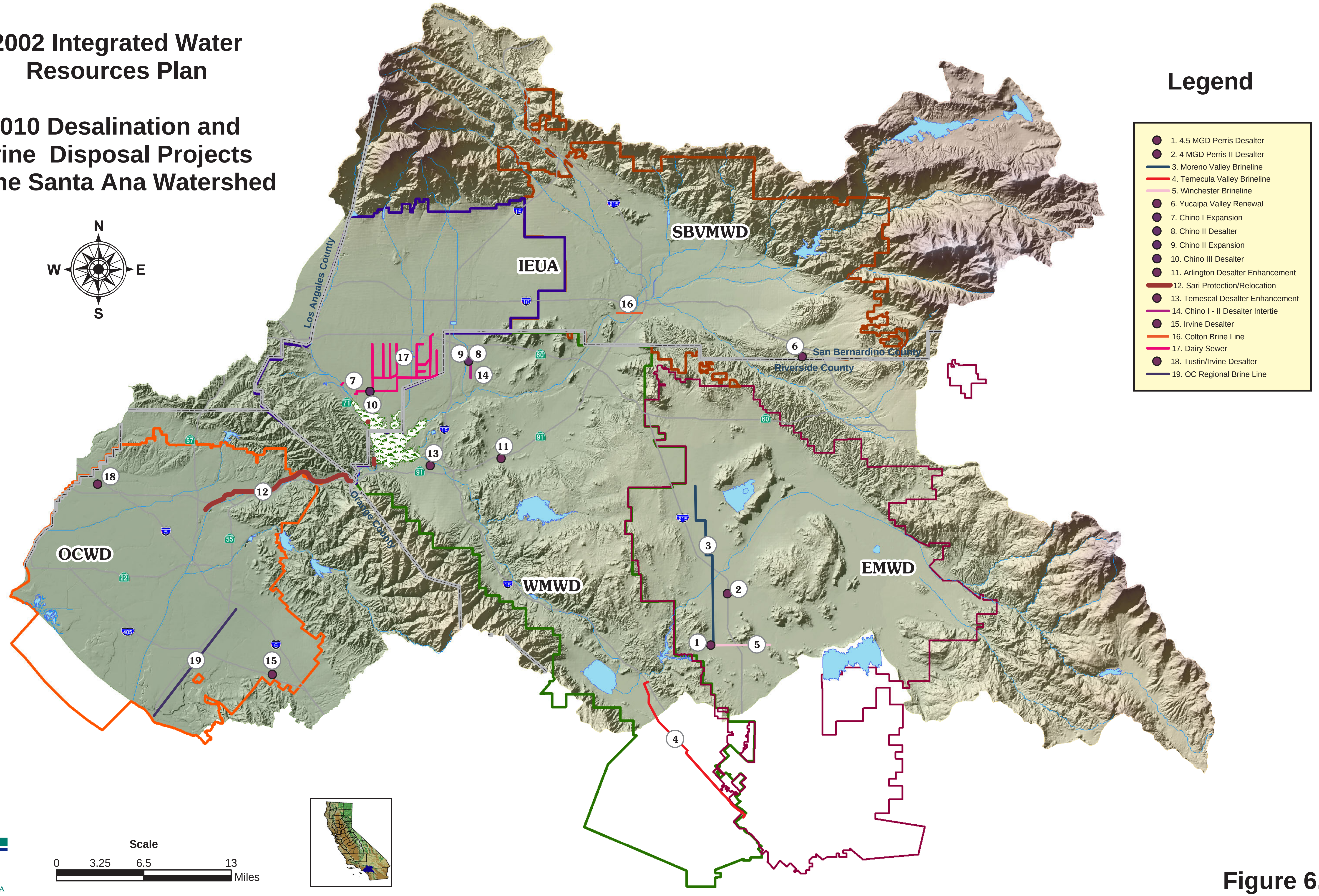

Figure 6.1

p:\projects\irp_larry\water_quality.mxd

2002 Integrated Water Resources Plan

2010 Groundwater and Lake Water Cleanup Projects in the Santa Ana Watershed

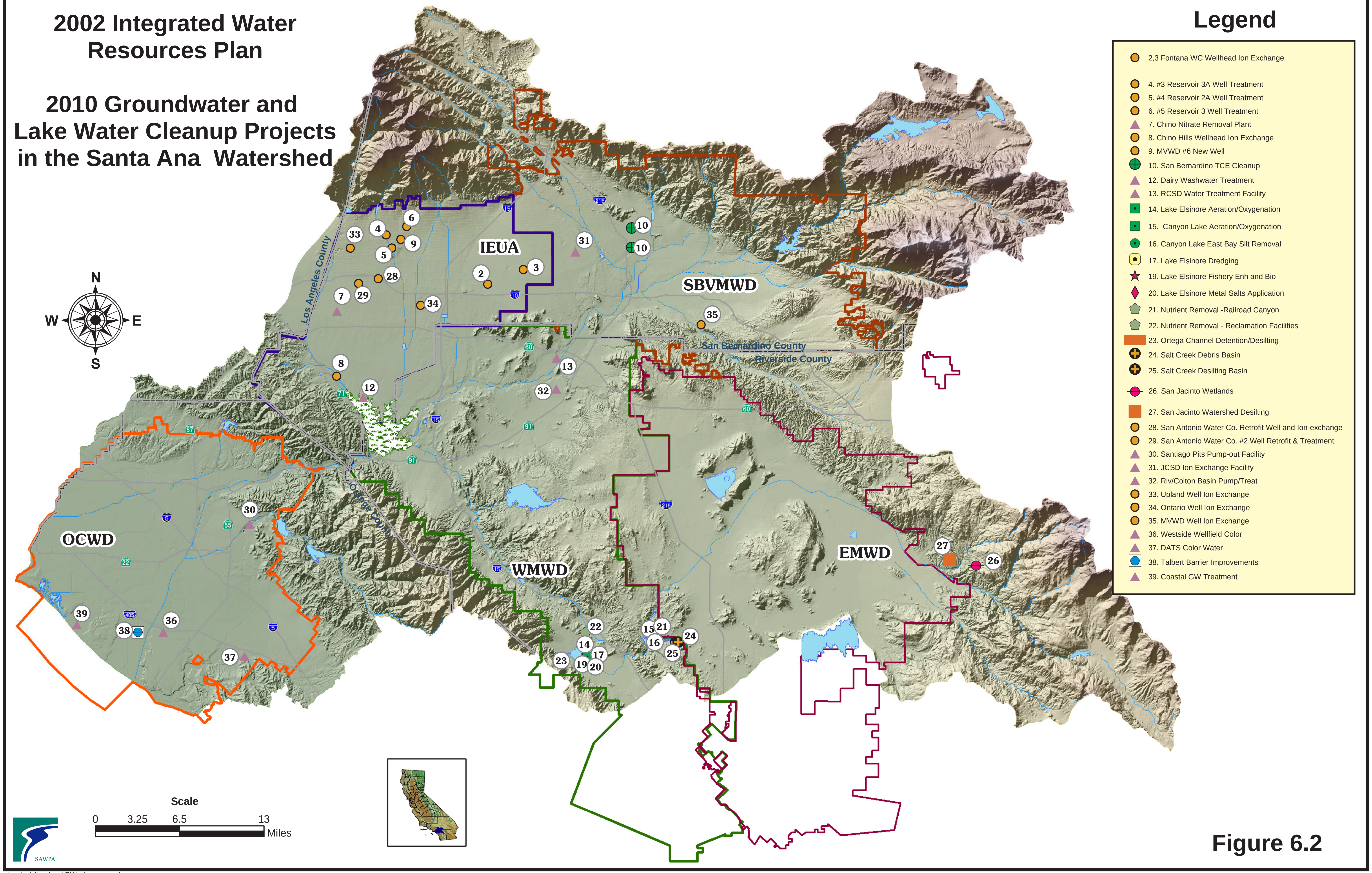

Figure 6.2

p:\projects\irp_larry\GW_cleanup.mxd

Temecula Valley Brine Line - This project would be one of three regional brinelines planned to connect to the District's non-reclaimable waste pipeline at the Menifee Desalter. Along with the Moreno Valley and Winchester Brine Lines, these facilities would provide for the cost-effective disposal of non-reclaimable brine wastes from industry and water treatment facilities. This system would protect the District's water recycling program from high salinity wastes and assist in long-term salinity management in the District's service areas. The Temecula Valley Brine Line would link the Murrieta, Temecula, and Lake Elsinore areas to Regional facilities near SAWPA's TVRI.

Winchester Brine Line – This project would be one of three regional brinelines planned to connect to the District's non-reclaimable waste pipeline at the Menifee Desalter. Along with the Temecula Valley and Moreno Valley Brine Lines, these facilities would provide for the cost effective disposal of non-reclaimable brine wastes from industry and water treatment facilities. This system would protect the District's water recycling program from high salinity wastes and assist in long-term salinity management in the District's service areas. The Winchester Brine Line would link the Hemet/San Jacinto area to regional facilities at the Menifee Desalter.

6.1.2 Inland Empire Utilities Agency

Groundwater quality in the lower Chino Basin historically has exceeded State mandated objectives for nitrogen and total dissolved solids. The problem has been caused by percolation of runoff from past and present agricultural and dairy activities in the region as well as from other industrial and municipal operations.

One of the goals of the OBMP is to "protect and enhance water quality." With regard to salt management, one of the recommended activities is to manage salt accumulation through dilution or blending, and the export of salt. As part of the Chino Basin OBMP, new and expanded desalting existing facilities would be constructed and an Organics Management Strategy would be developed. Desalination projects, as described below, would help to remove high TDS water from the groundwater basin. The Chino Basin Organics Management Strategy Business Plan, published on May 31, 2001, outlines plans for reducing the groundwater degradation from dairy manure contamination by constructing sewers at the dairies and treating manure at the IEUA Management Facility. The Business Plan also recommends the construction of anaerobic digesters at RP – 1, 2/5, and 4, that together would produce 20 megawatts of clean, renewable methane gas. Additional on-site dairy digesters would produce an additional 30 megawatts of methane gas by 2006.

Approximately 60% of wastewater treatment operations at two IEUA plants currently run off of the methane gas produced by anaerobic digesters. The Business Plan proposes to combine and convert 100% of all organic waste streams (manure, biosolids, and green materials) through anaerobic digestion into power. By 2015, the organic solids produced within IEUA's area are estimated to reach 720,000 tons per year.

The TIN/TDS Study (discussed in Chapter 3) has found that Chino Basin groundwater quality has been adversely impacted in a number of basin areas as a result of point and non-point source activities. Point source dischargers of organic solvents and other contaminants are closely regulated, and remediation of those kinds of groundwater quality plumes is underway. The ongoing concentration of dissolved minerals (TDS and nitrate), however, continues in the southern part of the basin due to pumping for overlying agricultural land use, the addition of TDS and nitrogen on the overlying land, and the lack of subsurface outflow from the basin.

This ongoing problem is the primary challenge facing the basin. The problem will worsen with decreasing agricultural land use, and associated decreasing pumping from the basin, which will result in rising groundwater in the south, decreased safe yield, and adverse impacts on Santa Ana River quality. Several OBMP program elements address these problems: groundwater level and quality monitoring, maximizing recharge of high quality water, maintenance of southern basin production with appropriate treatment to produce beneficially usable water, and salt management to reduce loading associated with agricultural practices on lands overlying the southern part of the basin.

6.1.2.1 Projects: 2010

Chino I Desalter Expansion and Chino II Desalter Project – This Chino Basin Desalter Authority (CDA) project is broken down as outlined below.

<u>Chino I Desalter Expansion</u>

The goals of the proposed Chino I Desalter Expansion are to provide wells, pipelines, distribution and treatment facilities, including ion exchange treatment equipment and possibly volatile organic compound (VOC) treatment, and to achieve up to a 5 MGD increase in Chino I Desalter capacity. By adding the proposed 5 MGD added capacity to the current capacity of 8 MGD, the total capacity for the desalter would be 13 MGD.

The proposed expansion of the Chino I Desalter would include a nitrate removal system using ion-exchange to reduce final blended water nitrate concentrations to 25 milligrams per liter (mg/L) or less (as NO_3). This nitrate removal system would include a complete ion-exchange facility for the reduction of nitrates, including vessels, piping, valves, pumps and motors, process control instrumentation, and all ancillary features necessary for water softening, media regeneration, and waste recycling and storage. A pipeline for in-plant conveyance of bypass water would also be added to the existing desalinization facility. Ancillary features of the pipeline would include block valves, a flow meter, and a flow control valve. Clearwell pump station modifications to convey the additional flow to the end user would also be necessary. The modifications include the addition of up to three pumps and necessary piping.

Miscellaneous modifications to the Chino I Desalter may include components such as a structure to house monitoring equipment and sample stations at the point of discharge to the end users, additional chemical pumps to allow for back-up capabilities, a possible new pipeline to connect Well #4 to the treated supply line, garage doors on inhibitor door openings and on the room where the Reverse Osmosis (RO) trains are located, nitrate and Electrical Conductivity (EC)/Total Dissolved Solids (TDS) analyzers at the RO bypass, RO inlet, RO permeate, and at the final blend before the clearwell. An additional treatment component may be added to remove VOCs from one or more of the bypass wells, should these constituents be found in the wells at levels requiring treatment.

Installation of new groundwater pumping wells to increase average raw water flow to the Chino I Desalter are anticipated to consist of five new wells located within the project areas. New raw water pipelines are proposed to be installed to transport the additional raw water pumped to the desalter. The new potable water pipelines would extend from the desalter, near the intersection of Euclid and Kimball to the existing City of Chino Reservoir and proposed Chino/Ontario pump station, to be located near the intersection of Schafer Avenue and Benson Avenue, on property currently owned by SAWPA and others. This property would be transferred to the CDA prior to construction of the new facilities. Total length of the proposed Chino I Desalter discharge pipeline is approximately 21,900 lineal feet. Additional pipeline would be required to deliver the potable water from the new Chino-Ontario pump station site, near the intersection of Schafer Avenue and Benson Avenue, to the City of Chino's reservoir site, located near the intersection of Benson Avenue and State Street. To deliver water to the City of Ontario, a small segment of pipeline would also be constructed from Benson Avenue, along with an underground vault to house a control valve and appurtenances for flow and pressure control. A similar facility would be located at the City of Chino's reservoir site near State Street and Benson Avenue.

Finally, two new pump stations, termed the Chino/Ontario Pump Station and the Chino Hills Pump Station, would be constructed to enhance the ability to move potable water from the Chino I Desalter to end users. The Chino/Ontario Pump Station would be located on a developed site currently owned by SAWPA and others, southeast of the intersection of Schafer Avenue and Benson Avenue. The operation of the new pump station, which would include three 200-HP pumping units, would be independent from the existing pump station at this site. The Chino Hills Pump Station would be required to deliver potable water from the City of Chino Hills' low-pressure zone to its intermediate pressure zone. This pump station would be located northwest of Soquel Canyon Parkway, behind an existing Southern California Edison substation.

Chino II Desalter

The new Chino II Desalter would include a 10 MGD Reverse Osmosis/Ion Exchange treatment system, a clearwell, and pumping and piping facilities to deliver product water to Jurupa Community Services District (JCSD), City of Ontario, City of Norco, and Santa Ana River Water Company. Treatment process schemes have been developed to address the proposed facility capacity of 10 MGD, as well as the ultimate expanded-facility capacity of 24 MGD. It should be noted that environmental documentation for the project entitles facility capacity of up to 14 MGD.

The desalter facility would improve reliability and quality of potable drinking water. The Chino II Desalter would be a 10 MGD water treatment facility, with the possibility to expand capacity to 24 MGD in the future. The primary treatment components are reverse osmosis (RO) and ion exchange (IX), similar to the Chino I facilities. The project goal is 25 mg/L nitrate and 350 mg/L TDS. Twelve (12) new wells would be located along Bellegrave Avenue or along Limonite Avenue/Cloverdale Road. A booster pump station with a total capacity of 1,575 HP would be constructed at the Chino II Desalter to boost flow into the JCSD system. Additionally, the City of Ontario would require a new, approximately 375 HP pump station along Milliken Avenue between Philadelphia Street and Francis Street to deliver 3,500 AFY, "wheeled" from the JCSD to the City's 8th Street Pressure Zone System. The preferred alignment for the raw water pipeline is to travel from the source wells proposed along Bellegrave Avenue to the Chino II Desalter site. Product water would be delivered to the 1,110-foot pressure zone via a 16 to 20 inch diameter pipeline in Harrel Street and a 16-inch diameter pipeline in Riverside County Flood Control District right-of-way. Integral to the project is the construction of the 24 inch diameter Chino I/Chino II inter-tie pipeline by JCSD, in Etiwanda Avenue between 58th Street and Galena Street. The inter-tie pipeline would be constructed as a separate project and is not within the scope of this project. To convey high saline wastewater from the upper Santa Ana River basin to the ocean for disposal after treatment, the Santa Ana Regional Interceptor (SARI) line would be utilized. The SARI pipeline runs through Bellegrave Avenue and is located approximately one mile south of the proposed site.

Dairy Sewer Project – This project would implement a manure conveyance system with the installation of sewers planned by the City of Ontario. The project would reduce the groundwater degradation from dairy manure contamination by constructing sewers at the dairies and treating manure at the IEUA Management Facility.

Organics Management Program – This five year program would construct on-site dairy pilot anaerobic digester pilot projects, digesters and an enclosed compost facility at RP-4, and an enclosed compost facility at RP-5.

Chino I - Chino II Desalter Intertie – This project would be constructed, with Jurupa Community Services District (JCSD) serving as the lead agency. Construction of the intertie pipeline by JCSD is integral to the Chino I/Chino II Desalter project.

The purpose of the Chino I - Chino II Intertie project is to improve reliability of the Chino I Desalter and the Chino II Desalter. The Intertie would allow water to transfer from the Chino I service area to the Chino II service area and vice versa, should one of the facilities become temporarily inoperable. The Chino I - Chino II Intertie project involves the construction of a 24 inch diameter cement mortar lined/cement mortar coated (CML/CMC) pipeline from the JCSD product water pipeline (Chino I Desalter water) at the intersection of Etiwanda Avenue and 58th Street to an existing 24 inch diameter CML/CMC pipeline (Chino II Desalter water) at the intersection of Galena Street and Etiwanda Avenue. The project also includes the open cut of Bellgrade Avenue and the boring or tunneling under the storm drain culvert at Galena Street in order to connect onto the existing Etiwanda Avenue 24-inch diameter CML/CMC pipeline on the north side of the box culvert. The project includes the construction of a pressure reducing station on Etiwanda Avenue north of Bellegrave Avenue and ancillary piping. The project would require the repavement of Etiwanda Avenue along the pipeline trench in order to meet the County of Riverside Transportation Department requirements. Mainline valves, air valves, and blow-offs would be placed along the pipeline in order to allow for the future operation and maintenance of the pipeline. A stubout would be provided at the intersection of Etiwanda Avenue and Bellegrave Avenue for future connection and delivery of product water to the Santa Ana River Water Company.

Chino III Desalter (formerly West Chino Desalter/Ion Exchange) – This project would construct a new desalination facility project that would further remove salts from the lower Chino Basin. It is proposed as part of Chino Basin Optimum Basin Management Plan and would provide an additional 9.5 MGD of desalted water capacity.

Chino II Desalter Ion Exchange Expansion - This project involves the construction of an expansion in capacity of Chino II Desalter constructed as part of the Integrated Chino Arlington Desalination System. The expansion would remove salts from the lower Chino Basin. It is proposed as part of Chino Basin Optimum Basin Management Plan. The project would provide an additional 18 MGD of desalted water capacity bringing the total capacity up to 28.5 MGD.

6.1.3 Orange County Water District

Increasing salinity is a significant water quality problem for the Orange County groundwater basin. Management of Orange County's groundwater basin requires the District to reduce salt input to the basin by obtaining low TDS water for groundwater replenishment and focus on long-term planning for future desalters. Increasing salinity of water is directly linked to increasing consumer costs in Orange County.

Some of the key salinity highlights in OCWD's 2020 Master Plan are:

- Review of water quality data shows increasing salinity in Orange County wells and that the basin has no assimilative capacity for additional salts. There is a greater inflow of high salinity water and lack of salt removal, thus leading to increasing salt concentrations in the groundwater basin.
- OCWD needs to lower groundwater salinity as part of its long-term water quality management. This may be accomplished by recharging lower TDS source water. Basin water quality management includes strategies to obtain lower TDS imported water from MWD, if available and supporting construction of upstream desalting facilities to lower TDS levels in the SAR as required to meet Basin Plan water quality objectives.
- OCWD is participating in long-term salinity management studies with MWD and SAWPA to evaluate increasing salinity trends, review water quality objectives, and develop a management plan to reduce salt input into Orange County's groundwater basin.
- The 1998 USBR/MWD Salinity Management Study concluded that for every additional 100 mg/L TDS increase in salinity there is a $105 million annual cost to MWD's consumers.
- Desalting is a reliable method of producing low TDS recycled water, regardless of drought conditions, as determined by over 25 years performance of Water Factory 21 to maintain the Talbert seawater intrusion barrier. Expansion of WF-21 is needed to minimize seawater intrusion as groundwater demands increase.

The potential loss of water supplies due to increasing salinity and the development of projects to reduce water salinity are a priority to OCWD. OCWD has implemented water quality protection projects to reduce salinity including WF-21, Irvine and Tustin desalters, Arlington and Chino Basin desalters, Prado Water Conservation, utilization of the Santa Ana River Interceptor (SARI) industrial brineline, and participation with the Regional Board on dairy manure management. Below are additional salt management projects to further reduce water salinity.

6.1.3.1 Projects: 2010

Irvine Desalter Project (IDP) – This Irvine Ranch Water District (IRWD) project is located in the southeastern portion of the Irvine Subbasin in Orange County, California. The project yield is approximately 7,000 AFY, with 5,000 AFY to be produced for potable uses and 2000 AFY to be produced for non-potable uses. The project combines groundwater recovery (reverse osmosis) and clean-up (Air Stripping) technologies to remove high salts, nitrates, and volatile organic compounds (VOCs).

The project has two component systems: (1) a potable system consisting of four wells located outside the VOC plume and (2) three wells located within the VOC plume. The potable water sources would be desalted with reverse osmosis (RO) treatment and the non-potable sources would be partially desalted and air stripped utilizing packed aeration towers. IRWD would dedicate an existing water supply pipeline for conversion into the eastern reach of the proposed Central Orange County Regional Brineline. Brines would be conveyed via this pipeline to the Orange County Sanitation District sewer system. OCWD will own the facilities until capital is retired. IRWD will operate the system and take ownership upon retirement of capital debt.

Additional project features are: (1) separation of the project into potable and non-potable components, (2) addition of an early warning monitoring well system, and (3) provision for a GAC wellhead pretreatment for one well.

The source of the VOCs is from the former El Toro Marine Corps Air Station. A Settlement Agreement with the U.S. Department of Navy (DON) and U.S. Department of Justice (DON) will provide for financial contributions by DON/DOJ and resolution of legal liability issues for the clean up portion of the project. DON's contributions will pay for all costs related to VOC cleanup.

Orange County Regional Brineline - The construction of this new regional brine line would increase the reverse osmosis (RO) recovery and reduce the power costs on the RO units associated with the GWRS project.

Tustin/Irvine (Frances) Desalter Project – This project would construct a future desalter/nitrate removal facility and would be located in the north Irvine and east Tustin areas of Orange County. The groundwater in the area is characterized by high TDS, hardness, nitrates, and selenium concentrations that exceed the maximum and secondary standards for these contaminants. Locally, TDS exceeds 1100 mg/l. Agricultural and urban drainage, as well as salt concentration due to shallow groundwater conditions, have degraded this portion of the basin. The degraded groundwater, which flows to the southwest, threatens existing and future potable water supply wells and severely limits the use of the basin in this area for groundwater use and storage. Studies have considered development of a wellfield and desalter project to intercept, contain, and restore this portion of the basin for over a decade, but due to high costs and the unavailability of supplemental funding, the project has not been able to move forward.

The project may be a joint effort of OCWD and IRWD, under which IRWD will design, operate, and maintain the facility and OCWD would provide groundwater management functions and would provide a waiver of the BEA to make the project costs on par with imported water costs.

The yield from the project has not yet been determined. Preliminary studies have assumed a yield of 8,000 AFY with a treatment plant capacity of 10 MGD. Six to eight wells would be constructed to produce the indicated yield. Brine disposal from the project would need to be conveyed to the brine disposal system for disposal to the ocean.

A feasibility report prepared in 1993 indicated a capital cost range from $16 million to $26 million for 6 MGD and 12 MGD treatment projects, respectively. The unit cost was in the range of \$500 to \$600 per acre foot. It is anticipated that the cost of the proposed 10 MGD project would be approximately \$24 million.

IRWD seeks grant funding to update the project report to determine the safe yield to the project, project cost, and level of outside grant and low-interest funding required to make the project economic feasible. The project is scheduled to be operational by 2010.

The project would provide environmental benefits beyond groundwater supply by reduction of non-point sources of nitrates and selenium that now drain into stream channels from shallow groundwater. These channels drain into the Upper Newport Bay State Ecological Preserve. CEQA compliance would be undertaken upon funding support.

The brine from the two Tustin Desalters and from large industrial generators such as Layton Softening in Santa Ana will utilize the proposed Orange County Regional Brine Line to transport brine to the ocean after treatment.

6.1.4 San Bernardino Valley Municipal Water District

Preventing additional water contaminants from being introduced to the basin in quantities that could eventually cause violation of drinking water standards or violations of wasted discharge permits is one of SBVMWD's primary objectives. This objective deals with prevention rather than remediation, and implies cooperative actions between the local water purveyors and other jurisdictions and departments.

Some of the strategies for managing the total dissolved solids (TDS), or salts, balance are as follows:

- Increasing the capture of local runoff, which is the highest quality source available, for recharge would have a positive impact on the salt balance. Future imported water quality, though uncertain, is projected to have TDS 50 – 100mg/L higher than local runoff. Local water, therefore, should be the first priority for groundwater recharge due to its higher quality.
- Retaining, rather than exporting, local runoff in the local groundwater basins to the maximum extent possible should be a top priority. In particular, exchange deliveries to the San Gorgonio Pass Water Agency (SGPWA), MWD, and the Department of Water Resources (DWR) should be limited to periods when the rate of local runoff exceeds the capacity to use the water within the area for both direct use and groundwater recharge.
- Using higher TDS recycled water, particularly for groundwater recharge, would require either adequate blending with additional low TDS supplies such as new local runoff or imported water, or treatment for reduction in TDS. If blending is proposed, the project would have to demonstrate that sufficient additional new local and/or imported water was being captured and recharged in the same general vicinity. Using new local water would require recharging approximately 130 percent of the quantity of recycled water proposed, assuming SAR water quality is approximately 140 mg/L TDS and recycled water is approximately 500 mg/L TDS. For example, a 10,000 AFY recharge project would require development and spreading of at least 13,000 AFY of new local water. Should imported water be used, the blending requirement would be much higher, depending upon the quality of SWP water.

6.1.4.1 Projects: 2010

Yucaipa Valley Regional Water Supply Renewal Project (Yucaipa Valley Water District) - This Yucaipa Valley Water District (YVWD) project consists of constructing a Reverse Osmosis Treatment Facility and a Brine Pipeline Extension, which would also allow for capacity increase. This project, coupled with the YVWD's aggressive recycled water program, would effectively eliminate the buildup of minerals in the Yucaipa Valley, minimize the amount of water imported from the fragile ecosystem in northern California, allow for the maximum use of high-purity recycled water, and ultimately reduce demands on the California State Water Project by 13,500 AFY. CEQA compliance is estimated to be completed in 2002.

Regional Benefits:

- Provides the Yucaipa Valley with a renewable water resource that will be a reliable water supply in the upper Santa Ana Watershed.

- Protects and enhances the regional groundwater quality by exporting concentrated salt brine that would normally accumulate through recycled water usage.
- Reduces the critical overdraft of the Yucaipa and San Timoteo Watersheds by reducing the fresh water production from the local groundwater basins.
- Encourages economic and environmental growth of the region by balancing water demands.

Watershed Benefits:

- Constructs the first wastewater treatment facility with both tertiary treatment and reverse osmosis to achieve advanced fresh water as an unconditional renewable resource.
- Protects water quality in the lower Santa Ana Watershed by maintaining high quality water in the upper watershed as the water of the upper basins eventually flows to the downstream basins.
- Extends the Santa Ana Regional Interceptor (SARI) pipeline, originally constructed by SAWPA. Upon completion of this project, the SARI pipeline would extend from Orange County to the eastern boundary of the Santa Ana Watershed creating one of the longest brine disposal pipelines in the United States.
- The Yucaipa Valley Water District would achieve a status of zero-discharge, providing the ultimate protection of downstream water resources consistent with the goals of the Clean Water Act.

State of California Benefits:

- Reduces the need for water to be imported from northern California that would normally be required to meet future water demands.
- Desalting and treatment of brackish water would allow poor quality water to be recycled and used.
- Conservation, including efficiency water use and reclamation, is consistent in protecting the best interest of the State of California.

6.1.5 Santa Ana Watershed Project Authority

SAWPA has long recognized the importance of removing salts from groundwater to help improve water quality within the SAW. In 1990, SAWPA completed a 7 MGD reverse osmosis plant, the Arlington Desalter. This desalter, designed to yield 6,000 AFY, produces domestic water from a brackish groundwater basin with the expectations to recover the basin in the next 30 years. The groundwater is treated sufficiently to meet drinking water standards, which will allow the basin to be used as it has in the past, producing 10,000 to 15,000 AFY. Expanding the capacity of this desalter is one of the projects listed below.

SAWPA continues to be an advocate of brine removal, as evidenced by the Santa Ana River Interceptor (SARI) Planning Study, which is estimated be completed by July 2002. This study is further described both in Section 11.3.1 and below as “SARI Protection/Relocation.”

6.1.5.1 Projects: 2010

Arlington Desalter Enhancement Project, Phase I - This project would construct improvements to the Arlington Desalter to provide up to 6.0 MGD of potable water, which requires various system improvements to deliver higher quality water on a reliable basis to the desired service areas. The existing Arlington Desalter, operating since 1990, extracts and treats impaired groundwater from the Arlington basin in the southwestern area of the City of Riverside. The desalter, using Reverse Osmosis (RO) technology, produces up to six (6) million gallons per day (MGD) of blended desalinized water, with another estimated one (1) MGD of concentrated brine (high salinity water) generated by the plant discharged to the Santa Ana Regional Interceptor (SARI) line. The blended desalinized water, which is non-potable, is currently discharged to the Arlington Channel, and ultimately to the Santa Ana River for recharge use by OCWD.

SARI Protection/Relocation – This project would relocate and/or protect SARI between Weir Canyon Road and Prado Dam (Reaches 5 – 8) in Orange County. This must be done due to the fact that only a few feet of soil now cover the brine disposal line in this area as a result of scouring. The line must also be protected from imminent increased flows due to the future raising of Prado Dam.

As part of the Santa Ana River Mainstream Project, the U.S. Army Corps of Engineers is planning to raise Prado Dam along the Santa Ana River approximately 30 feet and to redesign and construct changes to the outfall stream from the dam and its alignment. The changes resulting from these improvements will likely necessitate that portions of the existing SARI pipeline be protected and/or relocated.

6.1.6 Western Municipal Water District

As a member agency of the SAWPA, WMWD has access to the Arlington Desalter, a 7 MGD reverse osmosis plant (described under SAWPA in Section 6.1.5). The desalter produces domestic water from a brackish groundwater basin, which has high total dissolved solids (+1,000 mg/L) and high nitrate levels (+100 mg/L). The ultimate goal of the desalter is to bring the Arlington Groundwater Basin back to conditions to meet drinking water standards and allow the basin to be used as it has in the past, producing 10,000 to 15,000 AFY. It would also result in a likely reduction in the amount of water Western must import. The output of the plant is available to any water producer in the Watershed. Due to the pumping lift required to get the water into WMWD's domestic system, Western only considers direct use during shutdowns of the California State Water Project.

6.1.6.1 Projects: 2010

Temescal Desalter Expansion - This City of Corona project consists of the construction of a 5 MGD expansion to Corona's desalter and support facilities. Initial capacity from desalter wells and from the reconstruction of Wells 12, 13, and 19 currently provide up to 10 MGD additional local water supply. Recently constructed pipelines transport water to project facilities. This first phase of the Temescal Desalter began service in October of 2001 at a cost of $30 million. Expansion of wastewater pumping capacity would deliver an additional 5 MGD of effluent for groundwater recharge. This 5 MGD expansion is scheduled for completion by spring of 2004. Construction of a Green River lift station and force main would remove 0.350 MGD of wastewater from the SARI pipeline and allow that capacity to be used for desalter brine disposal. Engineering work is underway and the City expects to fund the $5 million for construction in June 2002.

Brine Line from Colton Power Plant - This project would construct a pipeline connection between the Colton Power Plant and the existing SAWPA SARI Brineline. Construction of the pipeline would eliminate brine from local disposal and would reduce salt buildup in local groundwater basins.

6.2 Groundwater and Lake Water Cleanup

The water quality projects identified in Section 6.1 dealt mainly with desalination and brine disposal. This section attempts to identify the remaining water quality projects that affect both groundwater and lake water. The primary water quality problems include nitrates, perchlorates, PCE, TCE, and MTBE. In areas such as the San Jacinto and Lake Elsinore Watersheds, an excess of nutrients is a major issue. A major objective of this IWRP is to assure that available supply is of adequate quality to ensure that beneficial uses can be met.

6.2.1 Inland Empire Utilities Agency

The OBMP's goal to "protect and enhance water quality" will be accomplished by implementing activities that capture and dispose of contaminated groundwater, treat contaminated groundwater for direct high-priority beneficial uses, and encourage better management of waste discharges that impact groundwater. The following activities will protect and enhance water quality:

- Treat contaminated groundwater to meet beneficial uses. Groundwater in some parts of the basins is not produced because of groundwater contamination problems. Intercepting contaminants before they spread can protect groundwater quality. Intercepted groundwater could be treated and used directly for high priority beneficial uses or injected back to the aquifer.
- Monitor and manage the Basin to reduce contaminants and to improve water quality. Actively assisting and coordinating with the Regional Board, the EPA, and other regulatory agencies in water quality management activities would help improve water quality in the Basin.
- Address problems posed by specific contaminants.

IEUA's Urban Water Management Plan Year 2000 Update reports that, in addition to the TDS and nitrate problems in the southern Chino Basin, new contaminants such as perchlorate and mercury, TCE, PCE, DBCP, and Chromium IV have been discovered in the aquifers within IEUA's service area and threaten the future expanded use of the Chino Groundwater Basin.

6.2.1.1 Projects: 2010

CCWD Project 3 - Reservoir 3A Wellhead Treatment - This project would construct a Granular Activated Carbon (GAC) Treatment Facility for the removal of 1,2 dibromo 3 chloropropane (DBCP) from District Well No. 34, which currently exceeds drinking water regulation maximum contaminant levels.

CCWD Project 4 - Reservoir 2A Wellhead Treatment Facility - This project would construct a combination central treatment facility for the removal of 1,2 dibromo 3 chloropropane (DBCP) and nitrate (N03) from District Well Nos. 8, 10, and 20, which currently exceed drinking water regulation maximum contaminant levels. The proposed facility would include the use of Granular Activated Carbon (GAC) units for the removal of DBCP and Ion Exchange units with self-contained destruction units for removal of nitrate. The work associated with this project would include the construction of all piping and other related facilities required to complete the project.

CCWD Project 5 -Reservoir 3 Wellhead Treatment Facility - This project would construct a combination central treatment facility for the removal of 1,2 dibromo 3 chloropropane (DBCP) and nitrate (NO3) from District Well Nos. 15, 17, 23, and 31, which currently exceed drinking water regulation maximum contaminant levels. The proposed facility would include the use of Granular Activated Carbon (GAC) units for removal of DBCP and Ion Exchange units with self contained destruction units for removal of nitrate. The work associated with this project would include the construction of all piping and other related facilities required to complete the project.

City of Chino Project 4 Nitrate Removal Water - This project would construct a Nitrate Removal Water Treatment Plant. The treatment plant would reclaim poor quality groundwater for beneficial use in keeping with the goals and objectives of the Chino Basin Watermaster Optimum Basin Management Program and the Southern California Integrated Watershed Program.

City of Chino Hills Project 1 New Well With Wellhead Treatment - This project would construct a new well (injection and extraction) and provide ion-exchange equipment for the treatment of high nitrates and TDS.

City of Ontario Project 6 - Wellhead Ion-exchange Treatment & Transmission Line - This project would construct approximately 12,500 L.F. of 18 inch transmission main and an ion-exchange treatment facility in order to increase dry-year yield and basin cleanup. The pipeline would collect high nitrate water from four existing wells, which produce a total of approximately 5,000 AFY.

City of Upland Project 1 Wellhead Ion-exchange - This project includes treatment facilities for 3 high nitrate treatment wells. The project is estimated to increase dry-year yield of 2,700 AFY and enhance ground-water quality.

Fontana Water Company Project 1 Wellhead Ion-exchange - This project would include wellhead treatment facilities for high nitrates and TDS and distribution. The project is estimated to increase dry-year yield of 3,700 AFY and enhance groundwater quality.

Fontana Water Company Project 2 Wellhead Ion-exchange - This project would include wellhead treatment facilities for high nitrates and TDS and distribution. The project is estimated to increase dry-year yield of 3,700 AFY and enhance groundwater quality.

Jurupa Community Services District (JCSD) Ion Exchange Facility – This project would construct a 12.7 MGD ion exchange treatment plant to treat high nitrate groundwater at a total cost of approximately $10,000,000. Phases I and II would allow for an 8 MGD capacity, with construction estimated for completion in 2003. Phase II would bring the plant’s capacity to 12 MGD by the year 2010.

JCSD provides water and sewer services to the communities of Eastvale, Mira Loma, Pedley, Glen Avon, and Sunnyslope, which together comprise a population of approximately 45,000 people. JCSD is the recipient of many years of groundwater degradation caused by known and unknown contaminants seeping into the groundwater. One such contaminant is nitrate, which is prevalent in JCSD well fields and has necessitated the shutdown of wells. The new facility would allow these wells to once again be used for blending purposes. The Feasibility Report is complete and the final design is nearing completion.

MVWD Project 6 Wellhead Ion-exchange Treatment for Two Wells at Plant 4 - This project would construct an anion exchange treatment facility for two wells high in nitrates. A brine disposal pipeline would be constructed to IEUA's non-reclaimable waste system. This project provides increased dry-year yield and basin cleanup for up to 4,700 AFY and permits the agency to utilize this and other groundwater production facilities to meet the water supply needs of the cities of Chino and Chino Hills during drought periods. The exportation of salts from the groundwater basin provides increased use of recycled water.

MVWD Project 7 Wellhead Ion-exchange Treatment at Well 2 - This project would construct an anion exchange treatment facility at an existing Well 2 location for treating groundwater. The well has been idle since 1984 due to nitrates (79 mg/1). Brine disposal would be transported through IEUA's non-reclaimable water system ¼ mile from the site. This project provides increased dry-year yield and basin cleanup for up to 1,450 AFY and permits the agency to utilize this and other groundwater facilities to meet water supply needs of the cities of Chino and Chino Hills during drought periods. The exportation of salts from the groundwater basin provides increased use of recycled water.

San Antonio Water Company Project 2 Well Retrofit & Wellhead Treatment - This project, located on Fourth Street west of San Antonio Avenue in the City of Ontario, would retrofit and equip a new well (injection and extraction) with wellhead ion exchange treatment facilities for high nitrates, with a future connection to the MWD Foothill Feeder. The project is estimated to increase dry-year yield of 3,000 AFY and enhance groundwater quality.

6.2.2 Orange County Water District

A salt imbalance exists in the Orange County groundwater basin. Review of water quality shows increasing salinity in Orange County wells and that the basin has no assimilative capacity for additional salts. There is concern that a greater inflow of high salinity water and lack of salt removal could lead to increasing salt concentrations in the groundwater basin.

Recent studies have shown that with increasing salt concentrations, residents and business within Orange County incur millions of dollars of additional expenses. These cost are due to reduced life expectancy of plumbing fixtures, increased water softening cost, reduce crop yields, etc. OCWD needs to lower groundwater salinity as part of its long-term water quality management. This may be accomplished by recharging lower TDS source water. Basin water quality management includes strategies to obtain lower TDS imported water from MWD, if available and supporting construction of additional upstream desalting facilities to lower TDS levels in the SAR as required to meet Basin Plan water quality objectives.

Preventing seawater intrusion is a basic tenant of OCWD. Water Factory-21 (WF-21) has effectively prevented seawater intrusion into coastal groundwater supplies for over 20 years. Once the proposed Groundwater Replenishment System described in Chapter 5 is operational, however, it will perform the same function as WF-21, which will then no longer be necessary. Problems with injection wells have dramatically reduced the amount of water injected along the barrier in recent years. In addition, expansion of the barrier is required as basin wide groundwater pumping increases. Use of new desalting technology would allow the District to effectively produce a reliable, low TDS water source for injection into the Talbert Gap.

The 2020 Master Plan concludes that OCWD should consider implementing the GWRS to improve the regions groundwater quality. Due to the importance of SAR flows, OCWD should also closely monitor activities in the upper SAR watershed that could degrade the quality of this water.

6.2.2.1 Projects: 2010

Westside Wellfield Color Water Project – This project would expand and modify an existing Mesa Consolidated Water District colored water treatment plant from 5 MGD to up to 15 MGD in order to fully utilize the under-produced colored water groundwater resource. Pumping of additional colored water from the deep aquifers will also reduce the potential for this water to travel into the clear main aquifers. The Feasibility Report is currently being prepared. The project is scheduled to be operational in 2006.

DATS Color Water Project – This IRWD project consists of a wastewater recovery system and brine line connection to allow a concentrated color waste stream, with low TDS, to be disposed to the OCSD sewer system, or possibly to the SARI line.

Fullerton Forebay Water Quality Improvements – This project consists of removing volatile organic compound (VOC) contamination from a shallow groundwater aquifer before it can migrate into the main drinking water supply aquifer. The project area is mostly located in

Fullerton, but covers parts of Anaheim and Placentia as well. The primary contaminants are PCE, TCE, and 1,1-DCE, with concentrations up to 2,500 micrograms per Liter (ug/L), where the maximum contaminant level (MCL) is 5 ug/L. There are multiple sources for the contaminants, many of which are unknown.

VOCs have impacted the groundwater supply and pose threat if not cleaned up. Production wells have been shut down or have reduced pumping rates. Fullerton wells show increasing VOC concentrations, as shallow VOC contamination may be "pulled down" into main aquifer. Project objectives include containing the VOCs, minimizing further impacts to groundwater production wells, expediting groundwater quality restoration, and working with regulators for faster action.

A Focused Feasibility Study (FFS) has been completed and the lowest cost remedial system was selected. The selected system is a self-contained modular pump-and-treat system that includes an extraction well, liquid-phase granular activated carbon (LGAC), and reinjects treated water to deeper aquifer. Phase 1 includes the construction of two extraction wells (600 gpm each), LGAC treatment with re-injection, and 15 monitoring wells. Phase 2 includes additional extraction and monitoring wells based on performance and data collected during Phase 1.

Santiago Pits Pump-out Facility – This project would construct a pump-out system to allow for the dewatering of the Santiago Pits in order that the recharge basin could be cleaned. The Santiago pits are used to recharge the Santa Ana River and MWD replenishment water into the OCWD groundwater basin. The basin is over 100 ft deep and is approximately 120 acres. The pump-out facilities would allow OCWD to empty the basin of all water so that silts and fine clays that accumulate on the bottom of the basin and reduce recharge rates could be removed. The facilities would consist of necessary piping and high capacity pumps that would discharge water below the basin into Santiago Creek. The CEQA and preliminary design report are complete.

Diemer Bypass Pipeline – The construction of this line would enable MWD to provide OCWD with a blend of State Project Water, which would help reduce the current salt imbalance with the groundwater basin. OCWD uses this water to replenish the groundwater basin. Potentially up to 100% of State Project Water supplies could be received during different times of the year depending upon MWD operations. MWD has tentatively agreed to construct this facility as partial compensation to OCWD for allowing MWD to store 60,000 AF of supplies in their groundwater basin.

River Water Quality Monitoring Facilities - This project would aim to use a fish biomonitoring approach to aid in characterization of water as being suitable as a source of drinking water. The Santa Ana River is the primary source of recharge for the Orange County groundwater basin, which provides over 2 million people about 75% of their drinking water supply. During the summer months, a majority of the Santa Ana River flow is tertiary-treated wastewater discharged from municipal facilities in San Bernardino and Riverside counties. Water quality in the Santa Ana River is also impacted urban and agricultural runoff.

Conventional chemical monitoring may not be sufficient to ensure source water quality in a protected watershed. The majority of organic compounds present cannot be identified and an even larger fraction is not characterized toxicologically. Within complex mixtures, combinations of chemicals may result n adverse health outcomes. Biological monitoring may indicate a response when single chemical levels are not predictive of a response.

Biomonitoring using Japanese medaka fish (*Oryzias latipes*) and Bluegill sunfish (*Lepomis macrochirus*) would be deployed to assess water quality. The first location tested would be shallow groundwater adjacent to the Santa Ana River. Biomonitoring would be conducted with a mobile facility that would allow testing at various surface water and groundwater sites in the Santa Ana River watershed. Each individual assay with medaka would last nine months. Variations in bluegill ventilation and coughing rates would be used to monitor short-term variations in water quality.

Well Closure Program – This project by the Orange County Water District (OCWD) would implement an abandoned production well closure program to protect groundwater underlying the highly urbanized northern half of Orange County. Based on eight years of records research and field reconnaissance, performed by staff and Groundwater Guardian program volunteers, OCWD estimates that there may be 1,400 abandoned wells that should be considered as candidates for closure. The Orange County Health Care Agency (OCHCA), municipalities, and water purveyors support OCWD's efforts to prioritize closure of wells that pose the greatest threat to water quality, wells located in known areas of contamination, wells with inter-aquifer screened intervals and/or those without proper sanitary seals. This program would especially target the closure of abandoned wells that have no owner on record.

The wells vary between 300 and 1,000 feet in depth. Concurrently, local well standards enforcement agencies would encourage identifiable well owners to close abandoned wells that are not in compliance with mandated well standards.

Dairy Washwater Treatment Project – This project would demonstrate the use of wetlands treatment technology to reduce the impacts from dairy waste on the Chino Groundwater Basin. Current management practices for washwater involve long-term storage in ponds where it is left to evaporate, percolate into groundwater, or is sprayed onto crops and/or disposal lands. The wetlands treatment system is expected to maximize the utility of existing storage ponds, reducing sediment loading in the washwater ponds through on-site treatment, increasing pond capacity and decreasing the need to clean and scrape storage ponds. The final product water is suitable for on-site reuse and reduces the amount of contaminants entering groundwater supplies as a result of percolation of washwater stored in ponds and sprayed on disposal lands.

Talbert Barrier Improvements, Phase II – This project would construct an additional line of injection wells seaward of the existing Talbert Barrier in order to accommodate additional groundwater production. The Feasibility Report is currently being prepared.

Coastal Groundwater Treatment Project – This project would provide wellhead treatment to remove NDMA and other contaminants from groundwater supplies located along the coastal portion of the groundwater basin. The Feasibility Report is complete and CEQA is currently being prepared.

6.2.3 San Bernardino Valley Municipal Water District

SBVMWD water quality management objectives include preventing water contamination, maintaining water quality, and improving water quality.

In addition to the salt management objectives listed in the previous section, part of SBVMWD's water contamination prevention program includes a wellhead protection program and coordination with National Pollutant Discharge Elimination System (NPDES) permit management activities. Wellhead protection programs coordinate activities among multiple jurisdictions to manage and control land-use decisions and enforce various regulatory measures to prevent contaminants form being introduced to the groundwater in areas upgradient from supply wells or well fields. West San Bernardino County Water District (WSBCWD) has established such a program and similar programs could be established elsewhere in the study area. The county and all cities within the study area are currently implement Best Management Practices under their NPDES Stormwater permit to improve the quality of urban runoff. Since a significant portion of the local urban runoff recharges the groundwater basins through streambeds and detention basins, improvement in the quality of such runoff is beneficial to protect groundwater quality.

The second water quality management objective is to maintain water quality to meet all applicable standards or requirements for the intended use. Some of the possible strategies to be implemented include:

- Using contaminated groundwater for purposes for which its quality is acceptable
- Blending contaminated groundwater to acceptable concentrations for potable use
- Providing wellhead treatment when needed
- Moving production to an area of acceptable quality.

Improving water quality is the third objective. The implementation of this objective requires the extraction and treatment of contaminated groundwater to meet quality standards appropriate for the intended use. Current remediation efforts for the Newmark, Muscoy, Norton, and Redlands-Crafton plumes reflect this objective. Additional efforts would generally follow strategies such as:

- Implementation of other wellhead treatment projects where cost-effective
- Identification of other potential areas of water quality degradation and the implementation of corrective measures where cost-effective.

6.2.3.1 Projects: 2010

City of San Bernardino TCE Cleanup – The San Bernardino Municipal Water Department (SBMWD) proposes to construct Granular Activated Carbon (GAC) treatment facilities on SBMWD property at 11th & Acacia (3,700 GPM/5.3 MGD) and at 27th & Acacia (3,100 GPM/ 4.5 MGD). The project would include raw water lines connecting the Department's 16th St. and 17th Street Wells to the 11th & Acacia treatment plant and raw water lines connecting the 23rd Street, 25th Street, and the 27th Street wells to the 27th & Acacia treatment plant. Additional finished water lines would be required to move the water from the 11th & Acacia plant into the system for distribution.

The Bunker Hill groundwater basin is the sole source of current and future water supply for the City of San Bernardino. The area within the Bunker Hill basin that is available to the SBMWD for new well construction (source of supply) is severely limited by the basin boundaries, the 1929 judgment, the USEPA Newmark Super Fund Project, and the existing contamination plumes within the basin (see attached map).

The SBMWD has five (5) highly productive wells within the contamination plume that have been idled as a result of the USEPA Super Fund project. These wells are not being used in the USEPA project because they are located in the Newmark plume and do not contribute to the containment of the leading edges of the plumes. Currently, the SBMWD does not have any treatment facilities available for these wells.

6.2.4 Western Municipal Water District

Because much of the Lake Elsinore and San Jacinto Watersheds are located within WMWD's service area, the following section is listed under WMWD, although WMWD is not a member of LESJWA.

<u>Lake Elsinore and San Jacinto Watersheds Authority (LESJWA)</u>

On March 7, 2000, the electorate of the State of California voted to approve Proposition 13, the Costa-Machado Water Act of 2000. Proposition 13 authorized the issuance and sale of State General Obligation Bonds in the total amount of $1,970,000,000 and directed the State of California to deposit the proceeds of the bond sale in the Safe Drinking Water, Clean Water, Watershed protection and Flood Protection Bond Fund. Proposition 13 created the Lake Elsinore and San Jacinto Watersheds subaccount and allocated $15,000,000 to this subaccount. These state funds must be invested in specific projects by 2004.
Upon appropriation by the Legislature these funds may be used to rehabilitate and improve the Lake Elsinore and San Jacinto Watersheds and the water quality of Lake Elsinore by funding certain listed kinds of projects. Proposition 13 specifically identified funding to the following types of projects:

1. Watershed monitoring
2. Storm channel modification
3. Nutrient control
4. Aeration
5. Wetlands restoration and enhancement
6. Wildlife habitat enhancement
7. Fishery enhancement
8. Calcium quicklime treatment
9. Sediment removal
10. Related planning and administrative costs for program

The funds appropriated were allocated to a joint powers agency created for the implementation of programs to improve the water quality and habitat of Lake Elsinore and its back basin consistent with the Lake Elsinore Management Plan ("prescribed programs"). The joint powers agency referred to is the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA), which was created under a Joint Powers Agreement on March 8, 2000. The agreement was made and entered into by and between the City of Canyon Lake, the Elsinore Valley Municipal Water District, the City of Lake Elsinore, the County of Riverside, the Riverside County Flood Control and Water Conservation District, and the Santa Ana Watershed Project Authority. Riverside County Flood Control and Water Conservation District since withdrew from the Authority, which leaves five agency members. LESJWA meets monthly and is governed by a Board of Directors comprised of one representative from each of the member agencies. The Board is also supported by a Technical Advisory Committee and a Public Relations Committee, which typically meet once to twice each month as well.

A water resource improvement program has been established for the 700 square mile San Jacinto and Lake Elsinore watersheds. These improvements address the following objectives:

- Provide nonpoint pollution control
- Develop flood control projects
- Protect wildlife habitat
- Protect and enhance recreational resources

LESJWA currently has underway a Program Environmental Impact Report, which examines recycled water, wetlands treatment, in-lake treatments, aeration/oxygenation, and biomanipulation projects. Also underway is an Environmental Impact Report that examines bio-manipulation and fishery enhancement, as well as in-lake treatments projects.

To date, LESJWA has completed or is in the process of completing a number of studies, including:

- Lake Elsinore Feasibility Study
- Canyon Lake Feasibility Study
- Impacts of Alum Addition on Water Quality in Lake Elsinore
- Impacts of Calcium Addition on Water Quality in Lake Elsinore
- Laboratory and Limnocosm-Scale Evaluations of Restoration Alternatives for Lake Elsinore
- Restoration of Canyon Lake and Benefits to Lake Elsinore Downstream

The source of much of the lake quality degradation has been traced to contributions of nutrients from upper watershed runoff. Various types of nonpoint source contributors have been identified in detail as part of an EPA Clean Lakes 314 Study. Major contributors of nonpoint source contributions include agricultural cropland, dairies, feedlots, grazing, land development, and urban runoff. Solutions to controlling the nutrient carried by runoff and sediment are both structural and nonstructural in nature and are described as follows:

- Establish Best Management Practices program for agricultural areas
- Create buffer strips along strategic upper watershed locations
- Create detention ponds for dairy and feedlot drainage
- Establish nutrient removing wetlands along drainage paths
- Implement sediment control structures

LESJWA has entered into agreements with the Regional Water Quality Control Board for the purpose of conducting nutrient, pathogen, and toxic TMDL monitoring programs. Studies included are a Canyon Lake Pathogen TMDL and Internal Loading and Nutrient Cycling in Lake Elsinore. A TMDL Workgroup currently meets on a monthly basis to enlist the participation of stakeholders in solving the various TMDL issues.

Some of the projects aimed at meeting the above goals are listed below and specifically identified as LESJWA projects:

6.2.4.1 Projects: 2010

Rubidoux Community Services District (RCSD) Water Treatment Facility (WTF) Cleanup - This project would expand the La Verne Mahnke Water Treatment Facility capacity to approximately 3,000 GPM. The existing facility has a capacity of 500 GPM and removes

Manganese from water produced by the District's Well 1. The District recently completed the construction of Well 17, which will produce approximately 2,200 GPM; however, the water from said well cannot be placed into the District's potable water system due to a Manganese concentration in excess of the California Department of Health Services secondary MCL.

City of Corona Well Site Treatment – The City of Corona has contracted with Calgon Corporation to develop and provide well site treatment to remove hydrogen sulfide from a well that produces water that is relatively low in TDS and Nitrates. The process involves proprietary state of the art granular carbon absorption technology to remove hydrogen sulfide. Expected production is 1 MGD, 1,100 AFY, from a well more than 800 feet deep. Cost of treatment is $146 per AF over a 10-year period. Corona is examining well site ion exchange to remove nitrates from another well that will produce 500 AFY. Cost of treatment is estimated to be $150 per AF.

March Air Reserve Base (MARB) Cleanup Recovery – This project would construct a pipeline to convey water recovered from the MARB groundwater remediation projects at IRP Site 31/GETS and Site 18 (on MARB) to irrigate lands, located within WMWD, overlying the basins tributary to the San Jacinto River.

The MARB is in the process of cleaning groundwater contaminated with jet fuel and cleaning solvents. This is being accomplished with 15 wells that pump water to a water treatment facility on the base. Some of the treated water is re-injected into the ground to maintain a hydraulic mound so the contamination will not spread beyond the base boundaries with the balance discharged to the Heacock storm drain channel.

Excess treated water would be available after necessary re-injection requirements have been satisfied. Approximately 300 AFY would be available for recovery and reuse by non-potable water customers utilizing existing pumping facilities at Site 31 that are currently supplied with imported water.

Pump and Treatment for Riverside/Colton Basin – This conceptual project would extract and treat 20,000 AFY of water drawn from the Riverside/Colton Basin.

RWQCB TMDL Monitoring – This LESJWA project would provide development of the nutrient TMDL project for Lake Elsinore and Canyon Lake, the pathogen TMDL for Canyon Lake, and the toxics TMDL for Lake Elsinore. The project would provide an understanding of the sources of nutrients for both lakes, pathogens for Canyon Lake, and toxics for Lake Elsinore. As a result, the project would provide the information necessary to help restore the water quality in both lakes.

Lake Elsinore Fishery Enhancement and Bio-manipulation – This LESJWA project would re-establish a more balanced distribution of aquatic species in the lake. By restoring a better balance of aquatic species, including predator to prey ratios in the lake, it is anticipated that the water quality would improve. The project would remove nuisance fish that contribute to the turbidity, excessive algae and nutrient levels in the lake and restore the predator fish population.

Lake Elsinore Metal Salts Application - This LESJWA project would apply metal salts (perhaps calcium chloride) to the lake bottom of Lake Elsinore in order to reduce the release of nutrients. This would help to prevent algae blooms and fish kills.

Canyon Lake Aeration/Oxygenation – This LESJWA project would construct an aeration/diffusion system, which would provide better distribution of oxygen back into the water column in order to avoid increasing build up algae blooms for Canyon Lake and to downstream Lake Elsinore. In times of significant rainfall, stormflows overtop the Canyon Lake dam and flow into Lake Elsinore. Both lakes have been listed as impaired water bodies for nutrients.

Canyon Lake East Bay Silt Removal – This LESJWA project would remove sediment from the East Bay of Canyon Lake in order to reduce the release of nutrients. Canyon Lake is filling each year with 2-3 inches of sediment from the upper watershed. The influx of sediment has seriously jeopardized further recreational use of the lake in the East Bay portion of the lake. This project would consist of dredging the estimated 500,000 cubic yards of sediments that have accumulated in the 52 acres of the East Bay of Canyon Lake. This would also help prevent algae blooms and fish kills in downstream Lake Elsinore.

Lake Elsinore Aeration - This LESJWA project would be an in-lake aeration system and diffusion system to mix the existing oxygen in the lake throughout the water column. This project would play a key role in assuring that future fish kills in the lake are eliminated and that less phosphorus is released back into the water column, thus significantly reducing the possibility of algae blooms.

Nutrient Removal – EVMWD Railroad Canyon Water Reclamation Plant – This LESJWA project would increase nitrogen and phosphorous removal capacities at EVMWD's Railroad Canyon Water Reclamation Plant to obtain water quality objectives and nutrient levels sufficient to discharge into Lake Elsinore to improve water quality and stabilize lake levels. Due to high evaporation rates, the operation of Lake Elsinore is jeopardized through dropping lake levels. The use of highly treated effluent from EMWD and local wastewater treatment plants would allow this water to be used as replenishment water for Lake Elsinore. Since the effluent is high in nutrients, additional treatment is necessary to drop the nutrients to a level sufficient to avoid further exacerbating the algae problems within Lake Elsinore.

Nutrient Removal – EVMWD Regional Reclamation Treatment Facilities – This LESJWA project would increase nitrogen and phosphorous removal capacities at EVMWD's Regional Water Reclamation Plant to obtain water quality objectives and nutrient levels sufficient to discharge into Lake Elsinore to improve water quality and stabilized lake levels. Due to high evaporation rates, the operation of Lake Elsinore is jeopardized through dropping lake levels. The use of highly treated effluent from EMWD and local wastewater treatment plants would allow this water to be used as replenishment water for Lake Elsinore. Since the effluent is high in nutrients, additional treatment is necessary to drop the nutrients to a level sufficient to avoid further exacerbating the algae problems within Lake Elsinore.

Ortega Channel Detention/Desilting – This LESJWA and RCFCWCD project would construct a detention basin to settle out sediments in the Ortega Channel prior to entrance to Lake Elsinore, which is listed by the SWRCB as an "impaired" water body. By reducing nutrient rich sediments from entering Lake Elsinore, water quality would improve. This project also provides for recreational uses of the basin site.

Salt Creek Debris Basin – This LESJWA project would construct a retention basin that would collect debris from medium sized storm flows prior to entering Canyon Lake to avoid degradation of water quality and loss of lake capacity.

Salt Creek Detention/Desilting Basin – This LESJWA project would construct a detention basin to settle sediments from Salt Creek prior to entrance to Canyon Lake. The project would assist in improving lake water and maintaining reservoir capacity.

Upper Watershed Nutrient Control – This LESJWA project would provide improvements to the upper portions of the San Jacinto Watershed through construction of wetlands, levees, flood control structures, debris basins, and retention basins. Nutrient control in the upper watershed would improve water quality throughout the watershed, including Lake Elsinore at the bottom of the watershed.

Water Quality Feasibility Study – This LESJWA project would study the San Jacinto Watershed and identify various projects and controls measures to meet water quality objectives for the watershed.

Lake Elsinore Dredging – This LESJWA project would remove nutrient rich sediments in Lake Elsinore in order to avoid fish kills and improve the water quality of Lake Elsinore. This project would dredge the lake bottom and dispose of the contaminated spoils.

San Jacinto Watershed Detention/Desilting – This LESJWA project would construct basins to assist in settling out material coming from the San Jacinto River prior to entrance to Canyon Lake. This would assist in lake water quality improvement and maintain reservoir capacity.

CHAPTER 7 WATER RECYCLING

Recycled water has been used in the watershed for many years to supplement local and imported supplies. Water reclamation projects involve treating wastewater to a level that is acceptable and safe for many non-potable applications. As shown back in Table 2.2, approximately 60,000 AFY of recycled water is currently used to meet water needs such as landscape, agricultural irrigation, groundwater recharge, and commercial and industrial applications within the Santa Ana Watershed.

The largest use of recycled water in the Watershed is for groundwater recharge, primarily in OCWD. During summer months, the Santa Ana River becomes primarily an effluent dominated river. This effluent or recycled water coming from upstream water reclamation facilities flows through the Prado Dam and is diverted to the river recharge basins in Orange County. Also, many golf courses, cemeteries, schoolyards, parks, street medians, and freeways in the Santa Ana Watershed are irrigated with recycled water. Other reclamation projects in the watershed include innovative uses such as toilet flushing in high rise buildings and residential landscaping, as evidenced by recycled water programs in the Irvine Ranch Water District.

In 1993, the United States Department of the Interior Bureau of Reclamation (BOR), in conjunction with the California Department of Water Resources (DWR) and seven local agencies, adopted the Southern California Comprehensive Water Reclamation and Reuse Study (SCCWRRS) to evaluate the feasibility of regional water recycling in Southern California. The SCCWRRS called for a six year, six million dollar comprehensive effort to examine recycled water opportunities from a regional perspective and to develop a long-term planning strategy to enlarge recycled water supplies for Southern California. The study was completed in 2000 and the Draft Final Report published in April 2001.

The product of the SCCWRRS was the generation of a list of 34 short-term projects for implementation by 2010, as well as the development of a long-term regional recycling strategy for projects through 2040. The short-term projects have a total potential yield of approximately 451,500 AFY of additional recycled water. The long-term analysis determined that an additional 296,000 AFY of new demand could potentially be satisfied by the year 2040.

The Southern California Water Recycling Projects Initiative (SCWRPI) is a multiyear planning study that is funded on a 50/50 percent cost-sharing basis between the BOR, DWR, and ten local agencies. This study, titled the Southern California Water Recycling Projects Initiative, Phase I Final Report and Phase II Plan of Study, was completed in October 2001. The SCWRPI is composed of two major components, a project specific work component and a regional component. The project specific work component consists of identifying recycled water planning projects, including projects developed as a result of the SCCWRRS effort. After a list of projects was identified, project descriptions and type of services required for the projects were developed. The regional component consists of developing scopes of work for a public information and education program, financial support opportunities, and for regional concerns, including water quality, that need to be addressed.

Table 7.1 lists the wastewater treatment plants, currently producing over 525,000 AFY (469 MGD) of treated effluent, which are operated within the Santa Ana Watershed. Figure 7.1 shows the locations of these wastewater treatment plants within the watershed. The majority of that effluent comes from the two plants operated by the County Sanitation Districts of Orange County (CSDOC). These two CSDOC plants treat a total of 270,000 AFY (241 MGD) that is discharged into the Pacific Ocean. For the SAW overall, 166,000 AY (148 MGD) is discharged to the SAR and 64,700 AFY (58 MGD) is recycled for various uses.

The amounts shown in Table 7.1 were determined from the latest data provided by the individual agencies. For comparison purposes, the "Total Discharge to the Santa Ana River" from Table 7.1 for the year 2000 was compared with the 1999 – 2000 "Total Wastewater Discharged in Watershed" from Table 4 of the Thirteenth Annual Report of the Santa Ana River Watermaster for Water Year October 1, 1999 – September 30, 2000. The totals are 148 MGD and 154 MGD, respectively, or roughly within four percent of the other. Considering the slight time period offset, these two independent totals corroborate the accuracy of the data.

For the year 2010, the amount of wastewater discharged to the SAR is projected to drop 12 percent, while the recycled amount almost triples. Thereafter, for years 2025 and 2050 the projections increase at an aggressive, but more consistent rate. With the various agencies' projected increases in water recycling, Table 7.1 shows that the treated water discharged to the SAR is 146,000 AFY, 201,000 AFY, and 243,000 AFY for years 2010, 2025, and 2050 respectively – all well above the minimum flow of 42,000 AFY.

Note that Table 7.1 assumes conventional river discharge from single isolated facilities for the majority of the listed agencies. Not all facilities, however, are operated in this manner. For example, EMWD operates five plants serving an interconnected collection system that allows diversion of raw sewage to whichever combination of treatment plants offers the lowest operating costs. EMWD projects service area flows but does not use long-range projections of plant flows. EMWD has the option of discharging surplus recycled water to storage ponds where disposal occurs through incidental recharge or to Temescal Creek, which ultimately connects to the Santa Ana River. EMWD is working with LESJWA to develop an additional discharge option to provide recycled water for Lake Elsinore. If this option develops, the District will preferentially discharge to Lake Elsinore rather than Temescal Creek. All treated effluent is discharged into a recycled water distribution system that connects all five plants and over 6,000 AF of surface storage reservoirs. Technically, the Temecula Valley RWRF is not in the Santa Ana watershed; however, much of the recycled water is used in the Santa Ana watershed. If permits for live stream discharge to the Santa Margarita River are developed, the projected discharge to the Santa Ana River will be reduced.

The following 2010 projects, shown in Figure 7.2 and listed in Table ES.1, contribute to the IWRP's goal of increasing water recycling production, which results in a new dependable supply source, thus reducing the SAW's dependence on imported water.

Table 7.1
WASTEWATER TREATMENT FACILITIES' PRODUCTION AND DESIGN CAPACITIES IN THE SANTA ANA WATERSHED

				2000					2010				2025				2050			
OPERATING AGENCY	FACILITY NAME	TREATMENT LEVEL	DISPOSAL METHOD	AVG. DAILY FLOW (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)
City of Beaumont (ULS)	Beaumont WWTP #1	Tertiary	Stream	1.29	1.50	1.29	1.29	0.00	2.50	2.50	1.00	1.50	4.00	4.00	1.75	2.25	8.00	8.00	3.50	4.50
Big Bear Area Regional Wastewater Agency	BBARWWA	Sec./Ter.	Crop Irrigation	2.00	4.60	2.00	0.00	2.00	4.60	2.50	0.00	2.50	4.60	3.00	0.00	3.00	4.60	4.00	0.00	4.00
California Department of Corrections	Chino Institution for Men	Secondary	Not Provided	0.60	0.90	0.60	Not Provided	Not Provided	0.90	0.62	Not Provided	Not Provided	0.90	0.62	Not Provided	Not Provided	0.90	0.62	Not Provided	Not Provided
City of Colton	Colton WRF/RIX	Secondary	Ponds & Landscape	6.18	8.40	5.25	5.25	0.00	9.75	9.75	9.75	0.00	9.75	9.75	9.75	0.00	9.75	9.75	9.75	0.00
City of Corona	City of Corona WWTP #1A	Sec./Ter.	Ponds/Stream	5.50	5.50	5.50	5.50	0.00	5.50	5.50	2.50	3.00	5.50	5.50	2.50	3.00	5.50	5.50	2.50	3.00
City of Corona	City of Corona WWTP #1B	Tertiary	Stream & Landscape	6.00	9.00	6.00	5.75	0.25	6.00	6.00	0.00	6.00	6.00	6.00	0.00	6.00	9.00	9.00	0.00	9.00
City of Corona	City of Corona WWTP #2	Sec./Ter.	Ponds	3.00	3.00	3.00	0.00	0.00	3.00	3.00	0.00	3.00	3.00	3.00	0.00	3.00	3.00	3.00	0.00	3.00
City of Corona	City of Corona WWTP #3	Tertiary	Stream & Golf Course	0.28	1.00	0.28	0.14	0.14	2.00	2.00	0.00	2.00	3.00	3.00	0.00	3.00	3.00	3.00	0.00	3.00
City of Corona	**Total Corona**	**Sec./Ter.**	**Misc.**	**14.78**	**18.50**	**14.78**	**11.39**	**0.39**	**16.50**	**16.50**	**2.50**	**14.00**	**17.50**	**17.50**	**2.50**	**15.00**	**20.50**	**20.50**	**2.50**	**18.00**
Eastern Municipal Water District	Hemet/San Jacinto RWRF	Secondary	Ponds/Stream	*	11.00	*	*	*	12.00	*	*	*	12.00	*	*	*	12.00	*	*	*
Eastern Municipal Water District	Moreno Valley RWRF	Sec./Ter.	Ponds/Stream	*	24.00	*	*	*	16.00	*	*	*	16.00	*	*	*	16.00	*	*	*
Eastern Municipal Water District	Perris Valley RWRF	Sec./Ter.	Ponds/Stream	*	19.00	*	*	*	15.00	*	*	*	18.00	*	*	*	18.00	*	*	*
Eastern Municipal Water District	Sun City RWRF	Tertiary	Ponds/Stream	*	2.00	*	*	*	4.00	*	*	*	4.00	*	*	*	4.00	*	*	*
Eastern Municipal Water District	Temecula Valley RWRF	Tertiary	Ponds/Stream	*	10.00	*	*	*	10.00	*	*	*	15.00	*	*	*	15.00	*	*	*
Eastern Municipal Water District	**Total EMWD**	**Sec./Ter.**	**Misc.**	**32.76**	**66.00**	**32.76**	**0.90**	**20.54**	**57.00**	**44.43**	**3.60**	**27.20**	**65.00**	**61.13**	**8.90**	**40.20**	**65.00**	**61.13**	**8.90**	**40.20**
Elsinore Valley Municipal Water District	Horsethief Canyon WWTP	Tertiary	Green Belt	0.37	0.50	0.33	0.00	0.33	0.50	0.47	0.00	0.47	0.50	0.50	0.00	0.50	0.50	0.50	0.00	0.50
Elsinore Valley Municipal Water District	Railroad Canyon WWTP	Tertiary	Golf Course	0.93	1.20	0.85	0.00	0.85	1.50	1.20	0.00	1.20	1.50	1.30	0.00	1.30	1.50	1.30	0.00	1.30
Elsinore Valley Municipal Water District	Lake Elsinore Regional WWTP	Tertiary	Stream	3.80	4.00	3.77	3.77	0.00	8.00	7.20	2.00	5.20	16.00	12.00	2.00	10.00	16.00	12.00	2.00	10.00
Elsinore Valley Municipal Water District	**Total EVMWD**	**Tertiary**	**Misc.**	**5.10**	**5.70**	**4.95**	**3.77**	**1.18**	**10.00**	**8.87**	**2.00**	**6.87**	**18.00**	**13.80**	**2.00**	**11.80**	**18.00**	**13.80**	**2.00**	**11.80**
Inland Empire Utilities Agency	Regional Water Recycling Plant #1	Tertiary	Stream, Golf Course, Agric., & Recharge	39.60	44.00	41.30	37.40	1.91	44.00	35.00	13.80	40.20	52.00	44.00	22.30	52.70	60.00	59.00	41.50	62.50
Inland Empire Utilities Agency	Regional Water Recycling Plant #4	Tertiary	Stream & Golf Course	3.00	7.00	2.40	2.36	0.04	14.00	14.00			21.00	21.00			35.00	35.00		
Inland Empire Utilities Agency	Satellite Plants	Tertiary	Stream	Not Constructed					5.00	5.00			10.00	10.00			10.00	10.00		
Inland Empire Utilities Agency	Regional Water Recycling Plant #5	Tertiary	Stream, Golf Course, Agric., & Recharge	Not Constructed					15.00	14.00	17.50	8.50	30.00	29.00	30.30	10.70	30.00	30.00	36.60	13.40
Inland Empire Utilities Agency	Carbon Canyon Water Recycling Facility	Tertiary	Stream, Landscape, & Agric.	9.10	10.20	9.10	6.00	3.10	12.00	12.00			12.00	12.00			20.00	20.00		
Inland Empire Utilities Agency	Regional Water Recycling Plant #2	Tertiary	Stream	4.40	6.70	4.40	4.40	0.00	Phased Out				Phased Out				Phased Out			
Inland Empire Utilities Agency	**IEUA Total**	**Tertiary**	**Misc.**	**56.10**	**67.90**	**57.20**	**50.16**	**5.05**	**90.00**	**80.00**	**31.30**	**48.70**	**125.00**	**116.00**	**52.60**	**63.40**	**155.00**	**154.00**	**78.10**	**75.90**
Irvine Ranch Water District	Los Alisos Reclamation Plant	Sec. (Ocean), Ter. (Recl.)	Landscape & Ocean Discharge	4.80	7.50	4.80	0.00	1.20	7.50	7.50	0.00	7.50	7.50	7.50	0.00	7.50	7.50	7.50	0.00	7.50
Irvine Ranch Water District	Michelson WRP	Tertiary	Landscape & Ocean Discharge	13.00	18.00	13.00	0.00	11.00	18.00	18.00	0.00	15.50	33.00	33.00	0.00	28.00	33.00	33.00	0.00	28.00
Irvine Ranch Water District	**IRWD Total**	**Sec./Ter.**	**Misc.**	**17.80**	**25.50**	**17.80**	**0.00**	**12.20**	**25.50**	**25.50**	**0.00**	**23.00**	**40.50**	**40.50**	**0.00**	**35.50**	**40.50**	**40.50**	**0.00**	**35.50**
Lee Lake Water District	Butterfield Estates Sewage Treatment Plant	Secondary	Seepage Pits	0.07	0.08	0.07	0.00	0.07	0.08	0.07	0.00	0.07	0.08	0.07	0.00	0.07	0.08	0.07	0.00	0.07
Lee Lake Water District	California Meadows Sewage Treatment Plant	Secondary	Seepage Pits	0.06	0.09	0.06	0.00	0.06	0.09	0.06	0.00	0.06	0.09	0.06	0.00	0.06	0.09	0.06	0.00	0.06

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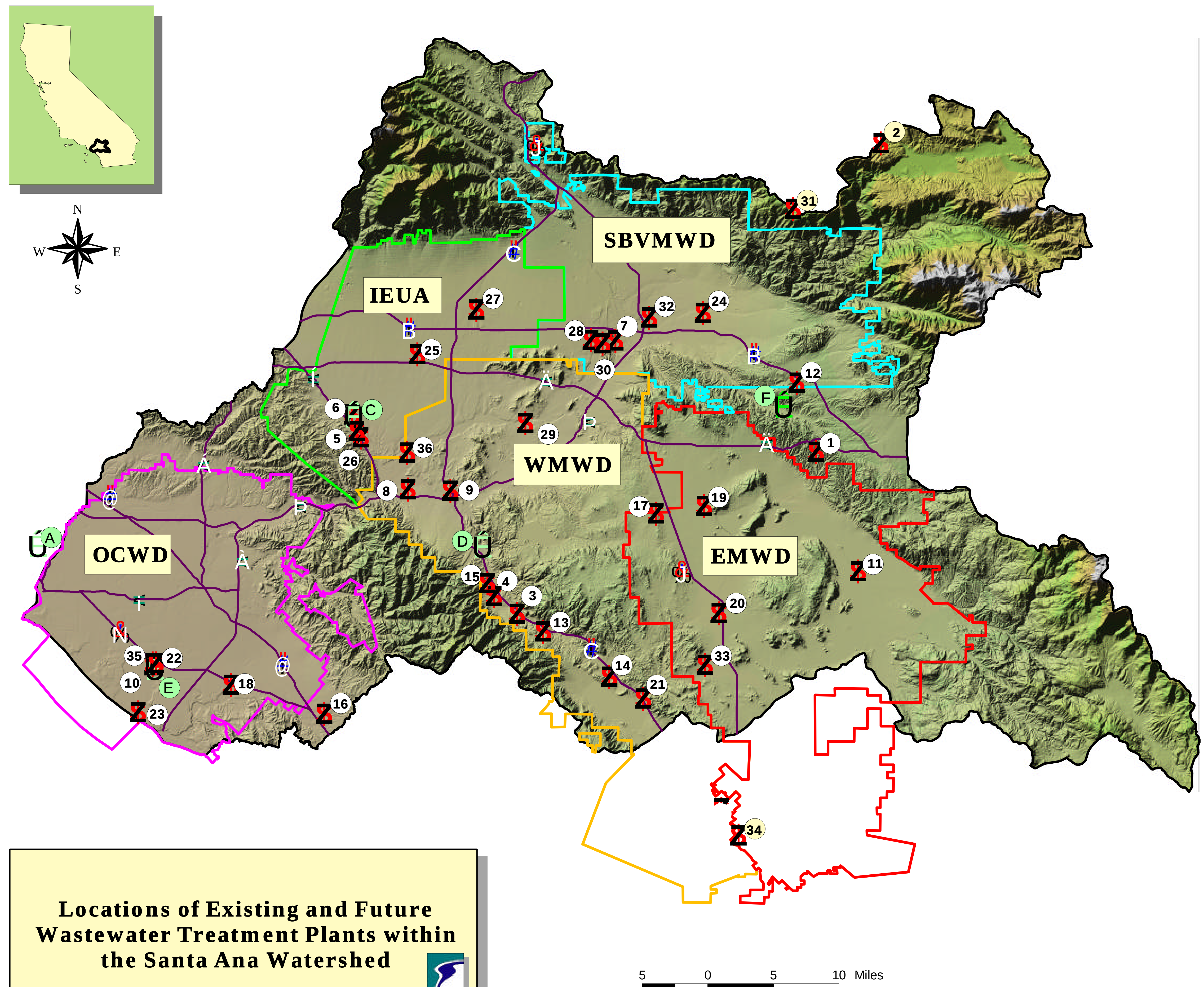
				2000					2010				2025				2050			
OPERATING AGENCY	FACILITY NAME	TREATMENT LEVEL	DISPOSAL METHOD	AVG. DAILY FLOW (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)
Lee Lake Water District	Lee Lake Wastewater Reclamation Facility	Tertiary	Stream	0.36	0.90	0.36	0.36	0.00	1.58	1.58	0.00	1.58	1.58	1.58	0.00	1.58	1.58	1.58	0.00	1.58
Lee Lake Water District	**LLWD Total**	**Sec./Ter.**	**Misc.**	**0.48**	**1.07**	**0.48**	**0.36**	**0.12**	**1.74**	**1.70**	**0.00**	**1.70**	**1.74**	**1.70**	**0.00**	**1.70**	**1.74**	**1.70**	**0.00**	**1.70**
Orange County Sanitation District	Reclamation Plant No. 1	Pri./Sec.	Ocean Discharge & OCWD GAP	90.00	90.00	90.00	0.00	**	184.00	184.00	0.00	***	208.00	208.00	0.00	****	236.00	236.00	0.00	****
Orange County Sanitation District	Treatment Plant No. 2	Pri./Sec.	Ocean Discharge	151.00	151.00	151.00	0.00	0.00	144.00	144.00	0.00	0.00	144.00	144.00	0.00	0.00	235.00	235.00	0.00	0.00
Orange County Sanitation District	**OCSD Total**	**Pri./Sec.**	**Misc.**	**241.00**	**241.00**	**241.00**	**0.00**	**0.00**	**328.00**	**328.00**	**0.00**	**0.00**	**352.00**	**352.00**	**0.00**	**0.00**	**471.00**	**471.00**	**0.00**	**0.00**
Orange County Water District	Green Acres Project (GAP)	Tertiary	Landscape & Industrial	7.25	7.50	7.12	0.00	7.12	13.50	8.00	0.00	8.00	13.50	8.75	0.00	8.75	13.50	8.75	0.00	8.75
Orange County Water District	Water Factory 21	Tertiary	Seawater Barrier	6.00	15.00	7.73	0.00	7.73	Phased Out				Phased Out				Phased Out			
Orange County Water District	**OCWD Total**	**Tertiary**	**Misc.**	**13.25**	**22.50**	**14.85**	**0.00**	**14.85**	**13.50**	**8.00**	**0.00**	**8.00**	**13.50**	**8.75**	**0.00**	**8.75**	**13.50**	**8.75**	**0.00**	**8.75**
Orange County Water District/Orange County Sanitation District	Groundwater Replenishment System (GWRS)	Tertiary	Groundwater Replen.	Not Constructed					130.00	70.00	0.00	70.00	130.00	70.00	0.00	130.00	130.00	70.00	0.00	130.00
City of Redlands	Redlands WWTP	Secondary	Not Provided	6.00	9.00	6.00	5.80	0.20	9.00	6.00	5.80	0.20	9.00	6.00	5.80	0.20	9.00	6.00	5.80	0.20
City of Rialto (OMI)	City of Rialto WWTP	Tertiary	Composting	7.00	10.70	6.80	6.80	0.00	10.70	7.00	5.00	2.00	15.70	9.50	4.50	5.00	15.70	9.50	4.50	5.00
City of Riverside	Riverside Regional Water Quality Control Plant	Tertiary	Stream/Golf Course	31.82	40.00	31.82	31.70	0.12	40.00	35.00	30.50	4.50	40.00	35.00	26.10	8.90	40.00	35.00	26.10	8.90
Running Springs Water District	Running Springs	Secondary	Ponds & Irrigation	0.55	1.00	0.55	0.00	0.55	1.00	0.65	0.00	0.65	1.00	0.75	0.00	0.75	1.00	0.85	0.00	0.85
City of San Bernardino	San Bernardino WRP/RIX	Sec./Ter.	Not Provided	25.00	25.00	25.00	25.00	0.00	33.00	33.00	33.00	0.00	60.00	60.00	60.00	0.00	60.00	60.00	60.00	0.00
Water Conservation District	Alamitos Barrier Recycled Water Project	Advanced Water Treatment	Seawater Barrier	Not Constructed					8.00	7.00	0.00	7.00	8.00	7.00	0.00	7.00	8.00	7.00	0.00	7.00
Western Municipal Water District	Western Riverside County Regional WWTP	Pri./Sec./Ter.	Stream	2.70	8.00	2.50	2.50	0.00	8.00	4.40	3.30	1.10	16.00	9.10	4.50	4.60	32.00	31.00	15.50	15.50
Western Municipal Water District	March Air Reserve Base WWTP	Pri./Sec.	Golf Course & Cemetery	0.33	1.00	0.33	0.00	0.33	5.00	2.00	0.00	2.00	5.00	5.00	0.00	5.00	5.00	5.00	0.00	5.00
Western Municipal Water District	**WMWD Total**	**Pri/Sec./Ter.**	**Misc.**	**3.03**	**9.00**	**2.83**	**2.50**	**0.33**	**13.00**	**6.40**	**3.30**	**3.10**	**21.00**	**14.10**	**4.50**	**9.60**	**37.00**	**36.00**	**15.50**	**20.50**
Yucaipa Valley Water District	H.N. Wochholz WWTP	Tertiary	Stream & Agric.	3.50	4.50	3.50	3.25	0.25	8.00	6.30	2.30	4.00	10.00	7.00	0.70	6.30	10.00	8.00	0.00	8.00
Yucaipa Valley Water District	Oak Valley WWTP	Tertiary	Stream & Agric.	Not Constructed					Not Constructed				3.00	1.20	0.00	1.20	3.00	2.50	0.00	2.50
Yucaipa Valley Water District	**YVWD Total**	**Tertiary**	**Misc.**	**3.50**	**4.50**	**3.50**	**3.25**	**0.25**	**8.00**	**6.30**	**2.30**	**4.00**	**13.00**	**8.20**	**0.70**	**7.50**	**13.00**	**10.50**	**0.00**	**10.50**
Totals					**562.77**	**469.46**	**148.17**	**57.78**	**812.69**	**699.72**	**130.05**	**224.92**	**950.19**	**839.30**	**179.10**	**350.55**	**1122.19**	**1028.60**	**216.65**	**383.30**

*This spreadsheet assumes conventional river discharge from single isolated facilities. EMWD operates five plants serving an interconnected collection system that allows diversion of raw sewage to whichever combination of treatment plants offers the lowest operating costs.
**7.12 MGD to OCWD GAP and 7.73 MGD to OCWD Water Factory 21.
***8.00 MGD to OCWD GAP and 70.00 MGD to OCWD GWRS
****8.75 to OCWD GAP and 130.00 MGD to OCWD GWRS

Total Increases Compared with Year 2000

	2000				2010				2025				2050			
	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)	DESIGN CAP. (MGD)	TOTAL PROD. (MGD)	DISCH. TO SANTA ANA RIVER (MGD)	RECL. AMOUNT (MGD)
Totals	**563**	**469**	**148**	**58**	**813**	**700**	**130**	**225**	**950**	**839**	**179**	**351**	**1122**	**1029**	**217**	**383**
Percentage Increase	**0%**	**0%**	**0%**	**0%**	**44%**	**49%**	**-12%**	**289%**	**69%**	**79%**	**21%**	**507%**	**99%**	**119%**	**46%**	**563%**



Locations of Existing and Future Wastewater Treatment Plants within the Santa Ana Watershed

LEGEND

Existing Wastewater Treament Plant

1 Beaumont WWTP Plant #1
2 Big Bear Area Regional WWA Plant
3 Butterfield Sewage Treatment Plant (LLWD)
4 California Meadows Sewage Treatment Plant (LLWD)
5 Carbon Canyon WRF (IEUA)
6 Chino Institution For Men
7 City of Colton Water Reclamation Facility
8 City of Corona WWTP # 1
9 City of Corona WWTP # 2
10 Green Acres Project (OCWD)
11 Hemet/San Jacinto RWRF (EMWD)
12 Henry N. Wocholz WWTP (YVWD)
13 Horsethief Canyon WWRF (EVMWD)
14 Lake Elsinore Regional WWRF (EVMWD)
15 Lee Lake Water Reclamation Facility (LLWWD)
16 Los Alisos Reclamation Plant (IRWD)
17 March Air Reserve Base WWTP (WMWD)
18 Michelson WRP (IRWD)
19 Moreno Valley RWRF (EMWD)
20 Perris Valley RWRF (EMWD)
21 Railroad Canyon Regional WWTP (EVMWD)
22 Reclamation Plant #1 (OCSD)
23 Reclamation Plant #2 (OCSD)
24 Redlands WWTP
25 Regional Water Recycling Plant #1 (IEUA)
26 Regional Water Recycling Plant #2 (IEUA)
27 Regional Water Recycling Plant #4 (IEUA)
28 Rialto WWTP
29 Riverside Regional WQCP
30 RIX (City of SB and City of Colton)
31 Running Springs
32 San Bernardino WRP
33 Sun City RWRF (EMWD)
34 Temecula Valley RWRF (EMWD)
35 Water Factory #21 (OCWD)
36 Western Riverside County WWTP (WMWD)

Future Wastewater Treatment Plant

A Alamitos Barrier Recycled Water Project (WRD)
B Satellite Plants - Location TBD (IEUA)
C Regional Water Recycling Plant #5 (IEUA)
D City of Corona WWTP #3
E Groundwater Replenishment System (OCWD and OCSD)
F Oak Valley WWTP (YVWD)

Water Districts

EMWD
IEUA
OCWD
SBVMWD
WMWD

Figure 7.1

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2002 Integrated Water Resources Plan

2010 Water Recycling Projects in the Santa Ana Watershed

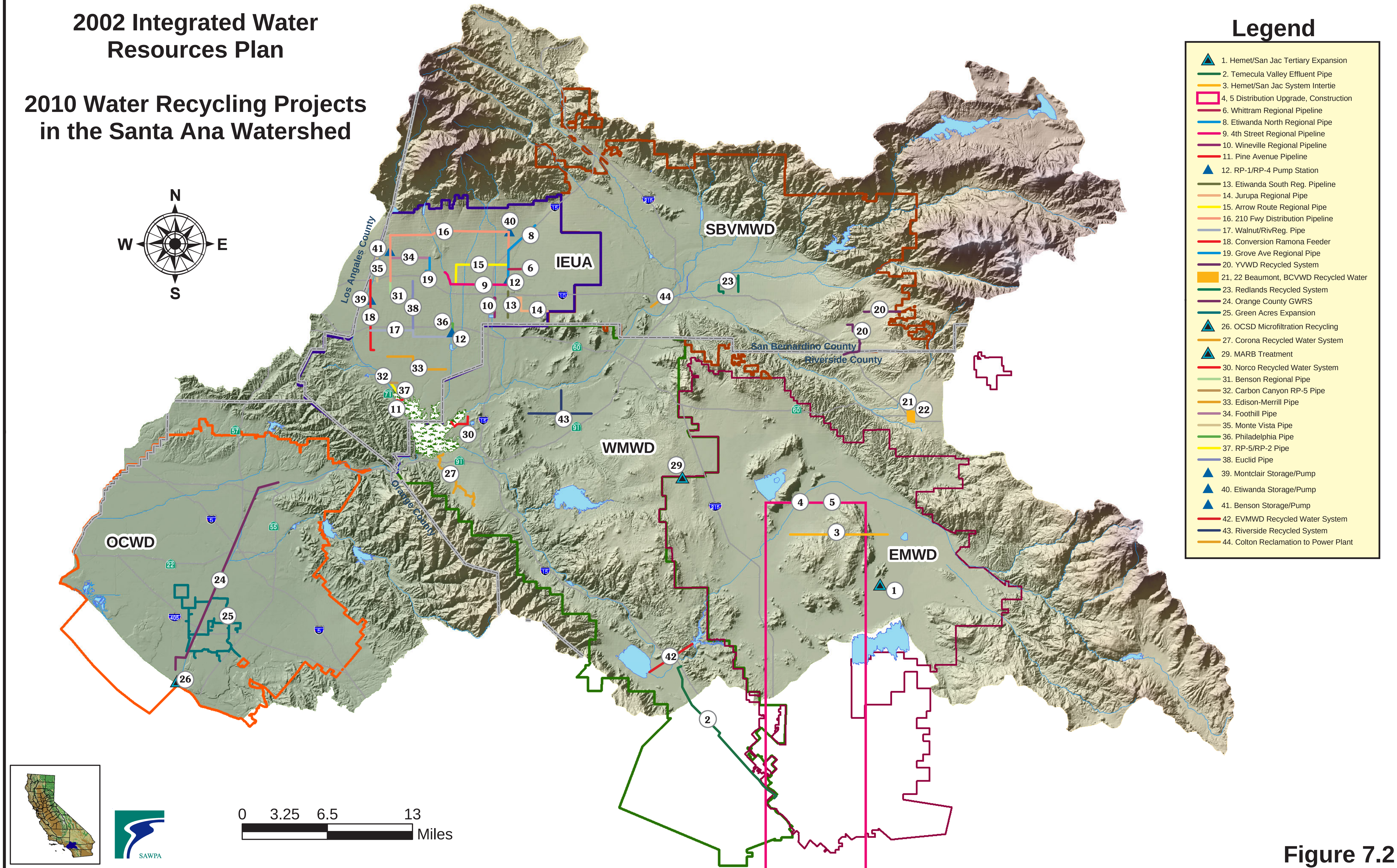


Figure 7.2

7.1 Eastern Municipal Water District

In the year 2000, EMWD produced 23,000 AF of treated wastewater for a variety of recycled water customers, including agricultural irrigators, golf courses, municipal irrigators (schools, parks, and greenbelts), as well as major environmental customers such as the State of California Department of Fish and Game Service's operation of the San Jacinto Wildlife Area. EMWD completed an updated 1997 Recycled Water Master Plan, which included major new recycled water projects such as landscape irrigation of major recreational land uses planned for MWD's Diamond Valley Lake Reservoir, potential use of recycled water for stabilizing and replenishing Lake Elsinore, and expanded use for industrial and municipal purposes.

Regional activities include participation in the Southern California Comprehensive Water Reclamation Study in conjunction with the U.S Bureau of Reclamation, Metropolitan Water District of Southern California, and the Santa Ana Water Project Authority. EMWD has implemented a Recycled Water Advisory Committee consisting of existing customers and staff from the cities and subagencies served by EMWD. This committee meets on an as needed basis and provides input to EMWD on issues ranging from pricing to facility planning and regulatory compliance.

EMWD is responsible for all wastewater collection and treatment within its service area and operates five regional water reclamation facilities (RWRF) treating over 32 MGD of wastewater. Wastewater flows are anticipated to increase to 61 MGD by the year 2025. The following briefly describes capacity and types of treatment for each facility:

Hemet/San Jacinto RWRF – This facility is an 11 MGD conventional activated sludge plant with the following unit processes: screening, primary sedimentation, aeration, secondary sedimentation, anaerobic digestion, and chlorine disinfection.

Moreno Valley RWRF – This facility has two separate treatment plants consisting of the following processes:

- Old Plant – 9.0 MGD of conventional activated sludge, including: screening, primary sedimentation, aeration, secondary sedimentation, and anaerobic digestion. This facility is being retrofitted to provide biological nitrification and denitrification.
- New Plant – 7.0 MGD Bardenpho process designed for high-level biological removal of nitrogen and phosphorus. Unit processes include: screening, aeration, secondary sedimentation, followed by tertiary treatment (coagulation, flocculation, filtration) and chlorine disinfection.

Sun City RWRF – This facility is a 3.0 MGD conventional activated sludge plant and is currently out of service. Service area flows are being transferred to the Perris Valley RWRF in order to reduce treatment costs. This facility will be placed back into service at such time that additional treatment capacity is required. Unit processes include: grit removal/comminution, primary sedimentation, aeration, secondary sedimentation, aerobic digestion, tertiary treatment (coagulation, flocculation, filtration), and chlorine disinfection.

Perris Valley RWRF – This facility has two separate treatment plants consisting of the following processes:

- Old Plant – 2.0 MGD extended aeration activated sludge with the following unit processes: grit removal/comminution, aeration, secondary sedimentation, and sludge thickening.
- New Plant – 7.0 MGD Bardenpho process designed for high level biological removal of nitrogen and phosphorus. Unit processes include: screening, aeration, secondary sedimentation, tertiary treatment (coagulation, flocculation, filtration), and chlorine disinfection.

Temecula Valley RWRF – This facility consists of an 8.0 MGD retrofitted A2O process designed for mid-level nitrogen and phosphorus removal and 10.0 MGD of advanced tertiary capacity designed for nutrient polishing as well as pathogen removal. Unit processes include: grit removal/comminution, primary sedimentation, aeration, secondary sedimentation, anaerobic digestion, upflow denitrification towers, tertiary treatment (coagulation, flocculation, tertiary sedimentation, filtration), and chlorine disinfection.

All treated wastewater is discharged into the District's regional recycled water distribution system. EMWD has developed over 135 miles of major regional transmission pipelines, which connect all five of the District's RWRFs, providing an extremely flexible recycled water delivery system. In conjunction with over 500 acres of surface storage reservoirs (2,000 MG capacity) these pipelines allow the District to sell over 70% of the treated wastewater produced in its service area. The balance of the plant flow is lost to incidental groundwater recharge during winter storage when demands for recycled water are minimal.

7.1.1 Projects: 2010

Hemet/San Jacinto Regional Water Reclamation Facility (RWRF) Tertiary Expansion – This project would upgrade the Hemet/San Jacinto RWRF facility to full tertiary treatment in order to maintain existing levels of water recycling. The Hemet/San Jacinto RWRF is the only one of the District's five treatment plants that does not provide full tertiary treatment. Proposed regulatory changes will require the elimination of storage and disposal ponds in and around the plant. This would allow expanded uses of recycled water in the Hemet/San Jacinto area as well as integration of recycled water use into the Groundwater Management Plan currently being developed by water users in the Hemet/San Jacinto Valley.

Temecula Valley Regional Water Reclamation Facility (TVRWRF) Effluent Pipeline - This project would connect the TVRWRF to the District's outfall pipeline, located near Lake Elsinore. The project would allow surplus recycled water from the plant to be used for replenishment and stabilization of Lake Elsinore, thus helping to solve a regional water supply problem. The TVRWRF currently has no outfall for the disposal of surplus recycled water except through a 24" pipeline that connects the plant to regional transmission facilities in the San Jacinto Watershed. Growth in plant flows will soon exceed existing system intertie capacity. Facilities needed include over 12 miles of 36" + pipeline and a major pump station.

Hemet/San Jacinto Regional Water Reclamation Facility (RWRF) System Intertie - This project would allow the use of significant amounts of recycled water in lieu of imported water and would complete the operational "looping" of the District's recycled water distribution system for the Hemet/San Jacinto area. Once the Hemet/San Jacinto RWRF is upgraded to tertiary treatment, the District would have the ability to connect the plant to existing pipelines serving the growing areas of southwest Hemet and MWD's Diamond Valley Lake Recreation area. Facilities needed include five miles of 24"+ pipeline and pumping facilities.

Distribution System Upgrade - This project would construct up to four steel storage tanks ranging from 1 to 3 MG and would provide the "on-demand" level of service required for expanded municipal recycled water use. The District's water recycling distribution system currently lacks the elevated operational storage necessary to establish pressure zones and provide the consistent flow and pressure control needed for planned municipal uses of the system.

Distribution Pipeline Construction - This project would focus delivering recycled water to municipal customers, such as golf courses, parks, schools, green belt areas, etc., which would otherwise utilize imported potable water. The District has identified a series of small to medium pipeline projects needed to expand deliveries of recycled water as growth increases treatment plant flows. These facilities indirectly conserve potable water and reduce pressure on imported water supplies.

EMWD Recycled Water Masterplan – This project would reevaluate facility requirements and costs, update the recycled water master plan, and develop environmental documentation required for system upgrades. The current recycled water system is designed primarily for delivery to large scale agricultural customers. Much of the system operates at gravity flow and lacks positive control of flow and pressure. EMWD's existing master plan identifies concepts for upgrading distribution capabilities to a level suitable for increased municipal use by establishing pressure zones through the construction of storage reservoirs and booster stations.

7.2 Inland Empire Utilities Agency

Completed in January 2002, IEUA's Recycled Water System Feasibility Study does the following:

- Describes the importance of water recycling in an effective water resources management program
- Updates IEUA's existing Recycled Water Master Plan
- Expands water recycling efforts to reflect local/regional needs and state and federal requirements
- Integrates water conservation efforts and water quality requirements into recycled water systems planning
- Identifies and evaluate the potential recycled water market
- Identifies and prioritize project timing and phasing components of a proposed IEUA Regional Recycled Water Distribution System
- Develops a financing plan for implementing the Regional Recycled Water Distribution System

Recognizing that water recycling is a critical component of an effective regional water resources management strategy, IEUA has implemented an aggressive water recycling program. In the future, water recycling will help to "drought proof" the Basin and to help achieve the objectives of the OBMP. Use of recycled water for groundwater recharge has been made an integral part of the Chino Basin Watermaster "Peace Agreement" implementing the OBMP. Water recycling is also an important part of IEUA's Urban Water Management Plan Year 2000 Update. Construction of recycled water projects across the IEUA service area protect and enhance the safe yield and ground water quality of the Chino Basin.

The needs for the proposed recycled water program are identified as follows:

- To reduce the salt load and improve the water quality of the Chino Basin and Santa Ana River
- To provide a more dependable local water supply and to reduce the likelihood of water rationing during future droughts
- To lower the anticipated costs of water and sewer rates to customers
- To create incentives to attract new businesses and industries, thereby creating new jobs

IEUA's Regional Recycled Water System Program would interconnect IEUA tertiary wastewater water reclamation plants RP – 1, 2, 4, 5 (under construction), and Carbon Canyon Water Recycling Facility. Together, these plants have a current total capacity of approximately 60,000 AFY, which is projected to increase to over 120,000 AFY by 2025. IEUA would also work with cities and new developments to ensure that all non-potable irrigation and industrial uses are dual plumbed for recycled water.

The additional recycled water distribution facilities would provide additional water resources for the irrigation of green spaces, golf courses, agricultural, and industrial process needs throughout the reclamation plants' service areas. This program would quickly provide an additional source of high-quality water for immediate uses, as well as provide for economic incentives for near-term economic development. Benefits of limiting the future demand on local potable water wells, imported water supplies, and distribution pipelines would also accrue, while drought protection would be enhanced as well.

The four existing wastewater water reclamation plants receive wastewater from the Regional Sewerage Service System within IEUA's 242 square miles service area. A system of regional trunk and interceptor sewers, owned and operated by IEUA, convey sewage to the plants. Local sewer systems are owned and operated by local agencies. The IEUA regional sewerage system is constructed in a manner that wastewater can be diverted from one RWRP to another, thereby avoiding overloading any one facility.

The four plants produce a tertiary treated recycled water that complies with California's Title 22 regulations. RP-1 and RP-4, and RP-2 coupled with the Carbon Canyon Water Recycling Facility (CCWRF) presently form the basis and resources for the two separate recycled water distribution systems: the northern system consisting of the RP-4/RP-1 outfall lines and the southern system delivering water from the CCWRF. The water quality from these plants is outstanding, with an average level of total dissolved solids (TDS) typically below 450 milligrams per liter (mg/L) and a total nitrogen level less than 10 mg/L (SAR Basin Plan 9 objectives TDS: 700 mg/L and TIN: 10 mg/L). A fifth plant, RP-5, is under construction and is expected to be on line by the end of 2002.

7.2.1 Projects: 2010

City of Ontario Recycled Water Masterplan - This project would ultimately lead to constructing facilities, including transmission mains and individual services connecting to the IEUA regional lines. One of the projects includes the potential use of source water from a groundwater extraction/treatment facility within the City. The project includes three phases. The first is to develop a comprehensive recycled water master plan. The second, based on the feasibility study included in the master plan, will designate priority projects for final design. The third phase is the construction of these projects. Total project yield would be 12,000 AFY.

Regional Plant No. 5 - This new facility is projected for startup in the year 2002 and will replace RP-2. The facility will be constructed in phases; the first phase will be 15 MGD. Certain components of the RWRP-2 facility will be incorporated into the new facility. The two digesters built to accommodate solids from Carbon Canyon facility were constructed at an elevation high enough to avoid the impact of raising the Prado Dam a projected 20 feet. The two new digesters and some piping will be used in the new facility.

Whittram Avenue Regional Pipeline – This project would construct a 16 inch and 12 inch diameter pipeline, 8,630 LF, extending eastward along Whittram Avenue. The pipeline would be fed off the North Etiwanda Pipeline between 7th Street and Arrow Route and distribute recycled water for recharge in Hickory Basin and Banana Basin, plus irrigation water to the California Speedway in the City of Fontana. Recycled water pumped north from RP-4 would flow east through the Whittram Avenue Regional Pipeline to the Hickory and Banana Basins (10 acres and 11 acres, respectively), where up to 2,000 AFY could be used as groundwater recharge. One short local lateral serving the California Speedway, delivering an estimated 430 AFY, is projected for service from the pipeline.

Interim Groundwater Recharge Project – Etiwanda Conservation Basins Pipeline – This project would construct a pipeline to the Etiwanda Conservation Basins, located in the SCE power corridor along Etiwanda Avenue between Valley Boulevard and San Bernardino Avenue, which is only a short distance (less than 0.125 mile) from the RP-1 outfall line to the groundwater recharge basins. A decision to make a single tap into the outfall line or a series of four taps for every two basins will be decided in the final design. The lateral pipeline(s) will deliver 800 to 1,100 AFY of recycled water.

Etiwanda North Distribution Line, Segment I, Phase I – This project would be constructed in four segments during Construction Phases I and II. The first reach, Construction Phase I (2001 – 2003), a 48-inch pipeline extending 5,873 LF would extend northward from the RP-4 outfall to Arrow Route for the short-term Phase I. The Arrow Route pipeline and the Fourth Street distribution pipelines would be connected to this section of the North Etiwanda pipeline and deliver recycled water from the east side of the service area to the western boundary of IEUA within pressure zone No. 3. The next three reaches, constructed during Phase II (2003 – 2004), of the Etiwanda North pipeline would eventually be extended northward within the next 4 years delivering recycled water to all northern pressure zones. The 210 Freeway Pipeline, Construction Phase IV (2006 - 2010) would be connected to the Etiwanda North pipeline immediately north of 14th street and Etiwanda Avenue. Both the 210 Freeway and North Etiwanda pipeline with deliver water to groundwater recharge basins in the upper Basin.

Fourth Street Regional Pipeline, Segment I – This 30 inch diameter 39,900 LF pipeline would be a primary delivery pipeline for recycled water to centrally located industries and businesses. This pipeline would also allow delivery to the six sets of groundwater recharge basins in the central area of the Chino Basin.

The Fourth Street Regional Pipeline would be constructed in two segments during the construction periods of Phase I (2001 – 2003) and Phase II (2003 - 2004). The Arrow Route Regional Pipeline and Fourth Street Regional Pipeline, Segment II, to be described later, would be coupled with the Fourth Street Pipeline, Segment I.

Wineville Avenue Regional Pipeline – This 16 inch diameter pipeline extends 7,856 LF and would deliver recycled water to Inland Paperboard and Packaging, Inc., a large industrial recycled water customer. The corporation will use 1,200 AFY of recycled water. Additionally, several other smaller customers will receive service directly off the Wineville pipeline. Recycled water will also be recharged in the Wineville Basin via the Wineville Avenue Regional Pipeline.

Pine Avenue Intertie Pipeline – This 16 inch pipeline, extending 3,000 LF, is the last segment, completing the connection tying together the existing north and south recycled water systems, joining the two systems together in pressure zone No. 1. The intertie will deliver water from the RP-1/RP-4 distribution line to the RP-5/RP-2 Regional Pipeline connecting to the Carbon Canyon facility recycled water system. The regional pipeline serves as part of the intertie system of the existing north and south systems.

Regional Plant No. 1/Regional Plant No. 4 Regional Recycled Water Pump Station, Phase I – This project would construct a regional recycled water pump station for IEUA. The Regional RP-1 and RP-4 pumping stations will serve as the primary pumping stations for delivery of recycled water throughout the north IEUA and central service area, with some recycled water being delivered from RP-1 to the IEUA southern service area. The RP-1 pumping station, located at an elevation of 800 feet will deliver recycled water to the central service area. The initial stage will have three 400 hp pumps and eventually be expanded to six pumps as the recycled water flow increases. The capacity of each pump will be 2,700 GPM. Phase I pumping capacity will deliver an estimated 13,070 AFY. With full build-out of the pump station with six pumps, pumping at full capacity will equal 26,140 AFY. Capacity at the RP-1 facility is projected to reach 60 MGD or 67,233 AFY by the year 2020. RP-1 is not expected to increase in capacity beyond 60 MGD in the future.

The RWRP-4 pumping station, located at an elevation of 1,080 feet will deliver recycled water to the northern service area. The initial stage will have two 200 hp pumps and will be expanded to four pumps or more depending upon the recycled water flows treated at this facility. The capacity of each pump will be 2,700 gpm. With two pumps, Phase I pumping capacity will deliver an estimated 8,712 AFY at full capacity. With full build-out of the pump station with six pumps, pumping at full capacity will equal 26,140 AFY. Major expansion is expected at RWRP-4, with ultimate capacity reaching 21 MGD or 23,532 AFY by the year 2020. By the year 2050, it is estimated that the facility will be increased to 48 MGD, producing 53,790 AFY of Title 22, full contact recycled water.

Regional Water Recycling Plant No. 1/ Regional Water Recycling Plant No. 4 Pump Station – Heart of the Regional System – This regional system would construct pump station facilities with the capacity to deliver 50,000 to 60,000 AFY of recycled water to all areas of the IEUA service area. Pumps would be added to the respective stations as increased demand expands over the next 10 years throughout the IEUA service area and to some agencies outside the IEUA service area but within the Chino Basin.

Booster Station at Regional Water Recycling Plant No. 4 – This project would be located at RP-4 in order to pressurize the Fourth Street Regional Pipeline system and to serve Ontario-15, Ontario-8, and CCWD-1 Local Laterals, and ultimately to serve Ontario-6, Ontario-7, Ontario-11, Ontario-12, Upland-1, Upland-2, CCWD-6, Montclair-1, and Montclair-3. The pump station would deliver 10,800 GPM.

Booster Station at Regional Water Recycling Plant No. 5 - This project would be located at RP-5 in order to pressurize the discharge from the plant pressurize the CCWRF/RWRP-5 Intertie Pipeline. The pump station would deliver 8,000 gpm.

Jurupa Regional Pipeline – This 20 inch and 16 inch diameter pipeline is an extension off of the Etiwanda South Regional Pipeline. The pipeline would extend eastward along Slover Avenue to Mulberry Avenue and turns southward on Mulberry, then east along Jurupa Avenue to the RP-3 Groundwater Recharge Basins. The pipeline would deliver 1,646 AFY of recycled water to the Fontana-3 local lateral and to the RP-3 site. Additionally, excess storm water captured in the

Jurupa Basin, and imported water collected therein, would be pumped to the RP-3 Groundwater Recharge Basins via the Jurupa Regional Pipeline for recharge to the aquifer.

Grove Avenue Regional Pipeline – The construction of this project would draw recycled water from the 12 inch diameter Fourth Street Regional Pipeline, Segment II. The Grove Avenue Regional Pipeline would connect to the Fourth Street Regional Pipeline just south of 6th Street in the City of Ontario and extend northward, serving CCWD and the City of Upland. The Grove Avenue pipeline would deliver recycled water to the 7th and 8th Street Recharge Basins, as well as provide water to CCWD lateral No. 6 and to the City of Upland's lateral No. 1. A combined total of 1,727 AFY would be delivered to recycled water customers and to the two basins for groundwater recharge. Eventually, the Grove Avenue pipeline would interconnect with the proposed Foothill Regional Recycled Water Pipeline that extends over to the Benson Avenue Pipeline, scheduled for construction in Phase V, (2006-2010). The Grove Avenue Regional Pipeline is proposed for construction in 2003 – 2004.

Philadelphia Avenue Regional Pipeline – This project would construct a 16 inch diameter pipeline extending 6,285 LF that would replace the existing gravity line used to recharge Ely Basin No. 3, thus increasing the total recharge capacity to 2,800 AFY from the current 500 AFY. The pipeline would also be used to serve the new Ontario soccer fields, which the City of Ontario is planning, plus, a new Kaiser Hospital building just south of Ely Basin No. 3 and north of SR-60 Freeway, as well as other potential new customers located along Hellman Street (including Maglite Industries).

Carbon Canyon Water Recycling Facility/Regional Water Recycling Plant No. 5 Intertie Pipeline - This 30 inch diameter pipeline would extend 8,751 LF and connect the existing north and south recycled water systems, joining the two systems together in pressure zone No. 1, MZ-3. The intertie would be part of the intertie between the RP-1/RP-4 facilities, and would serve as a supplemental supply to the CCWRF and the new RP-5 facility, assuring a continuous uninterruptible supply of recycled water to the cities of Chino and Chino Hills. The regional pipeline serves as part of the intertie system of the existing north and south systems. No local laterals are projected for service from the pipeline. The line will have capacity to deliver 6,175 AFY of recycled water to the two cities.

Regional Water Recycling Plant No. 5/ Regional Water Recycling Plant No. 2 Intertie Pipeline - This 12 inch diameter pipeline would extend 6,345 LF and connect the interconnection of the existing north and south recycled water systems together in pressure zone No. 1. The intertie would deliver water from the new RP-5 facility to the CCWRF recycled water system. The regional pipeline serves as part of the intertie system of the existing north and south systems. No local laterals are projected for service from the RP-5/RP-2 Regional Pipeline. The line would have capacity to deliver 3,385 AFY of recycled water to both Chino and Chino Hills.

Fourth Street Regional Pipeline, Segment II – This project is an extension of the Fourth Street Regional Pipeline, Segment I pipeline to the Turner Basins. The Fourth Street Regional Pipeline would be a 24 inch diameter pipeline, extending westward 32,315 linear feet from the Turner Basins to Ramona Avenue on the west side of the IEUA service area. The Fourth Street

Regional Pipeline, Segment II, is proposed for construction in 2003 – 2004. The completion of the Phase II pipeline will convey recycled water to the west side of the IEUA service area.

Etiwanda North Distribution Line, Segment II – This pipeline would be an extension of the Phase I pipeline that ended at the Reliant Energy, Etiwanda Power Generating Facility. The Etiwanda North Distribution Pipeline, Segment II, would be a 36 inch diameter 5,912 LF section, extending northward to the southeast diagonal of the I-15 Freeway. The third extension, a 24 inch diameter 3,325 LF section, extends from I-15 north to Baseline Avenue and serving the CCWD-13 lateral. The fourth and final section is a 24 inch diameter 11,469 LF section reaching to the San Sevaine Basins in the foothills of the San Gabriel Mountains. The Segment II pipeline would distribute recycled water to the future 210 Freeway pipeline, the CCWD 13 local lateral, and the Fontana-1 local lateral, as well as the San Sevaine Recharge Basins, the Victoria Basin and Lower Day Basin. The future 210 Freeway pipeline would deliver recycled water from the upper east side of the IEUA service area to the Agency's western boundary within pressure zones Nos. 2 and 3.

This project is proposed for construction in 2003 - 2004 with initial delivery of recycled water planned for the summer of 2003. The pipeline would deliver an estimated 7,567 AFY of recycled water for groundwater recharge and irrigation. The completion of the Segment II pipeline would convey recycled water to the upper most northern IEUA service area.

Monte Vista Regional Pipeline – This pipeline, located in MZ-1, would extend northward from the Sixth Street Pipeline or the new Central Regional Recycled Water Pipeline, to deliver recycled water to the College Heights Basin, Upland Basin, and the four Montclair Basins. The pipeline would deliver 6,424 AFY of recycled water to the three basins. No local service laterals are scheduled for connection to the Monte Vista Regional Pipeline. The Monte Vista Regional Pipeline is proposed for construction in 2003 – 2004.

Etiwanda South Regional Pipeline - This 18 inch diameter 7,880 LF pipeline would connect to the RP-4 outfall line at Inland Empire Avenue and extend southward to Marlay Avenue. The pipeline would deliver 351 AFY of recycled water to the Ontario I-10 local lateral and to the Jurupa Regional Pipeline, which in turn would deliver recycled water to the Jurupa Basin and to the Fontana - 3 and Fontana -4 local laterals. The Etiwanda South Regional Pipeline is proposed for construction in 2004 – 2006.

Arrow Route Regional Pipeline – This 30 inch diameter pipeline with a length of 18,970 LF (Etiwanda Avenue east to Archibald Avenue) plus, 9,900 LF (Archibald Avenue south to Fourth Street) would be a primary delivery line for recycled water to centrally located industries and businesses in the CCWD service area, plus delivery to six sets of groundwater recharge basins, in the central area of the Chino Basin, via the Fourth Street Regional Pipeline. The pipeline would deliver 3,459 AFY of recycled water to the CCWD-7, 8, 9, and 10 local laterals, and then to the Fourth Street pipeline.

Benson Avenue Regional 4.25-Million Gallon Storage Reservoir and Pumping Station – This recycled water project, located at Benson Avenue is needed to maintain pressure in the system and to equalize the water demand during the evening hours and during daytime peak demand periods. The storage reservoir and pumping station would be located on the west side of the

Agency service area, north of the RP's and would provide storage and pressure for the 210 Freeway and points north.

The Benson Regional 2,600 GPM and 2,000 GPM pump stations would be located at Benson Regional 4.25-million gallon storage reservoir site. The pump stations would lift recycled water into the reservoir and also lift water up-gradient, above the 1,230 feet elevation, to serve customers in the upper Basin. It would be used to maintain system pressure during peak demands during evening hours and restore the reservoir to full capacity during the daytime. The Benson Regional reservoir and pumping station are proposed for construction in 2003 – 2004.

Etiwanda Ave Regional 9.18-Million Gallon Storage Reservoir and Pumping Station – This recycled water project, located at Etiwanda Avenue and Highland Avenue in the City of Rancho Cucamonga, is needed as an equalizing reservoir for water demand during the evening hours and to maintain an equal pressure during peak demand periods during the daytime.

The Etiwanda Avenue Regional 12,000 gpm pump station would be located at Etiwanda Avenue and Highland Avenue in the City of Rancho Cucamonga in conjunction with the 9.8-million gallon storage reservoir. The pump station would lift recycled water into the reservoir and also lift water up-gradient above the 1,410 feet elevation to serve customers in the upper Basin. It would help maintain pressure during peak demands during the evening hours and restore the reservoir to full capacity during the daytime.

Edison/Merril Regional Pipeline - This 24 inch diameter pipeline would be a primary delivery line for recycled water from the Carbon Canyon facility, and eventually RP-5 and the RWRP-1/RWRP-4 Outfall line, connecting to the existing CCWRF Recycled Water Distribution System in the southwest corner of the Agency's service area. The regional pipeline would provide recycled water to the City of Chino and the City of Ontario as both cities expand into the Agricultural Area.

No local laterals are identified for this regional line. Direct connections to the line would include a golf course, a school, a health club, and local landscaping, equaling a projected use of 500 to 530 AFY. As the Agricultural Area develops the demand for local laterals will increase.

210 Freeway Distribution Pipeline – This project is to be divided into four separate projects:

1) Segment No. 1, begins at Etiwanda Avenue and I-15 Freeway and reaches north along Etiwanda Avenue to the 210 Freeway
2) Segment No. 2, begins at Etiwanda Avenue and the 210 Freeway, and reaches west along the Freeway with a diagonal from Baseline to 19th Street
3) Segment No. 3, begins at the 210 Freeway and the diagonal at 19th Street reaches west to Benson Avenue
4) Segment No. 4, begins at 19th Street reaches west to Benson Avenue, and extends south along Benson Avenue to 5th Street

The four 210 Freeway Regional Pipeline projects would deliver an estimated 4,115 AFY of recycled water for irrigation along the 210 Freeway, equaling 1,906 AFY. The remaining 2,209 AFY would be delivered to the CCWD-2, 3, 4, 5, 11, and 16 local laterals, and to the Upland-3 local lateral, equaling a total of 5,210 AFY.

Walnut/Riverside Regional Pipeline - The Walnut/Riverside Regional Pipeline, a 12-inch diameter pipeline, is a primary delivery line for recycled water from RP-1 Outfall line connecting to the converted Ramona Feeder on the west side of the Agency's service area. The regional pipeline will provide recycled water to the Chino-1 local lateral and the Ontario-13 and 14 local laterals. The pipeline, proposed for construction in 2006 – 2010, would form a looped system from the RWRP-1 regional outfall line to the west side of the IEUA service area in the lower Chino Basin.

Euclid Avenue Regional Pipeline (Alternative A) – This project is proposed as an alternate to redevelopment of the Conversion Ramona Feeder Regional Pipeline (Alternative B) project. The potential for new customers in the area of the Ramona Feeder Regional Pipeline is limited to five customers that would use 25 AF or less. Potential new customers in the area or the Euclid Avenue Regional Line is much greater - approximately 32 customers including schools, parks, and churches. The Euclid Avenue Regional Pipeline is proposed for construction in 2006 – 2010.

Conversion Ramona Feeder Regional Pipeline (Alternative B) – This project would convert the Ramona Feeder from potable use to recycled water use. The Ramona Feeder line is an existing water line presently owned by the Monte Vista Water District. The line is currently used for delivery of potable water to the lower Montclair residential area and to the cities of Chino and Chino Hills. The feeder line is under-sized for future water deliveries to the Chino and Chino Hills area and is projected for replacement by the Monte Vista Water District in the next three to five years. The new converted pipeline would deliver recycled water to the Montclair-4 and 5 local laterals in the upper area. The Montclair-4 local lateral would deliver water to the Brooks Groundwater Basin in the amount of 920 AFY, while local lateral No. 5 would supply 211 AFY to city parks. The Ramona Feeder Regional Pipeline, if selected as an alternative line, would be reconstructed in 2006 – 2010.

Benson Avenue Regional Pipeline - This 8 inch diameter 5,060 LF pipeline connects to the 210 Freeway Regional Distribution System at 5th Street in the City of Ontario, extending southward to Kingsley Street. The pipeline would provide recycled water to two local laterals, plus provide pressure and flow to the Foothill Boulevard/Grove Avenue Regional Pipelines. The pipeline, proposed for construction in 2006 – 2010, will form a looped system from the 210 Freeway Segment III and the 4th Street Regional Pipeline.

Foothill Boulevard Regional Pipeline – This 20 inch diameter 15,946 LF pipeline extends westward along Foothill Boulevard from Grove Avenue to Benson Avenue. The pipeline would deliver an estimated 143 AFY of recycled water to serve customers along the Foothill Boulevard and also 131 AFY to the Upland-1.

Montclair 4.25 Million Gallon Storage Reservoir and Pumping Station – This recycled water project would be located on the mid-west side of IEUA's service area, away from the RP's. A location for the facilities needs to be researched. This 4.25 MG reservoir and 6,800 GPM pump station are needed to maintain pressure during the day time and to assure delivery of adequate quantities of water during the late night and early morning hours. The location would be in the City of Montclair at Ramona Avenue and Brooks Street at the 930-foot elevation.

7.3 Orange County Water District

Within OCWD, the major water reclamation project proposed for the area, which will develop a new source of reliable, high quality potable water to replenish the Orange County groundwater basin and expand the existing seawater intrusion barrier is the Groundwater Replenishment System (GWRS), Phase I, which is described in Chapter 5 as a water storage project. The Southern California Comprehensive Water Reclamation and Reuse Study (SCCWRRS) also identified the GWRS project as the major facility for that area. Additional funding will be necessary to expand the GWRS for Phases II and III.

7.3.1 Projects: 2010

Irvine Ranch Water District (IRWD) Recycled System – This project would construct an expansion of the IRWD's system, which includes IRWD's ongoing expansions in the northern Irvine area and their proposed systems in the Newport Coast area to the south. In addition, this project proposes that IRWD's Michelson WRP would take over full-time delivery of recycled water to all new and some existing GAP customers in the Newport Coast area in order that the GAP can expand into the Huntington Beach area. The total annual flow from IRWD to users in the GAP system would be approximately 2000 to 2,500 AFY. This shift in supply is necessary, as the Huntington Beach demands are larger than the remaining capacity of the GAP treatment facilities.

The conversion of the San Juan Reservoir to a seasonal recycled water storage facility is also included as a part of this project. Without this additional seasonal storage, the IRWD system may not be able to meet its future peak summertime reclamation demands without using supplemented water supplies. Using the San Joaquin Reservoir would also allow the IRWD system to avoid wintertime discharges to the OCSD Plant No. 1 and help to maximize the reuse of the Michelson WRP. The GAP would also benefit from this seasonal supply because of the intertie between IRWD's and GAP's system.

IRWD's Michelson WRP is a full tertiary facility with a capacity of 20.5 MGD and planned capacity of 26.4 MGD by 2010. Approximately 17,600 AFY of recycled water is produced and used in the IRWD system. Excess flows in the winter periods are either stored, sent to the GAP system, or bypassed to OCSD's Plant No. 1, as the Michelson WRP is not currently allowed to discharge into the adjacent San Diego Creek.

OCSD Microfiltration Recycling - This project would construct advanced wastewater treatment improvements (microfiltration) for the remaining treated effluent that OCSD treats and sends out the ocean for discharge. The balance of the remaining OCSD effluent would be sent through the OCWD/OCSD GWRS for microfiltration and reverse osmosis treatment for ultimate recharge back into the groundwater basin.

Green Acres Project Expansion - This project would supply areas in the City of Huntington Beach with recycled water for landscape and industrial uses; Approximately 3,000 AFY of additional supplies would be provided. The project would reduce coastal demands for groundwater, including peak summer time landscaping requirements. The Feasibility Report and CEQA are both complete.

Prado Dam Conservation Project – This project would store additional flood flows behind Prado Dam for reuse. The Feasibility Report is complete and CEQA is currently being prepared.

7.4 San Bernardino Valley Municipal Water District

As laid out in the recently completed Regional Water Facilities Master Plan Draft EIR, some of the District's management strategies include:

- Managing surface water from rainfall and snow melt runoff in order to utilize flows for agricultural irrigation and municipal supply
- Managing recycled water, where up to one million AFY of wastewater is projected to be generated at ultimate development within SBVMWD's boundaries.

SBVMWD foresees utilizing recycled water in two principal ways: to meet direct non-potable uses and for groundwater recharge. Beyond satisfying the base flow requirement at Riverside Narrows (15,250 AFY or 12,420 AFY when there is no cumulative deficit), the remaining water is available for use.

One existing example of direct non-potable use is the rapid infiltration-extraction (RIX) tertiary treatment facility, which provides advanced treatment to secondary flows from the cities of Colton and San Bernardino. In year 2000, approximately 34,000 AF were discharged to the SAR.

Groundwater recharge of recycled water holds several benefits, including:

- Offsetting the amount of imported water for replenishment purposes
- Utilizing a continuous and reliable source that is not subject to local hydrologic variations or the uncertainty of imported water
- Minimizing the infrastructure needs for recharge, as large spreading areas are generally already available.

7.4.1 Projects: 2010

City of Beaumont/Beaumont-Cherry Valley Water District Recycled Water System, Phase I - This recycled water system would result in the reuse of all of its recycled water effluent. About 1 MGD would be used to maintain existing riparian vegetation downstream of the historical point of discharge to Coopers Creek. The remainder would be used for direct irrigation uses, groundwater recharge, and to support new wetland habitat in the Beaumont area. The recycled water system would result in a decrease in imported state project water of about 8,000 AFY. Construction of the recycled water system would occur in several phases. The agencies are ready to proceed with the first two phases immediately. The first two phases would reduce the demand for imported water by 4,500 AFY. Phase 1 includes transmission pipelines, pump stations, reservoirs, and control systems to move 2,250 AFY of recycled water to three golf courses (two of which currently exist and use potable groundwater for irrigation water supply) and about 1,000 AFY for groundwater recharge.

City of Beaumont/Beaumont-Cherry Valley Water District Recycled Water System, Phase 2 – This recycled water system would result in the reuse of all of its recycled water effluent. About 1 MGD would be used to maintain existing riparian vegetation downstream of the historical point of discharge to Coopers Creek. The remainder would be used for direct irrigation uses, groundwater recharge, and to support new wetland habitat in the Beaumont area. The recycled water system would result in a decrease in imported state project water of about 8,000 AFY. Construction of the recycled water system would occur in several phases. The agencies are ready to proceed with the first two phases immediately. The first two phases would reduce the demand for imported water by 4,500 AFY. Phase 2 includes a recycled water reservoir to store recycled water during low demand periods (late fall, winter and early spring) for use during high demand periods, transmission pipelines, and new wetlands in Nobel and Marshall Creeks. The storage reservoir would be used to firm up recycled water supplies for Phase 1 and Phase 2 uses. About 1,000 AFY would be discharged to the wetlands and 750 AFY would go to direct irrigation projects. About half the water discharged to the wetlands would recharge groundwater.

Big Bear Recycled Water Planning Study – This project would lead to constructing facilities to allow using 500 AFY of recycled water for spreading at groundwater recharge sites, habitat and wetlands, irrigation and spreading, demonstration gardens and tree farms, and for marsh stabilization.

City of Redlands Recycled Water System - This project proposes to construct advanced wastewater treatment processes at the existing Redlands Wastewater Treatment and Disposal Facility (RWTF) and to install underground pipelines to convey recycled water to various locations within the City of Redlands. The City owns and operates the RWTF, which was constructed in the 1960s and has been expanded and upgraded over the years to its current treatment capacity of 9.5 MGD. The RWTF presently treats and disposes of between 6 to 7 MGD of wastewater collected from its service area.

Currently, secondary treated effluent from the RWTF is transported by pipeline to percolation ponds located about one-half mile easterly of the plant site. The City has determined that its present treatment and disposal methods should be modified to provide a more effective use of the effluent from the RWTF. Additionally, proposed new regulations for the quality of effluent discharged from the RWTF will require the City to produce a higher quality effluent regardless of the end use. To meet the proposed effluent quality regulations and provide a better use of the effluent, the City is proposing to alter its treatment process to produce recycled water that meets the requirements contained in Title 22, Division 4, Chapter 3, Water Recycling Criteria of the California Code of Regulations (Title 22). The process alteration proposed will also allow the City to more effectively produce effluent that meets the proposed new regulations for total inorganic nitrogen (TIN) concentrations of 10 milligrams per liter (mg/l) or less.

To implement the recycled water project, modifications, and upgrades to the existing plant and equipment is required. Some of the mechanical and electrical equipment has reached the end of its useful life. Other equipment will be upgraded to incorporate advancements in energy efficiency. The following areas of the existing RWTF will be upgraded: Headworks, Peak Pond Pump Station, Blower Building, Return Activated Sludge and Waste Activated Sludge Pump Station, Final Effluent Pump Station, Auxiliary Systems, and Electrical System. This project has the capacity to reduce demand on higher quality groundwater by up to 9,500 AFY.

Running Springs Recycle Project Study - This project would lead to upgrading the existing treatment facility to tertiary treatment, modifying percolation ponds, and utilizing the recycled water for local users. The Running Springs Treatment Plant is a 1 MGD secondary facility that is owned and operated by the Running Springs Water District. The treatment facility is planned for expansion to 1.5 MGD of secondary treatment by 2010. The project consists of two phases:

(1) Phase I has been completed and consists of utilizing recycled water to create and maintain a greenbelt to provide fire protection in the area.
(2) Phase II is in the planning stage and consists of modifications to the percolation ponds to supply recycled water to a wildlife enhancement project.

Yucaipa Valley Water District (YVWD) Recycled System - The proposed Yucaipa Recycled Water System plan utilizes recycled water from the Henry N. Wochholz WWTP, which is owned and operated by the YVWD. The treatment facility is a 4.5 MGD tertiary treatment facility that is planned for expansion to 6 MGD by 2010. The Henry N. Wochholz WWTP currently supplies approximately 1.8 MGD to existing recycled water users. The projected available recycled water supply for 2010 is approximately 4.2 MGD, all of which is allocated to more than 10 landscape irrigation users in the proposed Yucaipa recycled water implementation. The project will require the construction of approximately 12 miles of new pipeline and additional pumping capacity.

7.5 Western Municipal Water District

Early estimates of water reclamation projects within the Western Municipal Water District are defined in the Southern California Comprehensive Water Reclamation and Reuse Study. These reclamation quantities depict anticipated Year 2010 recycled water flows minus the obligated discharge quantities to meet the Prado Judgement.

WMWD currently operates the March Air Reserve Base WWTP, which supplies non-potable water for irrigation purposes, and the Western Riverside County Regional WWTP, which discharges treated effluent to the SAR. Future projections for both plants reflect an increase in treated water for irrigation purposes.

The City of Corona recently completed the June 2001 <u>Recycled Water Master Plan and Market Study</u>, which encompasses the 45 square mile area that is expected to ultimately be served by the City's sewer and water utilities. The purpose of the study was to "investigate the feasibility of the City using recycled water to satisfy a portion of its water supply and wastewater disposal needs; to identify the most cost effective system; and to assess the economic, financial, and environmental ramifications of the identified project." As mentioned in Chapter 5 of the IWRP, the "Temescal Basin Groundwater Recharge Feasibility Study" should be complete by October 2002. This document would investigate the feasibility of constructing facilities to convey recycled water from the City's WWTP No. 1 and WWTP No. 2 to groundwater recharge basins.

7.5.1 Projects: 2010

City of Corona Recycled Water Distribution System, Phases 1 - 5 – The construction of this system would consist of pumping stations, transmission and distribution pipelines, regulating reservoirs, upgrading of WWTP Plant No. 1 and WWTP No. 2, and retrofits of onsite irrigation systems. This proposed Corona recycled water system builds upon the local recycled water plans of the City of Corona, utilizing recycled water from three treatment facilities: Corona WWTP No. 1, No. 2, and No. 3. The projected available supply for 2010 is approximately 7,100 AFY. CEQA documentation is complete.

Corona completed its Recycled Water Master Plan and Market Study, Program Environmental Impact Report, and Financial Strategies in 2001 using City funds and a planning grant from the State of California Water Resources Control Board. Recycled water allows the City to devote its domestic water supply, a scarce resource, to higher and better use. Irrigation demands will be met with a drought resistant supply from tertiary treated wastewater. The master plan proposed a $46.3 million system that would be constructed in five different construction phases over an 8-year period in a pay as you go program. Corona has revised the project phases to improve the economic viability of the project has submitted a Financial Assistance Application to the State Water Resources control Board for a grant and low interest loan under the State Revolving Fund program. The revised project would construct a $25 million first phase in fiscal year 2004-05 having a capacity of 500 AFY. Later phases and inclusion of groundwater recharge would be constructed as they became economically feasible or with the availability of grant financing.

City of Norco Recycled Water Piping – This project would allow the City of Norco to maintain the level of Lake Norconian, pursuant to its agreement with California Rehabilitation Center (CRC), while conserving potable water pursuant to Section 13550 of the California Water Code. Because of limited water production and high nitrate levels in the water produced, the CRC requested from the City of Norco a connection to the City's water system, as well as the transfer of CRC's well field and pipeline to the City. Because a suitable pipeline already exists under the Santa Ana River, connection of the Archibald (wastewater) Treatment Plant and Lake Norconian "feeder" line would require a short section (approximately 600 feet) of new pipeline under River Road in the City of Norco, as well as rehabilitation of the existing pipeline to convey reclaimed ("tertiary treated") water from the Archibald Treatment Plant for maintenance of the water level of Lake Norconian.

The CRC has an existing water line that extends from a CRC well field near River Road and Bluff Street to the State facility at Fifth Street and Norconian Drive. Their wells currently draft from a shallow aquifer containing water with a high nitrate concentration. Excess production is pumped into Lake Norconian, a man-made lake on the Naval Warfare Assessment Station (NWAS). With the transfer of property from NWAS to CRC, the State was obligated to supply adequate water to maintain the level of Lake Norconian. The water supplied each year is 325 acre-feet.

In addition to the anticipated use of reclaimed water for Lake Norconian, two City parks—Snipes Park and Wayne Makin Park—as well as a park and a lake in a private development (Fifth Street Park and HCI Lake, respectively), lie adjacent to the existing water line. These parks and the HCI lake would use approximately 499 acre-feet per year of reclaimed water for irrigation and lake level maintenance.

On the eastern side of the community, a new housing development is planned to encompass 948 acres, with 588 homes, 450 acres of open space, and a large landscape maintenance district. The development project is conditioned to install and use reclaimed water for parkway and open space irrigation. The project is anticipated to require 60 acre-feet per year of water for irrigation uses.

Lastly, Crestlawn Memorial Cemetery has requested access to reclaimed water for irrigation. Their estimated annual consumption is 336 acre-feet per year. The potential annual use of reclaimed water by the uses identified above is 895 acre-feet per year. Additional use in landscaped medians, industrial landscape areas, and other parks is anticipated as access to reclaimed water becomes more available.

City of Riverside Recycled System – This project would require the construction of approximately three miles of new pipeline and additional pumping capacity to supply recycled water to new users. The proposed Riverside recycled water system plan utilizes recycled water from the 40 MGD Riverside Regional WQCP, which is owned and operated by the City of Riverside. The Riverside implementation plan includes approximately 12 MGD of recycled water from the Riverside Regional WQCP as part of existing commitments related to several judgments and interagency agreements. The projected available supply for 2010 is approximately 28 MGD, of which approximately 3.3 MGD is allocated to six users for landscape irrigation and industrial purposes.

EVMWD Recycled Water System – This project would construct a distribution system to serve the Central Portion of the District's service area with recycled water. Ultimately, an estimated 6,500 AFY of demand would be met. Elsinore Valley Municipal Water District has recently completed a master plan of recycled water system facilities using effluent from the Railroad Canyon Wastewater Treatment Plant and their Wastewater Regional Plant No. 1.

Colton Water Reclamation Plant to Colton Power Plant - This project would construct a recycled water pipeline from the Colton Water Reclamation Plant for delivery to the new proposed Colton Power Plant for cooling water purposes.

March Air Reserve Base (MARB) Tertiary Treatment – This project would construct a 1 MGD tertiary treatment filter at the existing March Air Reserve Base secondary treatment plant, as well as recycled water storage and distribution facilities. Such facilities would immediately replace 1,000 AFY of non-potable demand currently supplied with Colorado River water. Facilities required to implement this project include:

- A) A 1.0 MGD tertiary treatment filter
- B) A 0.5 MG steel reservoir
- C) A pump station located at the MARB WWTP
- D) Distribution piping that connects an existing 20 inch diameter March Air Force pipeline, which traverses Western's service area from Lake Mathews to March Air Reserve Base, to Cajalco Creek, west of the Lake Mathews dam.
- E) Acquisition of property for construction of a recycled water storage reservoir.

CHAPTER 8 FLOOD PROTECTION

Many of the Santa Ana's tributaries are dry riverbeds that only have water in them during the rainy season. These are completely parched throughout most of the year, but one major storm system can quickly turn them into raging torrents. While the Santa Ana Basin is an arid environment and even qualifies as a desert in many areas, its close proximity to the ocean brings heavy storms at times, and these are problematic from a flood control standpoint. Historically, efforts to deal with flooding on the South Coast focused on damage control. As the area became urbanized, city planners simply channeled the periodic deluges into the ocean. This usually prevented floodwaters from inundating the cities, but it had little benefit for local water supply. Though many of the SAW's creeks and rivers are lined with concrete, today storm water is seen more and more as a resource that has not been fully tapped. Facilities that are constructed would divert floodwaters to recharge basins, which could convert what has in the past been seen as a dangerous nuisance into a precious commodity. IEUA has been particularly aggressive in the development of recharge basins to capture stormwater flows (shown in Figure 5.1), while other SAWPA member agencies have a number of stormwater capture projects planned as well. More projects throughout the watershed, however, are necessary to maximize this intermittent yet valuable resource. With the evident benefits of groundwater recharge, capturing stormwater and using this very high quality water to meet the region's rapidly growing needs makes flood protection projects more important than ever.

At the same time, it is still important to ensure that floodwaters do not endanger life and property. It is evident that they can be physically devastating to wetlands, farms and houses, while floods in agricultural and industrial regions also elevate the potential for hazardous discharges into the river. The following 2010 projects, shown in Figure 8.1 and listed in Table ES.1, will help to meet these important objectives.

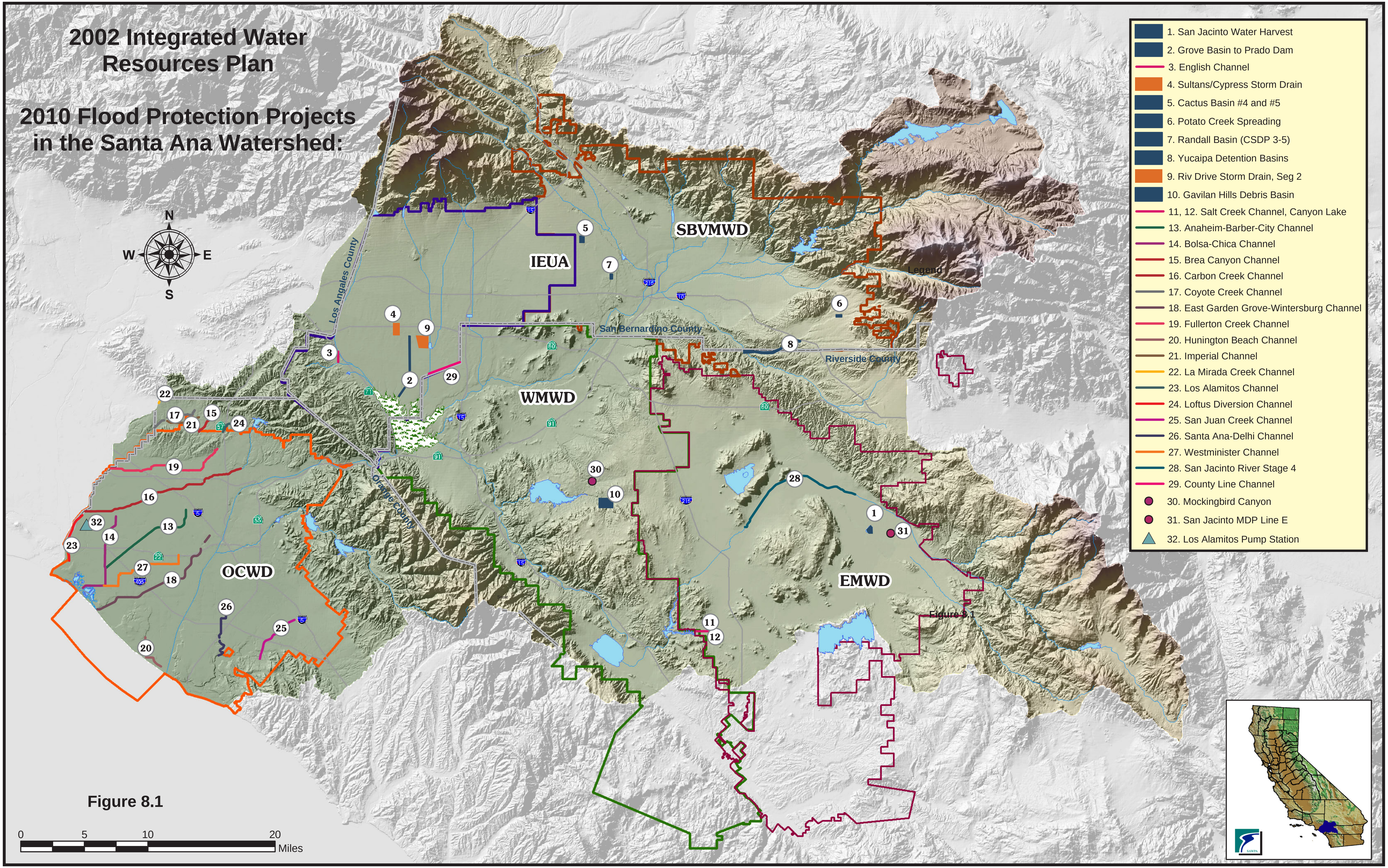
8.1 Eastern Municipal Water District

8.1.1 Projects: 2010

San Jacinto Water Harvesting Project - This project would utilize the San Jacinto Reservoir to capture approximately 300 to 320 AFY of storm water flows discharged from a master planned channel alignment (Storm Drain Line E) to recharge the area's groundwater basin. The purpose of this process, known as "water harvesting," is to allow EMWD to capture water during the peak seasonal wet periods and store it for use during dry periods. When this type of project is initiated in an urbanizing area, such as the San Jacinto Valley, rainfall run-off can be captured, stored, and/or percolated into the ground before it flows out of the basin and either floods downstream areas or percolates into less desirable areas. EMWD views this project as a demonstration project to determine if this is an effective water conservation strategy.

The San Jacinto Reservoir is approximately 140 acres in size. Approximately 70 acres are currently used to store recycled water, leaving the balance for storm water capture and potential recharge. The Riverside County Flood Control and Water Conservation District (District) has a master planned channel alignment called Storm Drain Line E that was designed to circumvent the southerly perimeter of the Reservoir. The District approved a branch line extending from Line E to the Reservoir to allow for the discharge of storm water flows directly into the Reservoir. Inclusion of a branch line to the extension of Line E will allow storm water discharge to either be directed into the Reservoir or remain in the flood control channel and continue past the Reservoir. The branch extension from Line E to the Reservoir will contain an inlet structure at the Reservoir's current embankment. Storm water would enter the Reservoir and rise until it reaches the height of an outlet structure located to the west of the inlet structure. Once water reaches the elevation of the outlet, it would overflow the Reservoir storage area and return to its natural drainage course. The branch from Line E and the inlet/outlet structures are to be completed by the District. The outlet structure, which will be within the reservoir boundaries, will be constructed by EMWD. The completion of Line E will allow EMWD to use an existing structure to capture future storm water run-off. This project is estimated to be completed in late 2003.

San Jacinto MDP Line E – This cooperative project between RCFCWCD, EMWD, and the City of San Jacinto would provide flood control, mitigation of downstream urban stormwater impacts, and high flow storm water harvesting.


2002 Integrated Water Resources Plan
2010 Flood Protection Projects in the Santa Ana Watershed:
N
S
W
E
1. San Jacinto Water Harvest
2. Grove Basin to Prado Dam
3. English Channel
4. Sultans/Cypress Storm Drain
5. Cactus Basin #4 and #5
6. Potato Creek Spreading
7. Randall Basin (CSDP 3-5)
8. Yucaipa Detention Basins
9. Riv Drive Storm Drain, Seg 2
10. Gavilan Hills Debris Basin
11, 12. Salt Creek Channel, Canyon Lake
13. Anaheim-Barber-City Channel
14. Bolsa-Chica Channel
15. Brea Canyon Channel
16. Carbon Creek Channel
17. Coyote Creek Channel
18. East Garden Grove-Wintersburg Channel
19. Fullerton Creek Channel
20. Hunington Beach Channel
21. Imperial Channel
22. La Mirada Creek Channel
23. Los Alamitos Channel
24. Loftus Diversion Channel
25. San Juan Creek Channel
26. Santa Ana-Delhi Channel
27. Westminister Channel
28. San Jacinto River Stage 4
29. County Line Channel
30. Mockingbird Canyon
31. San Jacinto MDP Line E
32. Los Alamitos Pump Station
SBVMWD
IEUA
WMWD
OCWD
EMWD
Los Angeles County
San Bernardino County
Riverside County
Orange County
Legend
0
5
10
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Miles

Figure 8.1

8.2 Inland Empire Utilities Agency

8.2.1 Projects: 2010

County Line Channel - This project is part of the Riverside County Flood Control and Water Conservation District's adopted "Eastvale Master Drainage Plan," which provides a practicable means to convey the 100-year peak flow rates from the City of Ontario (San Bernardino County)/Eastvale area to the Santa Ana River floodplain. The project would begin at Hamner Avenue, proceed southwesterly along the county line, and discharge into the Cucamonga Creek Channel. The proposed channel configuration consists of approximately 7,300 lineal feet of reinforced concrete box ranging from 10 feet to 14 feet in width and 8 feet to 10 feet in depth. The reinforced concrete box will transition to an open rectangular channel for approximately 6,300 lineal feet varying from 20 feet to 25 feet in width and 10 feet to 15 feet in depth. The total length of the proposed channel is approximately 13,600 lineal feet. The total permanent impact area is approximately 25 acres. Most of this development would occur on the underground portion of the project and would likely be revegetated after construction, thus causing only temporary impacts. The proposed open channel section of the project would permanently impact approximately 2.5 acres.

Grove Basin to Prado Dam - This project proposes to convey outflow from Grove Basin to the Prado Basin. This facility would prevent flows from entering the dairy areas and reduce contamination of flows. Estimated cost is $18 million.

English Channel (Chino Hills) - This project would construct replacement facilities of existing substandard facilities, which cause flooding in horse ranch areas. Additional benefits include vehicular traffic and pedestrian safety. Improvements consist of open channel and double box culverts at the Peyton Drive and Eucalyptus Avenue intersection.

Sultana/Cypress Storm Drain - This project proposes to intercept and convey flows that enter the dairy area reducing contaminated water entering the Santa Ana River.

Cactus Basins #4 And #5 - This project proposes to intercept and recharge stormwater flows into the basins.

Potato Creek Spreading Grounds - This project proposes to intercept and recharge stormwater flows into the basins.

Randall Basin (CSDP 3-5) - This project proposes to expand the existing basin and to intercept and recharge stormwater flows into the basins.

Riverside Drive Storm Drain, Segment 2 – This project consists of approximately 10,200 feet of underground storm drain tributary to the Lower Cucamonga Spreading Grounds. Phase 1 of the project would include both reinforced concrete pipes, reinforced concrete boxes, and various concrete/grouted rock structures. Phase 2 would include one underground storm drain within the Lower Cucamonga Spreading Grounds and approximately 1,600 feet of underground storm drain from the Spreading Grounds to the Army Corps of Engineers (ACOE) Cucamonga Creek Channel. The maximum depth of excavation is approximately 40 feet.

The City of Ontario has identified this project and the Lower Cucamonga Spreading Grounds as part of their ultimate master plan of storm drain facilities within the Master Plan of Drainage for the New Model Colony (2000). Segment No. 2 of the Riverside Storm Drain is needed to provide additional watershed protection to safeguard lives and protect the City of Ontario Agricultural Preserve from existing flood hazards.

8.3 Orange County Water District

8.3.1 Projects: 2010

The following list provides the names of Orange County Public Facilities & Resources District (OCPFRD) projects:

- Anaheim-Barber City
- Bolsa Chica Channel
- Brea Canyon Channel
- Carbon Creek
- Coyote Creek
- East Garden Grove-Wintersburg and OV
- Fullerton Creek
- Huntington Beach/Talbert Channel System
- Imperial Channel
- La Mirada Channel
- Los Alamitos Pump Station
- Los Alamitos
- Loftus Diversion
- San Juan Creek Trabuco Creek
- Santa Ana - Delhi Channel
- Westminster Channel

8.4 San Bernardino Valley Municipal Water District

The San Bernardino County Department of Transportation/Flood Control, whose primary purpose is to detain the stormwater for a minimum period of time, and then release it to make room for subsequent storm events, owns many of the spreading facilities within SBVMWD. One goal is to retain runoff in the spreading basins for longer periods of time, for groundwater recharge purposes, if more accurate and closely coordinated storm forecasting is considered. This change in operating policy would require close coordination between the county and water conservation agencies. SBVMWD currently uses the basins during the non-flood season, with the approval of the San Bernardino County Flood Control District (SBCFCD).

8.4.1 Projects: 2010

East Valley Resource Conservation District - Yucaipa Detention Basins – This project would construct two basins: the first would be located at the confluence of Wilson and Oak Glen Creeks and the second would be located in Wildwood Creek. These two basins would be a beginning step towards helping solve the problems the landowners in Live Oak Canyon (one of the seriously affected downstream areas), where many of the properties are eroding away.

The storm drain system that the city inherited from the county in the City of Yucaipa had very few improvements; consequently, a substantial portion of the city is located within the boundaries of a 100-year floodplain and a significant amount of erosion occurs every time there is a storm. This project would provide critical flood control improvements needed to protect the City from flooding and to limit the amount of erosion that impacts all downstream property owners.

8.5 Western Municipal Water District

8.5.1 Projects: 2010

Gavilan Hills Debris Basin - This project would construct a basin that would capture sediment and debris from a 4,480 acre watershed, thus reducing the contamination of Cajalco Creek and Lake Mathews.

Mockingbird Canyon Floodplain Acquisition - This RCFCWCD project would prevent (via purchase) encroachment of development into a riparian area upstream of the city of Riverside. The area could conceivably be used as a source of environmental mitigation banking, as well as being a site for potential stream restoration and wildlife corridor enhancement.

Agricultural Flood Protection – This LESJWA project would construct levees and other flood control structures around various dairies located in the San Jacinto Watershed to control nonpoint source runoff of nutrients and other constituents of concern that may be negatively impacting downstream water bodies, such as Canyon Lake and Lake Elsinore.

Salt Creek Channel Improvements – This LESJWA project would provide improvements to the Salt Creek Channel to increase its flood control capability by removing sediments.

Canyon Lake Causeway Improvement – This LESJWA project would construct improvements to the Canyon Lake Causeway in order to enhance the flood control ability of Canyon Lake.

San Jacinto River Stage 4 – This LESJWA and RCFCWCD project would construct levy improvements and improve flood control capabilities along the San Jacinto River Stage 4. Approximately 3-1/2 miles of levee would be constructed, which would alleviate about 2,700 acres of dairy farm land from flooding. Uncontrolled flood waters crossing dairies are thought to be contributory to current water quality problems in Canyon Lake and Lake Elsinore.

CHAPTER 9 WETLANDS, ENVIRONMENT, AND HABITAT

The projects detailed in this chapter demonstrate that the water needs of people and those of wildlife can actually be compatible. OCWD, for example, has operated an artificial wetland for almost a decade in the Chino area, and has realized estimated water treatment cost savings of more than ten million dollars annually. The system works by taking nitrate-rich water from the river and easing it through man-made wetlands. In the swampy environment nitrates are absorbed and used by the abundant plant life. Not only does this practice help purify tainted water (accomplishing the same goal as treatment plants); it opens significant SAW acreage to migrating birds as well.

Rapid development often shortchanges waterfowl by building over scarce wetlands or diverting the water that would normally sustain them. This can be avoided, however, through continued development of artificial wetlands along the course of the Santa Ana River; in fact, this negative trend can actually be reversed. Foliage in the artificial wetlands should be a tremendous benefit for removing nitrates in local water supplies. Unfortunately, not all plants are beneficial along waterways. For example, much of the SAR is inundated with a persistent species of non-native cane called *Arundo donax*. The huge bamboo-like grass reaches heights of 40 feet, and uses as much as 37,000 acre-feet of water every year. Reducing the cane presence in the watershed is a high priority project, and millions of dollars have already been allocated from the statewide water bond to help control it. Figure 9.1 illustrates the locations of many of these projects, which are also listed in Table ES.1.

9.1 Eastern Municipal Water District

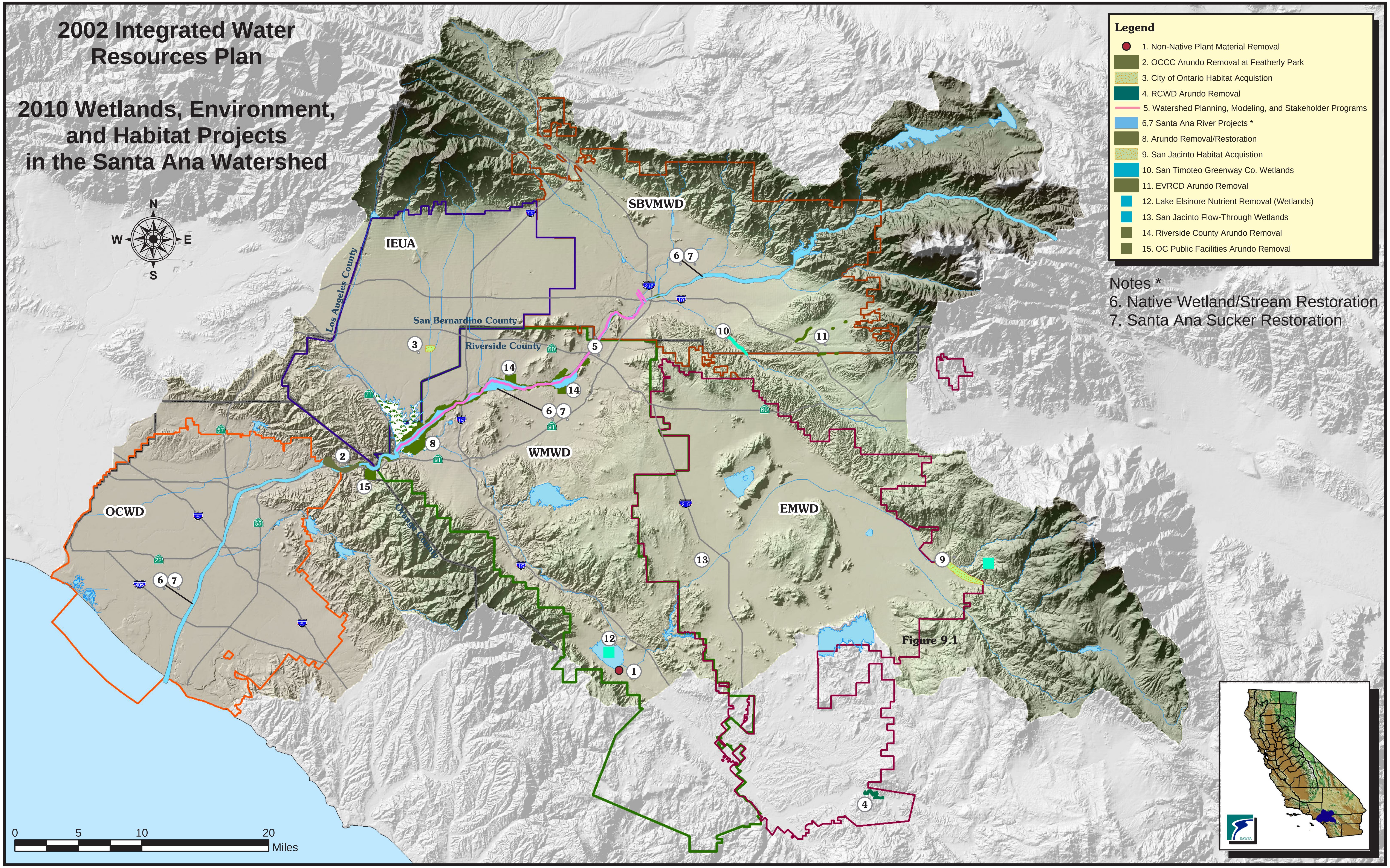
In the San Jacinto Watershed, the Department of Fish and Wildlife recently listed the San Jacinto River as critical habitat for the San Bernardino Kangaroo Rat. This is likely to affect uses of San Jacinto River flows, which currently primarily consist of floodwater diversions by EMWD to spreading basins and flows into Canyon Lake and Lake Elsinore.

9.1.1 Projects: 2010

San Jacinto Habitat Acquisition - This project would acquire mitigation property identified in the Habitat Conservation Plan (HCP), allowing EMWD to proceed with a major conjunctive use project featuring all of the major environmental objectives established in the CalFed program. EMWD's Hemet/San Jacinto Conjunctive Use project would utilize up to 100 acres of bottom land in the San Jacinto Riverbed. This area has been listed as critical habitat for the San Bernardino Kangaroo Rat and will therefore require mitigation in the form of acquiring suitable habitat and protecting it with a Habitat Conservation Plan (HCP). EMWD is currently working on a HCP with Federal resource agencies.

San Jacinto Flow-Through Wetlands – This LESJWA project would create a flow-through wetlands that would provide both habitat enhancement and nutrient removal to the San Jacinto River from Canyon Lake to Lakeshore Drive. The project would provide recreational opportunities through the creation of trails for biking, walking, or viewing habitat.

Rancho California Water District (RCWD) Arundo Removal - This project would remove Arundo from the Rancho California Water District service area, primarily within the Murrieta Creek area. The removal of the invasive species would enhance the groundwater recharge capabilities of the creek and thereby allow greater recharge of the groundwater basin. Local groundwater resources constitute 70% of the local supply of the water supply served by RCWD.



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9.2 Inland Empire Utilities Agency

9.2.1 Projects: 2010

City of Ontario/City of Chino Habitat Acquisition – This project would help fund the acquisition of additional lands for habitat conservation and restoration of natural habitat. Within the southerly portions of the Chino Basin lies the 50 square mile Chino Basin Dairy Preserve, one of the largest concentration of dairy farms in the nation. This area is beginning to urbanize with the expansion of surrounding cities of Ontario, Chino, and Chino Hills. Development plans and general plans for the expanded sphere of influence into the Chino Basin Dairy Preserve are being prepared by the three cities, as well as by San Bernardino and Riverside counties, covering this area. With the increasing urbanization, there is a need to establish multipurpose open space corridors along flood ways and general open space areas within the agricultural and uplands areas. These open space areas provide critical flood hazard mitigation, restoration to natural riverine ecosystems, nonpoint source pollution control, and green ways for the public.

9.3 Orange County Water District

9.3.1 Projects: 2010

Orange County Public Facilities & Resources 1,200 Acre Arundo Removal - This project would remove Arundo from the SAR bottom and restore riparian habitat. The project is located in the SAR canyon in the Yorba Linda area. The limits are from Weir Canyon Road to the Orange County line.

Orange County Conservation Corps Arundo Removal @ Featherly Park - This project is designed to remove Arundo from a park adjacent to the SAR and restore riparian habitat. The project is located at Featherly Park in Orange County.

9.4 San Bernardino Valley Municipal Water District

9.4.1 Projects: 2010

East Valley Resource Conservation District (EVRCD) Arundo Removal - This program would reduce the threat of invasive plants (especially Arundo and Tamarisk) on native habitat and river systems. Projects currently in process of first-time treatment would continue on all upper watershed tributaries, as well as main stem Santa Ana River down to Riverside County Parks and Open Space District Lands (and on into Orange County). Observance of the previously established follow-up program with each land management entity would gradually increase their capabilities to perform long-term maintenance. The program would also provide education to private landowners through written materials, workshops, and hands on assistance. Database maintenance would include areas of infestation, current projects, sensitive species, and native vegetation recovery.

9.5 Santa Ana Watershed Project Authority

9.5.1 Projects: 2010

Arundo Removal/Restoration – This five to ten-year project seeks to remove the Arundo donax (giant cane) from the Santa Ana Watershed and restore some 10,000 acres of riparian habitat. The giant cane is a significant fire hazard, and has cost millions of dollars and ravaged the environment each time it burns. The native flora typically take much longer to grow, are much less dense and after each fire the Arundo expands its grip on the environment. From the perspective of water supply, most observers estimate that if the Arundo were removed and replaced with native species, some 10,000 AF of water per year could be saved. Funding to date has provided almost $25,000,000 and will take at least five years to complete; however, more funding is needed for agencies to more aggressively remove the species and monitor removal for five or more years. These funds should ideally be established in a regional fund to provide for long-term funding of Arundo removal. Initial funds are being used to reimburse the removal agencies for their costs to remove additional Arundo and to expand their efforts. Long-term funding would help ensure this menace is eradicated in the watershed and also allow for future monitoring.

Native and Treatment Wetlands - This five-year program will develop and fund projects in Orange, Riverside, and San Bernardino counties in areas where improvements to water quality are the most critical. The creation and restoration of wetlands in the watershed is essential to improving water quality and reducing the impacts of non-point source pollution. Wetlands are used for natural water treatment and serve as a buffer to the river and its tributaries. They also provide environmental habitat and a cleaner more resilient system for surface waters. Treatment wetlands are constructed where larger flows of highly eutrophic waters are found to reduce nutrients and other pollutants and provide habitat. These areas may be surrounded by natural wetlands and provide habitat for many sensitive, endangered, and threatened species. Natural wetland restoration will also be provided in areas where land and function can be maintained.

- ***Anaheim Recharge Wetlands*** – This project would install landscaping and other miscellaneous improvements around existing recharge basins. The Feasibility Report is currently being prepared.
- ***Mill Creek Wetlands*** – This project would divert Mill Creek flows, which travel through the dairies through existing wetlands, to receive natural water quality treatment prior to using the water in Orange County. The CEQA is complete and the final design is underway.
- ***Imperial Highway Wetlands*** – This project would construct engineered wetlands below Prado Dam to efficiently treat Santa Ana River flows. The Feasibility Report is currently being prepared.
- ***River Road Wetlands*** – This project would construct 300 acres of wetlands to provide natural treatment for Santa Ana River flows prior to using the water in Orange County. The Feasibility Report is complete and the CEQA documents to be prepared in 2002.
- ***San Diego Creek Watershed Natural Treatment System*** – This project would develop and maintain a system of approximately 35 man-made wetlands throughout the San Diego Creek Watershed. The wetlands would use natural processes to remove unwanted

sediment, nutrients, pathogens, and other contaminants from urban runoff. In conjunction with the San Joaquin Marsh, other best management practices, and urban runoff treatment programs implemented by cities and Orange County, these wetlands would greatly increase the ability of the cities and the county to cost-effectively comply with State urban runoff standards and, by doing so, protect the water quality of the San Diego Creek, Upper Newport Bay, and the adjacent coastal environment.

- ***Chino Creek Park and Wetlands*** - This project would construct 100 acres of wetlands along Chino Creek just above Prado Dam for the removal of nitrate and other contaminants from resulting from runoff. Additionally, the wetlands would provide additional habitat to wildlife in the area.
- ***Bolsa Chica Wetlands*** – This project would establish the Bolsa Chica Wetlands, located in Orange County, as part of the solution to address the influx of nutrients to the upper Newport Bay, which has been listed as an impaired water body due to nutrients, sedimentation, and other constituents flowing from upstream sources.
- ***Cucamonga Creek Wetlands*** - This project would construct wetlands to provide natural treatment for Cucamonga Creek, located in IEUA.
- ***Yucaipa Valley Water District (YVWD) Wetlands Enhancement Project*** – This project would construct a 30 acre wetlands facility to further treat recycled water prior to discharge to San Timoteo Creek. The project includes pipelines, hydraulic control structures, control systems, and a new 30 acre wetlands. Discharge from the new wetlands would support the existing riparian habitat downstream of the existing YVWD point of discharge to San Timoteo Creek. This project would integrate with other elements of the YVWD recycled water system such that all recycled water produced by the YVWD would be reused, thereby reducing the demand for imported state project water by about 9,000 AFY
- ***San Timoteo Creek Wetlands*** - This project is designed to increase water quality and quantity in San Timoteo Canyon, and subsequently the Bunker Hill Basins, through the re-establishment, creation, restoration and protection of wetlands in the floodplains of the canyon and its major tributaries from Loma Linda to Interstate 10.
- ***Upper Santa Ana River Wetlands*** - This project would construct wetlands to provide natural treatment for the upper reaches of the SAR.

Santa Ana Sucker Restoration – This project assists the recovery of the Santa Ana Sucker, a small native fish that is officially listed as a threatened species, through habitat restoration measures. A five-year effort, this project aims to make modifications to the Santa Ana River and its tributaries to remove barriers and provide refuge for the fish in their development cycles in the upper watershed. This work will begin with continuing the development of scientific studies to better understand the suckers' needs. As an understanding of the suckers' needs improves, more complex and costly efforts may be taken to restore its habitat. This effort, with the cooperation of various agencies, will eventually result in the de-listing of the species as threatened.

Watershed Planning, Modeling, and Stakeholder Programs - This three-year program would provide a prototype model for California watersheds. Watershed efforts are advanced to benefit the region and the people of California when multipurpose projects are provided that answer a variety of needs and are supported by a broad group of stakeholders. Collecting the information and developing the plans, as well as coordinating the stakeholder programs, is essential to these efforts. Infrastructure development is needed to advance state-of-the-art data management and to model how various programs and projects affect the watershed. This program would develop these tools and provide information and outreach to both the public and other agencies. It would also serve as a permanent home for collaborative projects in the watershed, as well as an independent analysis of the effects of various solutions on the current and projected future conditions of the watershed.

9.6 Western Municipal Water District

9.6.1 Projects: 2010

Lake Elsinore Nutrient Removal (Wetlands) – This LESJWA project would include purchasing land, constructing a back basin wetlands, and implementing other nutrient control measures for Lake Elsinore in order to provide a natural method to reduce the lake's high nutrient level and provide an improved wildlife habitat. The existing 356-acre wetlands in the back basin could be reconfigured to provide advanced treatment to recycled water added to the lake and circulated lake water. The project could construct a pumping system to pump water into the wetlands for treatment and back to the lake for replenishment. The project could improve the water quality of the lake by treating circulated lake water and providing additional treatment to recycled water.

Non-Native Plant Material Removal – This LESJWA project would remove non-native plant materials in the back basin of Lake Elsinore that are taking over the natural habitat. This project would enhance and protect the wildlife habitat.

Mockingbird Canyon Floodplain Acquisition - This project would prevent (via purchase) encroachment of development into a riparian area upstream of the city of Riverside. The area could conceivably be used as a source of environmental mitigation banking, as well as being a site for potential stream restoration and wildlife corridor enhancement.

Riverside County Arundo Removal - This program would remove a large part of the Arundo in the middle portion of the riverbanks that are held or controlled by WMWD. The program has been operating using mitigation funds and is in need of expansion to meet the goals indicated in the Arundo section above.

CHAPTER 10 RECREATION AND CONSERVATION

Recreation projects not only enhance local water supply and expand regional wetlands for wildlife improvement, they also create opportunities for the public to enjoy the area's waterways to the fullest extent possible. Ensuring access to the region's wetlands, lakes, and streams will enable locals to see first-hand how the SAR and its tributaries make substantial contributions to waterfowl migration and wildlife in general.

Increased urbanization within the SAW has challenged local agencies to develop infrastructure for the future to meet water demands and to provide flood control for public safety. It is essential that the growth of urban areas occur in balance with the environment to maintain viable habitat for native species of plants and wildlife, and to maintain a high quality of life for the people in the community. An effective means of establishing this balance would be the development of open space corridors which promote the dual establishment of multiple species habitat, wetlands, stormflow capture and storage, aquifer recharge, water quality improvements, and passive and active recreational open spaces.

Some of the most rapidly growing regions of the Santa Ana Watershed that would benefit from this concept include the Santa Ana River, Newport Bay, and the new city sphere of influence expansions into the Chino Basin Dairy Preserve. In the Chino Basin Dairy Preserve, for example, approximately 15,000 acres of land will gradually be converted from dairy and agricultural development into an urbanized area. Concerns have been raised that the conversion to urban use includes an appropriate balance with other uses such as wildlife habitat, open spaces, and adequate floodplain along rivers and creeks. The establishment of multipurpose open space corridors would enhance the environment and facilitate efficient land use planning. The following benefits of the open space corridors have been identified:

- Environmental Enhancement
- Habitat Creation: Riparian & Marsh
- Green Space
- Biodiversity
- Wildlife Propagation
- Recreation
- Hiking
- Jogging
- Cycling
- Equestrian Trails
- Water Resource Management
- Water Conservation
- Storm Flow Capture and Storage
- Water Quality Improvement
- Aquifer Recharge
- Emergency Storage
- Erosion Control
- Educational
- Bird Watching

- Environmental Science Labs
- Public Awareness

With regard to conservation, this document recognizes two primary categories of conservation. The first is defined as long-term programs that require investments in structural programs such as ultra-low-flush toilets, low-flow showerheads, or water efficient landscape irrigation technology, as well as ongoing public education and information. Long-term conservation programs should not be intrusive or require extreme life-style changes. The primary conservation strategy evaluated in this document involves the implementation of cost-effective long-term programs that have long-lasting savings.

Using MWD's terminology from their 1996 IRP, long-term conservation is further broken into two types of programs: programmatic and passive programs. Programmatic conservation represents savings requiring significant investments by water agencies in order to implement toilet and showerhead retrofit programs, landscape programs, commercial and industrial conservation, and distribution system leak repairs. Passive programs, such as plumbing codes, ordinances, and pricing require much less financial assistance from the water industry since these savings result from regulations or changes in behavior.

The second category, short-term behavioral conservation, employs extraordinary conservation measures. This short-term behavioral conservation could include measures such as rationing or penalty pricing used during droughts. Extraordinary conservation measures would have a significant impact on consumers, and could account for as much as a 5% reduction in retail demands. Because extraordinary conservation measures would typically only be employed during severe or extreme shortages (as defined in MWD's 1999 Water Surplus and Drought Management Plan), these measures will *not* be considered in the 2025 and 2050 drought year scenarios. By only treating long-term conservation as a supply source, this IWRP is mirroring the same logic adopted by MWD's 1996 IRP.

Eventually, SAWPA member agencies may need to consider conservation measures that would involve some significant lifestyle changes. These changes may be intrusive initially; the goal, however, would be to ultimately educate consumers in the way they view water usage. One example would be to promote xeriscape (drought-proof and/or hardscape landscaping), by either providing significant incentives for consumers that landscape their homes or businesses, or disincentives for consumers that use excessive water. Implementing improved landscape management through the use of evapo-transpiration (ET) controllers and encouraging native landscaping could also diminish water use. Another possibility would be to require that all commercial and industrial buildings, and all golf courses use solely non-potable water for irrigation.

The recreation and conservation component of the IWRP is further detailed below, where a group of recreation and conservation 2010 programs and projects are shown in Figure 10.1 and listed in Table ES.1, to achieve this important goal.

10.1 Eastern Municipal Water District

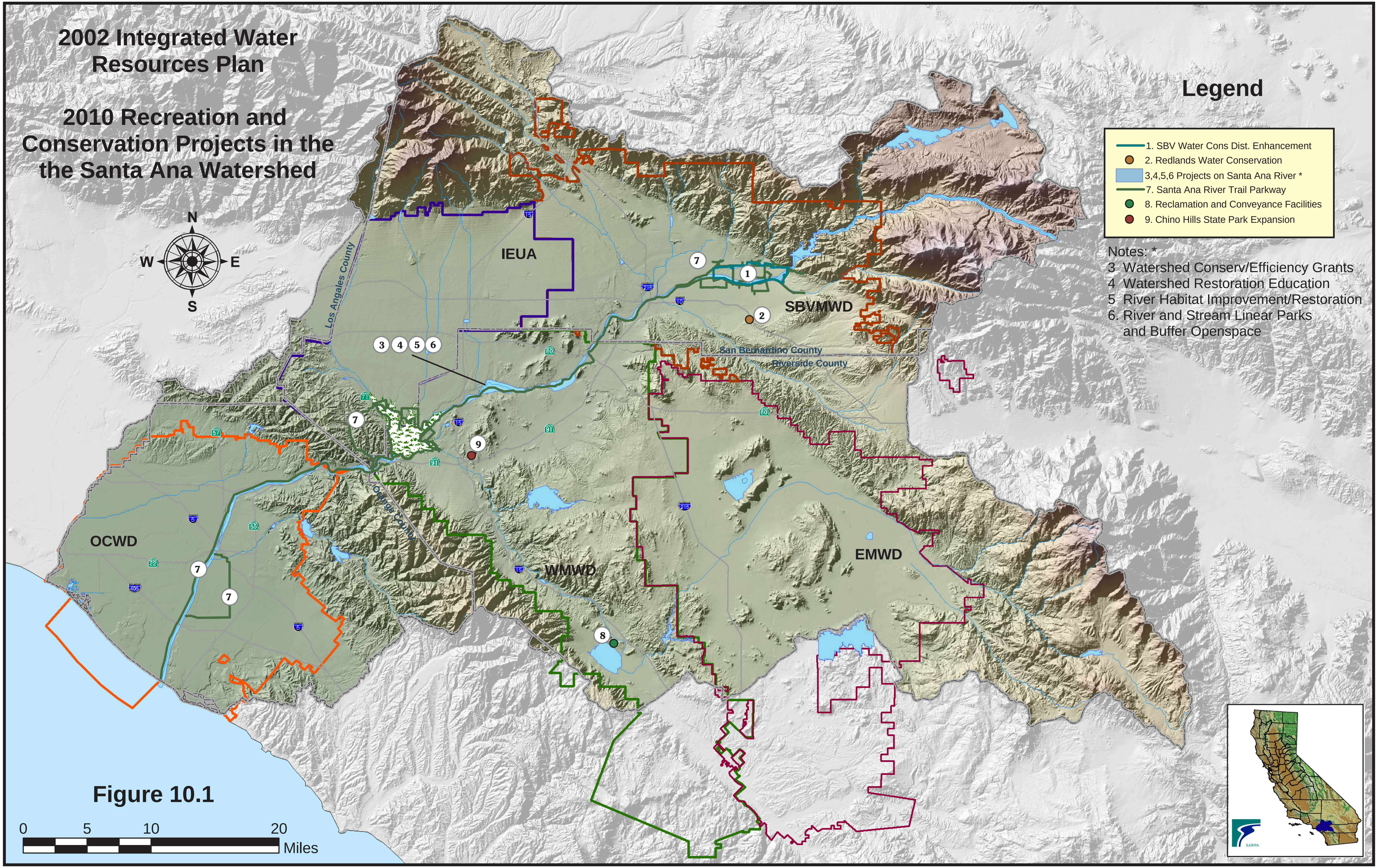
Water conservation is one of several high priority policies actively implemented in the District. Programs such as residential water audits, ultra-low flush toilet replacements, and landscape water audits are well received and quite common. The "conservation awareness" developed during the early 1990's drought appears to have had a permanent effect on the domestic use patterns of EMWD's customers. The conservation reductions seen during the height of the drought have continued as the EMWD's water demand did not return to pre-drought levels until 1999.

Since water conservation is a long-term goal for EMWD, it continues to encourage and support the efficient use of water resources. The intention is to maximize local resources, minimize reliance on imported water, and promote efficient water management practices. As one of the original signatories (February 1992) of the California Urban Water Conservation Council Memorandum of Understanding, EMWD agrees to implement fourteen conservation Best Management Practices on a regular basis.

These efforts are specifically geared to provide a minimum savings by the year 2010 of 8,000 AF of water directly related to conservation/water management. Below are some of the key accomplishments of EMWD's conservation program:

Water Conservation Program

- Received water agency certification, and two years later a "gold star" from ACWA, partially due to excellence in water conservation programs.
- Conducted thousands of residential water-use surveys, which include analysis of water consumption patterns and leak testing of outdoor irrigation systems and all indoor plumbing, at no charge to the customer. About 300 customers take advantage of this service each year, resulting in savings of approximately 40 AFY, or 400 AF during the past ten years of surveys.
- Conducted free landscape/irrigation seminars – attended by thousands or residents over the past ten years, designed to help customers make better use of drought-tolerant plants and to learn proper lawn and irrigation maintenance techniques.
- Distributed over 12,500 free ultra-low flush toilets in the past eight years. This program alone has conserved 3,300 AF of water.
- Implemented 300 commercial landscape projects as part of a water budget program designed to save hundreds of AF of water each year.
- Contributed over $200,000 to assist local municipalities conduct large water-efficient landscape demonstration projects in EMWD's 555 square mile service area.
- Supplied 25,000 low-flush showerhead conservation kits to residents during the past ten years.
- Currently conducting a high-efficiency clothes washer rebate program for both residential and commercial customers. These units are the new front-loading washing machines that are designed to use less water, less soap and less energy.
- The latest water conservation tips are maintained and regularly updated on both a telephone hot line and EMWD's web page.



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10.2 Inland Empire Utilities Agency

IEUA's Urban Water Management Plan Year 2000 Update provides a summary of water conservation and public affairs activities. It addresses efforts currently underway and programs to help target future conservation efforts. IEUA is a signatory to the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California and is a member of the California Urban Water Conservation Council (CUWCC). IEUA has made the State-mandated Best Management Practices (BMP) the cornerstone of its conservation programs and a key element in the overall regional water resource management strategy for the region.

IEUA plans to significantly expand the conservation programs offered within its service area to achieve and, if possible, exceed the state-mandated BMP. By 2020, IEUA anticipates reducing water demands by 24,000 AF of water, or about 7%. During the next five years, IEUA anticipates increasing its funding of water conservation programs from an initial investment of $100,000 in spring, 2001, to an annual investment of $300,000. Additional funding assistance will be sought from entities will be sought from entities such as MWD, State Water Resources Control Board, California Department of Water Resources and the U.S. Bureau of Reclamation.

The elements of IEUA's BMP program are below:

- BMP 1 -- Water Survey Programs for Single Single-family Residential and Multi Multi-family Residential Customers
- BMP 2 – Residential Plumbing Retrofits
- BMP 3 – System Water Audits, Leak Detection and Repair
- BMP 4 – Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections
- BMP 5 – Large Landscape Conservation Programs and Incentives
- BMP 6 – High High-Efficiency Washing Machine Rebate Programs
- BMP 7 – Public Information Programs Information
- BMP 8 – School Education Programs
- BMP 9 – Conservation Programs for Commercial, Industrial and Institutional Accounts
- BMP 10 – Wholesale Agency Assistance Programs
- BMP 11 – Conservation Pricing
- BMP 12 – Conservation Coordinator
- BMP 13 – Water Waste Prohibition
- BMP 14 – Residential ULFT Replacement Program

The elements of IEUA's Long-Term Water Conservation Program are:

1) Participate (IEUA and the retail member agencies) in regional conservation efforts developed by MWD, including the established Conservation Credits Program (for co-funding of specific projects), and conservation pilot projects
2) Promote conservation based rate structures among the retail agencies
3) Increase the involvement of legislators, city councils, business interests and others to help ensure a coordinated approach to regional and statewide water issues
4) Develop and implement regional and local conservation programs that meet BMP goals on a cost effective pooled basis

5) Establish a Water Use Efficiency Steering Committee to help emphasize the multiple benefits efforts in the IEUA service area
6) Acquire grant funding from a variety of sources including the MWD, Environmental Protection Agency, US Bureau of Reclamation and others to offset local funding requirements for local and regional BMP programs
7) Assist in the development and implementation of local retail agency BMP based water use efficiency programs including program design, acquisition of grant funding and implementation reporting to grant funding sources
8) Develop and implement region-wide BMP based water use efficiency programs including requests for proposals, contract management, implementation reporting to retail agencies and grant funding sources
9) Implement the Landscape Performance Certification program to develop Landscape Irrigation Budgets (LIB) to accurately quantify landscape water savings
10) Report IEUA BMP implementation to the California Urban Water Conservation Council and assist member agencies to do the same
11) Monitor and conduct studies of programs regarding water savings, water recycling, and new technologies
12) Respond to member agency requests for presentations to their Boards and customers to advance water use efficiency-related activities. Encourage member agencies to adopt BMP for urban water use efficiency.
13) Focus significant attention on developing programs to cost-effectively achieve quantifiable water savings and other measurable benefits and comply with BMP goals, including Commercial, Industrial and Institutional (CII) Customer Incentive Programs, Large Landscape Irrigation Budgets, Residential ET Irrigation Controller Pilot Program, and High-Efficiency Washing Machine Rebate Programs.

10.2.1 Projects: 2010

Water Conservation Program (Year 2000 – 2005) – This program would use water conservation, along with recycling, to meet a substantial portion of increases in IEUA's service area water demands created by population growth. This goal would reduce IEUA's demand on imported water sources, and would provide a drought proof resource that is not subject to environmental restrictions and weather conditions. As a means to encourage participation by its retail agencies, IEUA has divided its conservation program into five categories:

- Support
- Residential
- Commercial/industrial/institutional
- Landscape
- School education.

10.3 Orange County Water District

10.3.1 Projects: 2010

MWDOC Water Conservation Program – This program proposes the installation of 250,000 Ultra-Low-Flush Toilets, 30,000 Automated Evapotranspiration Based Irrigation Controllers, and 14,000 Residential Water Use Surveys over a five-year period. A cooperative partnership, led by the Municipal Water District of Orange County, Metropolitan Water District of Southern California, Orange County Sanitation District, Orange County Water District, and Orange County's retail water agencies within the SAR watershed, targets implementation of established Water Use Efficiency Best Management Practice for urban water conservation. Specific BMP's targeted include Residential Water Use Surveys, Large Landscape Retrofits, and Commercial, Industrial and Institutional Plumbing Fixture Retrofits.

10.4 San Bernardino Valley Municipal Water District

In the recently completed Regional Water Facilities Master Plan Draft EIR, one of the District's management strategies includes making water conservation an important component for reducing ultimate demands and thereby lowering the need to import large quantities of SWP water. Increased water conservation measures are estimated to reduce ultimate demands by five to ten percent. Some of these conservation measures include increased water rates, distribution of toilet retrofit kits, and long-term public education. Also, plumbing codes now require use of water-conserving fixtures and landscaping standards under the Water conservation in Landscaping Act provide a permanent reduction in unit water demands and will continue to have a significant impact in areas of new development.

10.4.1 Projects: 2010

City of Redlands Water Conservation - This project would replace potable surface water, currently being used for landscape and citrus irrigation, with non-potable groundwater supplies, thereby reducing demand for potable water supplies in the Basin rather than developing new potable sources. By utilizing existing non-potable water sources, the City of Redlands is proposing a project of sliplining 40,000 feet of irrigation canals and pipelines that will make more efficient use of the available water supplies of the Bunker Hill Basin.

San Bernardino Valley Water Conservation District (SBVWCD) Enhancement - This proposed enhancement project would include construction of water conservation percolation basins to replenish the groundwater basins; construction of flood control levees and dikes to protect mineral extraction activities from surface water flooding by waters of the Santa Ana River and Plunge Creek, and construction of horse and hiking trails - including overnight camping; establishment of wildlife preserves and observation stations; and construction of associated utilities and infrastructure.

SBVWCD proposes to enhance the water conservation activities that support the San Bernardino Valley. The Bunker Hill groundwater basin is a vast underground reservoir situated between the San Jacinto fault and the San Andreas Fault at the base of the San Bernardino Mountains. The Santa Ana River is the main surface water system that empties out of the San Bernardino Mountains onto a vast flood plain. About one mile upstream from the canyon mouth, the U.S. Army Corps of Engineers (Corps) constructed Seven Oaks Dam. The impervious fill material for the dam, which was taken from approximately 300 acres of the flood plain, had previously been the site of extensive groundwater percolation basins operated by the Water Conservation District. Now that the dam is complete, the site, although 40 feet below the original surface level, should be returned to its use for water conservation. The Water Conservation District plans to construct a more extensive, yet more effective, network of percolation basins and associated distribution canals and weir structures, and ground level storage of storm flows.

The Water Conservation District has also been coordinating a Proposed Land Management and Habitat Conservation Plan for the Upper Santa Ana Wash, an area of approximately 5000 acres, which encompasses the 300 acres above (Wash). The Wash is considered by the State to have regionally significant deposits of sand and gravel for mineral extraction to support the region's economy. The Wash is environmentally significant because it is the habitat for 19 endangered, threatened, or sensitive species. The Wash is the only expansive area for groundwater replenishment in the upper valley. As a result, a coordinated plan has been developed in concept that will balance these primary land users, while also supporting local needs for recreation and infrastructure, and protection of property from flooding.

Bunkerhill Water Storage and Conservation / San Bernardino Vision 2020 Lakes & Streams Project – This project would seek to remove excess groundwater, use surface reservoirs as storage facilities, while at the same time creating waterfront development areas of new housing, commercial, and recreational uses. The Bunker Hill Basin Groundwater Storage and Conservation Program/San Bernardino Vision 2020 Lakes & Streams project provides the concept of using abundant water resources as a strategic tool for redevelopment and groundwater storage. More specifically, the project objectives are to:

- Utilize excess groundwater as the dynamic force to revitalize areas within the City and provide a new unifying image.
- Strengthen and enhance the existing core of the City and create new waterfront development areas of housing, commerce, and recreation.
- Create an economic engine to improve property values, attract new development, create new employment opportunities, and improve the image of the City of San Bernardino.
- Develop a specific plan, which serves as a framework for the economic and social revitalization of the City of San Bernardino.

The first phase of tasks to be completed include:

- Provide a site specific plan, environmental studies (EIR), cost evaluations, economic development plan; identify specific funding sources, development processes; and prepare documents to process the proposed amendments to the City's General Plan and Development Code.
- Coordinate with the Water Resources Joint Powers Authority in the design, location, and development integration of the lakes and streams.
- Develop design guidelines, concepts, and methods to direct growth and redevelopment of the City of San Bernardino.

10.5 Santa Ana Watershed Project Authority

10.5.1 Projects: 2010

Watershed Conservation/Efficiency Grants - This program would provide water conservation and water efficiency grants to various water supply agencies and others throughout the region. The program could capitalize on new technology as it's developed and provide an important incentive to take bold steps in conservation and efficiency for smaller projects.

Watershed Restoration Education - As a supplement to watershed restoration activities, this program would provide funding for public education of restoration needs and techniques in order that the benefits of restoration projects could be better understood.

River Habitat Improvement/Restoration - This program would fund projects to add and improve lands for river habitat and works in coordination and cooperation with other programs at SAWPA. The funding of acquisition and improvement of habitat for the river is an important piece of the program that creates a working ecosystem along the river. A majority of the river and its close tributaries are in public hands; however, critical parts are privately held or are not cared for sufficiently.

Santa Ana River Trail Parkway – This project would further develop the Santa Ana River Trail and Parkway along the Santa Ana River. These areas would be set aside for conservation, recreation, and historic purposes. Planning and initial construction of parts of the Santa Ana River Trail were performed around 1990. The trail is completed in Orange County and parts of Riverside and San Bernardino Counties. More improvements, however, are needed to complete and upgrade the multiuse trail to connect the San Bernardino Mountains and the Pacific Crest Trail, which run from Mexico to Canada to the Pacific Ocean. This trail would connect important areas in the inland empire cities and counties, thus expanding regional access and availability to existing parks and riverfront areas, as well as providing alternative transportation and recreation opportunities. A large stakeholder group composed of the counties, cities, and environmental groups in the watershed supports the completion of this trail. Project participants include:

- Cities: Anaheim, Colton, Corona, Highland, Huntington Beach, Loma Linda, Norco, Redlands, Rialto, Riverside
- Counties: Orange, Riverside, and San Bernardino
- Others: County Service Area 19 (Chino Hills), National Park Service, Rivers and Trails Conservation Assistance, Orange County Water District, California Department of Parks and Recreation, U.S. Forest Service –San Bernardino National Forest

The funding of additional planning and coordination with construction and augmentation for the existing reaches will make the trail the regional "parkway" for non-motorized transportation. Benefits of the Santa Ana River Trail and Parkway to the region include:

- Continuous multi-use trail system
- Habitat preservation and restoration
- Trail linkage to over 32 regional trails
- System of trail facilities including rest stops, staging areas, campgrounds and trail camps.

- Opportunities for economic development and enhancement
- Cultural and historic elements
- Health and fitness

Below is a list of the various projects that comprise the Santa Ana River Trail Parkway:
- Orange County Staging
- Orange County Enhancements
- Featherly Park Center/Staging
- Prado Planning and Completion
- Wier/Aliso/Gypsum Extension
- River Wash Loop and SBC Enhancements
- Rancho La Sierra Hole Lake
- Van Buren Staging Area
- Corona Prado Completion
- Riverside County Enhancements
- La Cadena Staging Area
- County Line to La Cadena
- Upper Wash Loop Study

River and Stream Linear Parks and Buffer Openspace - This five-year program will substantially improve both environment and water quality for the watershed. The creation of linear parks and buffer openspace along the river and its tributary streams will, like the wetlands described above, provide habitat connectivity and buffer the streams from non-source contamination, thereby improving water quality. These corridors would function for wildlife and human movement with either unimproved path or formal paved trails. The connectivity for wildlife would provide for their continued movement during urbanization of farm and less developed spaces. Local agencies would provide trails in the area for connecting the Santa Ana River Trail with the river and tributaries in the watershed. This would provide an ideal opportunity for connection with local schools and groups to aid education and understanding of the functions of the watershed. The creation of education opportunities in understanding the confluence of these streams and the river would advance and promote how effective these natural treatment systems are. These buffers would additionally provide an increased ability to meet TMDLs and reduce the impacts of non-point source pollution.

Chino Hills State Park Expansion - This project would work to connect the Prado Wetlands and the Chino Hills State Park, which currently are isolated and disconnected, separated by a narrow strip of land. The project area, located directly east of the current park boundary, east and north of the SR-71 freeway, and south of the Santa Ana River, would be acquired from the current landowners. This land would provide for a new entry point into the park and would benefit the environment, habitat, and preserve additional lands for the park areas. This area would also contain the Santa Ana River Trail and provide non-motorized access to the park and additional destinations for the trail.

10.6 Western Municipal Water District

WMWD has taken a leadership role in water education and conservation programs, not only locally but statewide. Staff members serve and take part in DWR water conservation and education committees, MWD education and public affairs committees, America's Clean Water Foundation, and ACWA Public Affairs Committee. Western also has hosted a number of DWR meetings including the Water Education Advisory Committee, CIMIS 21, and DWR/AWWA Leak Detection Workshops.

In March of 1995, Western was recognized by the U.S. Department of Interior, Bureau of Reclamation in Washington D.C. as a recipient of the 1995 Leadership in Water Conservation Award - Education Mentor Category. There were more than 160 nominations nationwide in five categories. WMWD was selected from among 45 entries in the Education Mentor Category to receive this prestigious award.

Western is a signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California and currently has the following 16 BMP programs in place, which are described in detail in the WMWD 2000 Urban Water Management Plan:

- BMP 1 - Interior and Exterior Water Audits for Single Family and Multi-Family Customers
- BMP 2 - Plumbing Retrofit
- BMP 3 - Distribution System Water Audit, Leak Detection and, Repair
- BMP 4 - Metering with Commodity Rates
- BMP 5 - Large Landscape Water Audits
- BMP 6 - Landscape Water Conservation Requirements
- BMP 7 - Public Information
- BMP 8 - School Education
- BMP 9 - Commercial/Industrial Programs
- BMP 10 - Commercial/Industrial Water Use Review
- BMP 11 - Conservation Pricing
- BMP 12 - Residential Landscape Water Conservation
- BMP 13 - Water Waste Prohibition
- BMP 14 - Water Conservation Coordinator
- BMP 15 - Financial Incentives
- BMP 16 - Ultra-Low Flush Toilet Replacement

10.6.1 Projects: 2010

Reclaimed Water Connection and Conveyance Facilities – This LESJWA project would construct a recycled water pipeline to convey recycled water to Lake Elsinore. The project would construct a connection at EVMWD’s Regional Reclamation Treatment Facilities or a connection at EMWD’s discharge pipeline from the Temescal Pipeline in order provide recycled water necessary to stabilize the lake level to maintain recreational opportunities in the lake.

Make-Up Water Purchases – This LESJWA project would purchase water necessary to stabilize the lake level to maintain recreational opportunities in the lake. Up to 15,000 AFY of make-up water would be purchased to offset the annual evaporation of water from Lake Elsinore.

Riverside-Corona Resource Conservation District Agricultural Water Management - This project would conduct a maximum of 15 water management evaluations on large commercial, residential, municipal, and agricultural water use sites in the Orange County area. Evaluations would determine beneficial water needed to irrigate landscape or crops, and provide recommendations on design, maintenance, and cultural practices to reduce water waste and to improve application uniformity and efficiency.

CHAPTER 11 LONG-TERM REGIONAL NEEDS

11.1 Water Supply Deficiencies

One of the major goals of SAWPA and its member agencies is to actively work towards drought-proofing the watershed. In order to adequately weather a drought scenario, thought and planning must be given to time horizons further out than just the traditional ten or twenty years. Finding additional sources of water supply, beyond simply counting on traditional imported sources is of paramount importance. Thought must be given to seeking even more water supply from conjunctive use, recycled water, desalting projects, as well as other creative means of new water supplies.

Table 11.1 below suggests that that the growth within the watershed may actually be far greater than previously thought. The disparity between the two future scenarios for 2025 and 2050 should raise some concern that the SAW region is not adequately accounting for long-term future demands. In most of the member agencies' master plans, for example, water demand was rarely projected beyond 2020. What this comparison suggests is that the member districts within the SAW may need to prepare for more significant growth out to 2025 and 2050 than previously projected.

Table 11.1

Current and Projected Water Growth vs. Population Growth in the Santa Ana Watershed

	2000	2005	2010	2015	2020	2025	2050
Total SAW Population	**5,125,068**	**5,516,902**	**5,835,946**	**6,232,207**	**6,666,743**	**7,192,720**	**9,760,125**
Percentage Increase	**0%**	**8%**	**14%**	**22%**	**30%**	**40%**	**90%**
Total SAWPA Agency Direct Water Demands (AFY)	**1,455,744**	**1,567,930**	**1,685,385**	**1,770,432**	**1,845,517**	**1,891,755**	**2,159,741**
Percentage Increase	**0%**	**8%**	**16%**	**22%**	**27%**	**30%**	**48%**

11.1.1 Imported Water Dependability

In the February 11, 2002 Report on Metropolitan's Water Supplies, the water supply reliability policy objective is: "Through the implementation of the Integrated Resources Plan (IRP), MWD and its member agencies will have the full capability to meet full-service demands at the retail level at all times." The report states that if all imported water supply programs and local projects proceed as planned, with no change in demand projections, reliability could be assured beyond 20 years. The availability of MWD's water supplies is determined by comparing total projected water demand and the expected water supply over the next 20 years.

While MWD's projections are well laid out, there are some areas of concern, primarily involving some of the assumptions. One of the report's assumptions is that reliability could be assured beyond 20 years "if all imported water supply programs and local projects proceed as planned, with no change in demand projections." These factors are extremely dependent on federal and state grant funding cycles, as well as the overall economic cycles over the next 20 years.

Another issue of concern is the dependability of CRA water, which has a high TDS concentration. Solving this issue is of great importance to SAW agencies. Given the salt balance challenges (further discussed in this chapter) within the SAW, several agencies do not import CRA water, and those that do typically require blending with SWP water. As discussed in Chapter 3, the 1998 USBR/MWD Salinity Management Report projects CRA water salinity through the year 2015 to be above 800 mg/L under dry year conditions. During wet year conditions, salinity projections show TDS values between 650 and 800 mg/L. Even if CRA water is available, many SAW agencies may be unable to use it due to water quality issues.

Relying on the delivery of SWP water based on "historical SWP deliveries" may also be suspect, as SWP water has become less available due to environmental constraints in the Bay-Delta. Securing water from this source may become even more difficult in the future. In the 2002 Report on Metropolitan's Water Supplies, MWD shows a 2020 single dry year scenario where it relies upon 70,000 AFY of California Aqueduct deliveries coming from SBVMWD, in addition to an unspecified amount from SBVMWD programs under development.

As part of the MWD 2002 IRP Update, a Report Card will be published on the 1996 IRP implementation. One of the areas as being deficient to date is conjunctive use. In fact, the report will acknowledge lower dry year groundwater storage is expected than the previous 2020 target. All of the above factors considered, eliminating drought year(s) reliance on imported water should still be a major goal within the SAW.

Because MWD's 1996 IRP targeted 2020 reliability and not beyond, the 2002 IRP Update will identify supply sources needed to compensate for the 2020 storage drawdown, as storage levels were left low under the 1996 IRP 2020 scenario. Preliminary estimates place the total supply necessary to ensure sustained reliability at approximately 220,000 AF in *addition* to the 1996 IRP water supply projections.

11.1.2 Long-Term Storage

Though all six major project categories listed in the IWRP contribute to the long-term goal of drought-proofing the SAW, conjunctive use projects are one of the primary components to accomplish this. Local and regional long-term storage projects are not without their challenges to overcome, such as basin capacities, rising groundwater, quality of water stored in aquifers, as well as the effects of injecting groundwater on existing water quality. Economic issues and agreements dealing with such things as infrastructure costs and water supply rights will need to be addressed as well, since many agencies and subagencies simply lack the facilities to pump the necessary groundwater to meet their demands during time of drought. Based on the information collected for this report, however, more conjunctive use projects will be needed to eliminate dependence on imported water during times of drought.

The IWRP also lists a host of desalting, ion exchange, and recycling facilities that are planned for the SAW. These facilities are effective tools to generate not only drought year water supply, but "regular year" water supply as well. By cleansing tainted groundwater supplies or recycling wastewater, previously unusable sources of supply are available to meet water demands. While these new water supplies do not contribute directly to long-term storage, they help reduce reliance on imported water by helping to meet yearly water demands. For these reasons, more of these types of facilities are needed over the next 50 years.

Other planned projects, such as stormwater capture facilities, contribute more directly to both short-term and long-term storage. These projects divert floodwaters to recharge basins, thus converting what has in the past been seen as a dangerous nuisance into a valuable resource. Though a number of these types of projects are planned throughout the watershed, this periodic supply source still remains largely untapped and could make significant contributions to groundwater storage programs.

Imported water is projected to continue to be an important source of groundwater recharge for conjunctive use storage during regular years. This of course allows SAWPA agencies to purchase imported water during times when said water is plentiful, in order that groundwater basins can be replenished for use during dry periods. SAW agencies, nevertheless, will in fact reduce their overall dependence on imported water, even during "regular years," by developing many of the regular year supply sources discussed in Section 11.6.

11.1.3 Water Quality Issues

Water quality issues are an increasing concern throughout the watershed. While newspaper articles appear almost daily to report alarming findings with regard to one constituent or another, the major regional water quality concern remains salt. Currently more salts are being input to the SAW than are being removed. Without reducing salt concentration levels, the groundwater supplies will only continue to increase in salinity, thus resulting in further groundwater degradation and leaving behind a vast compromised resource of high TDS water. Without more immediate and future desalters to halt groundwater degradation, the future cost of treatment will likely result in higher costs of production. To support this, Figures 11.1, 11.2, and 11.4 show the total salt added and removed from the watershed for the years 2000, 2025, and 2050, respectively (assuming implementation of *planned* member agency projects). Each figure divides the SAW into the Upper watershed, the Lower watershed, and the San Jacinto watershed. Figure 11.1 demonstrates that for the year 2000, there is an annual ongoing salt net inflow of 590,000 tons for the entire watershed. Figures 11.2 and 11.4 for years 2025 and 2050, respectively, include the proposed desalting facilities defined by the SAWPA member districts. Even with these projects, a significant salt net inflow of 298,000 tons/year for 2025 and 195,000 tons/year for 2050 remains.

Salt balance is used to describe a basin where the amount of salts entering the basin is equal to the amount of salt leaving the basin. Figures 11.3 and 11.5 illustrate the SAW salt balance in 2025 and 2050, assuming implementation of *both* planned member agency projects and projects proposed in Section 11.6. Figure 11.3 depicts that by adding the additional water recycling and desalting projects to help the watershed reach zero imported water during drought years, the SAW is down to a salt net inflow of 157,000 tons/year in 2025. Figure 11.5 shows that by 2050, the SAW is actually removing 127,000 tons/year more salt than it is receiving.

The salt balance data and method used to arrive at the above figures is found in Appendix C. The method used in the IWRP derived data from a variety of sources to arrive at a relatively simplistic calculation and addresses mass (tons) alone. Because computing TDS inflow and outflow is a complex matter, it must be acknowledged that TDS concentration causes impairment, not mass alone. Impairment from TDS results when the TDS concentration exceeds a threshold concentration that protects beneficial use; nevertheless, while the salt balance calculations do not address TDS concentration, they do serve to provide a valuable overview of the current and estimated future salt accumulation within the watershed. Also, every attempt was made to use the most recent data from the SAWPA member agencies. 2025 and 2050 projections, however, did not take into account possible technological improvements, such as future higher TDS brine concentration for desalters, for example, which could have a significant effect on the amount of salt removed from the watershed.

Achieving salt balance within the SAW requires inputting lower TDS water, and removing and cleaning existing high TDS groundwater. In particular, with conjunctive use storage projects playing such a major role in the watershed, preserving and maintaining high quality water must continue to be a primary objective.

11.1.3.1 Water Softeners

Water softeners are another factor that may increasingly introduce more salts into the watershed. Based on MWD/USBR's 1999 Salinity Management Study, there are currently three types of water softeners for residential and commercial use. All three water softener types regenerate by flushing a high salt brine solution through a water softening resin. The first two types are self-regenerating water softeners (SRWS), which automatically regenerate at the point of use, while the third type is regenerated away from the point of use. SRWS using timers are permanently installed units that automatically regenerate using a timer. SRWS demand-initiated regeneration (DIR) units automatically regenerate when a demand sensor or valve recognizes that the soft water has run out. Exchange-tank units are portable units where a cartridge is changed on a regular basis at an offsite centralized location.

Based on the MWD/USBR study, the total estimated salt used and subsequently discharged to the sewer system ranges from approximately 300 lbs/single family dwelling/yr for the timer unit to 170 lbs/single family dwelling/yr for the DIR unit. The discharge of this salt into the wastewater collection system has a negative impact on recycled water and wastewater plant effluent. For the purposes of the IWRP, the impact water softeners have within the SAW were neither estimated nor factored into any salt balance calculations for several reasons:

- The MWD model performs complex iterative calculations
- There are a variety of water softener units available on the market with a wide range of salt discharge to the sewage system
- Water softener usage tends to increase as potable water salinity increases, while the reverse is also true

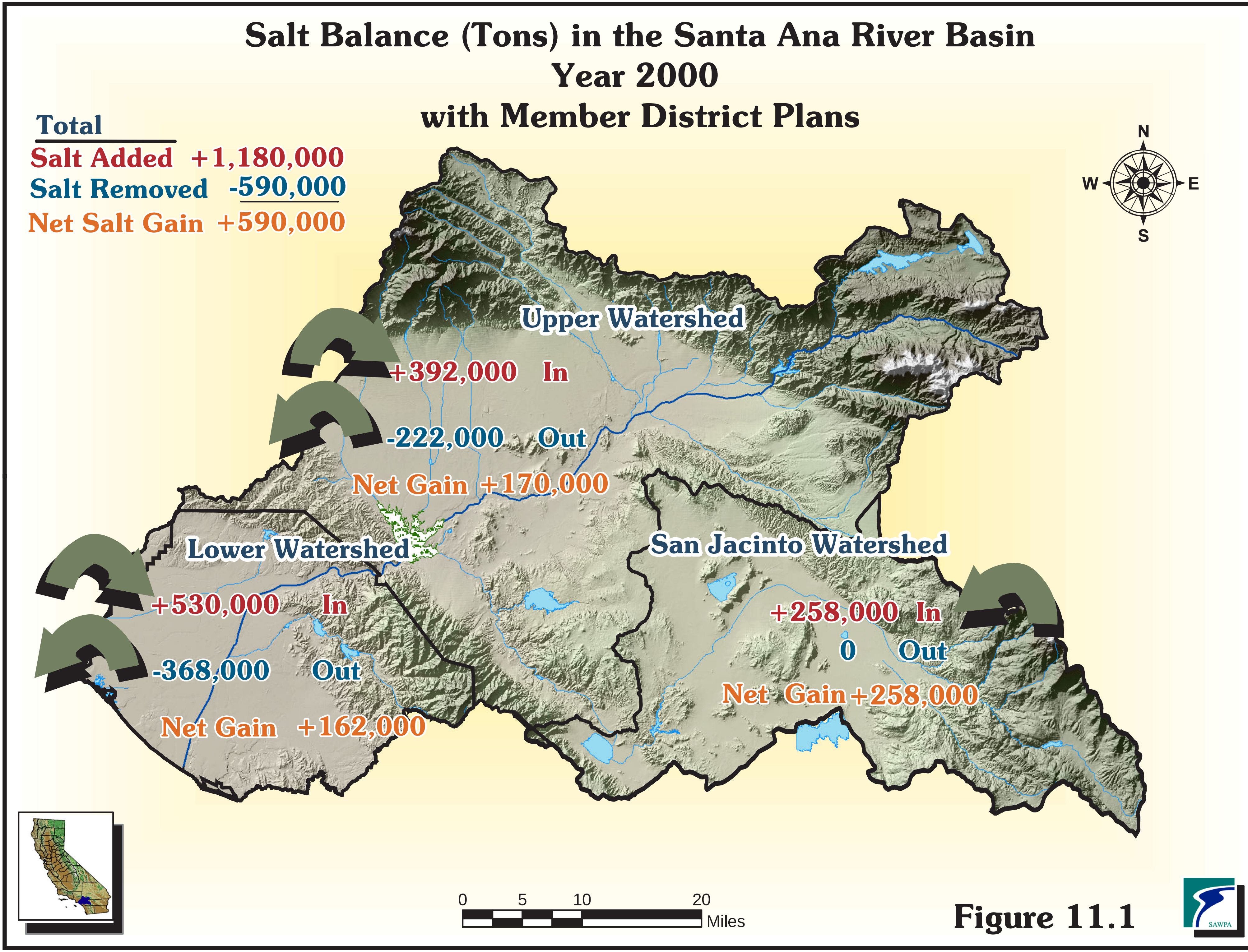

Figure 11.1

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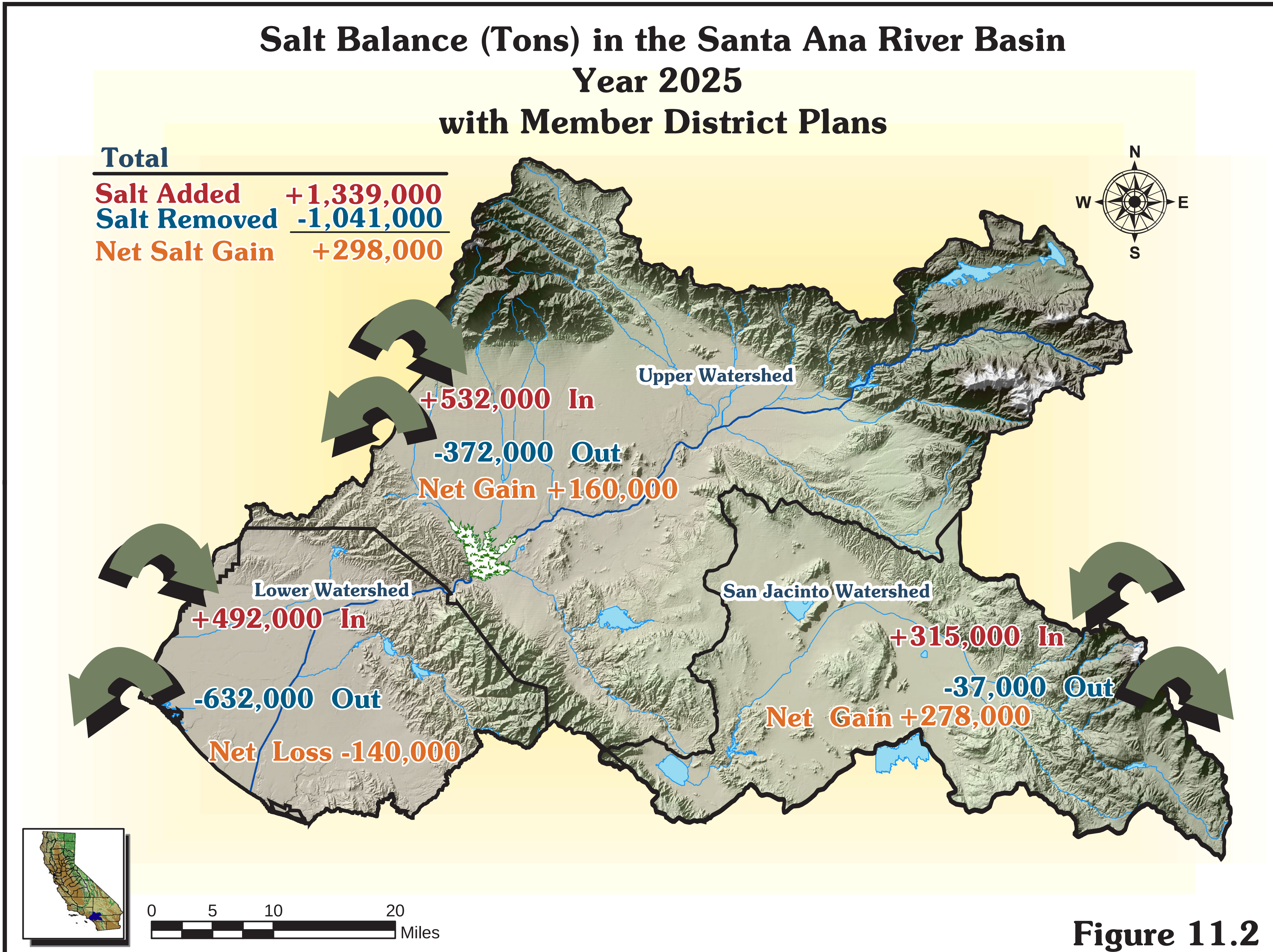

Figure 11.2

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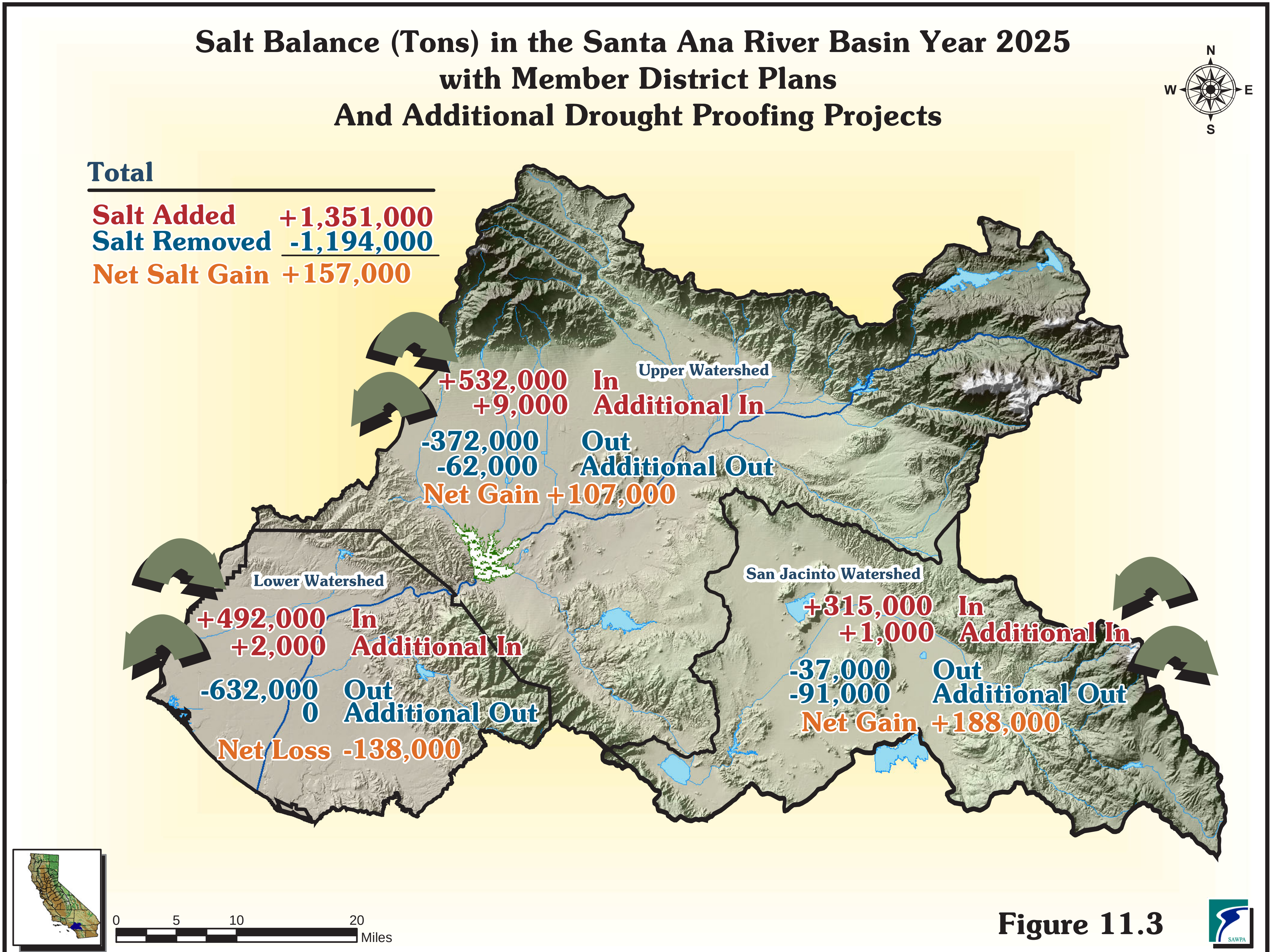

Figure 11.3

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Salt Balance (Tons) in the Santa Ana River Basin
Year 2050
with Member District Plans

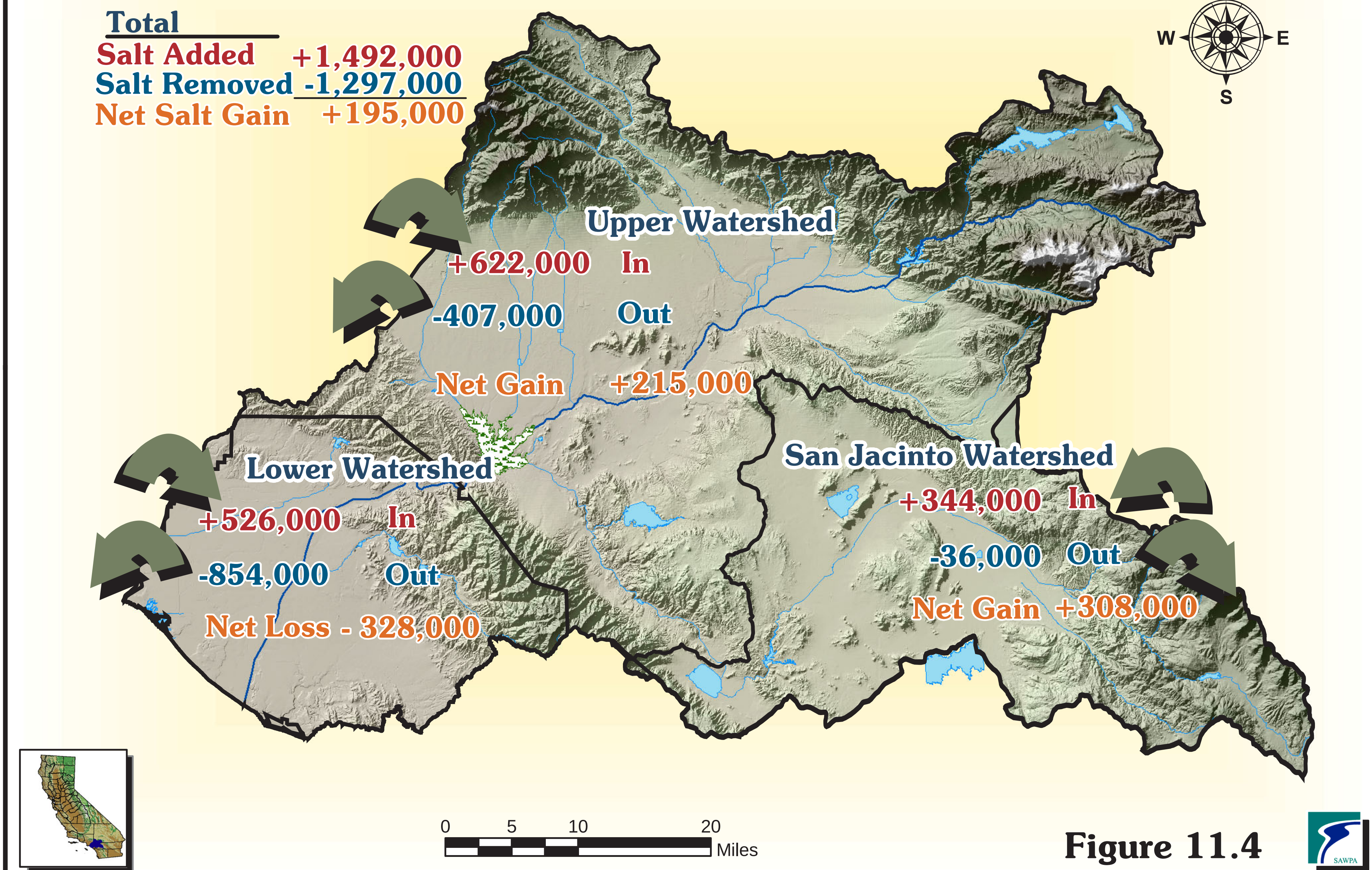

Figure 11.4

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Salt Balance (Tons) in the Santa Ana River Basin Year 2050 with Member District Plans And Additional IWRP Proposed Projects

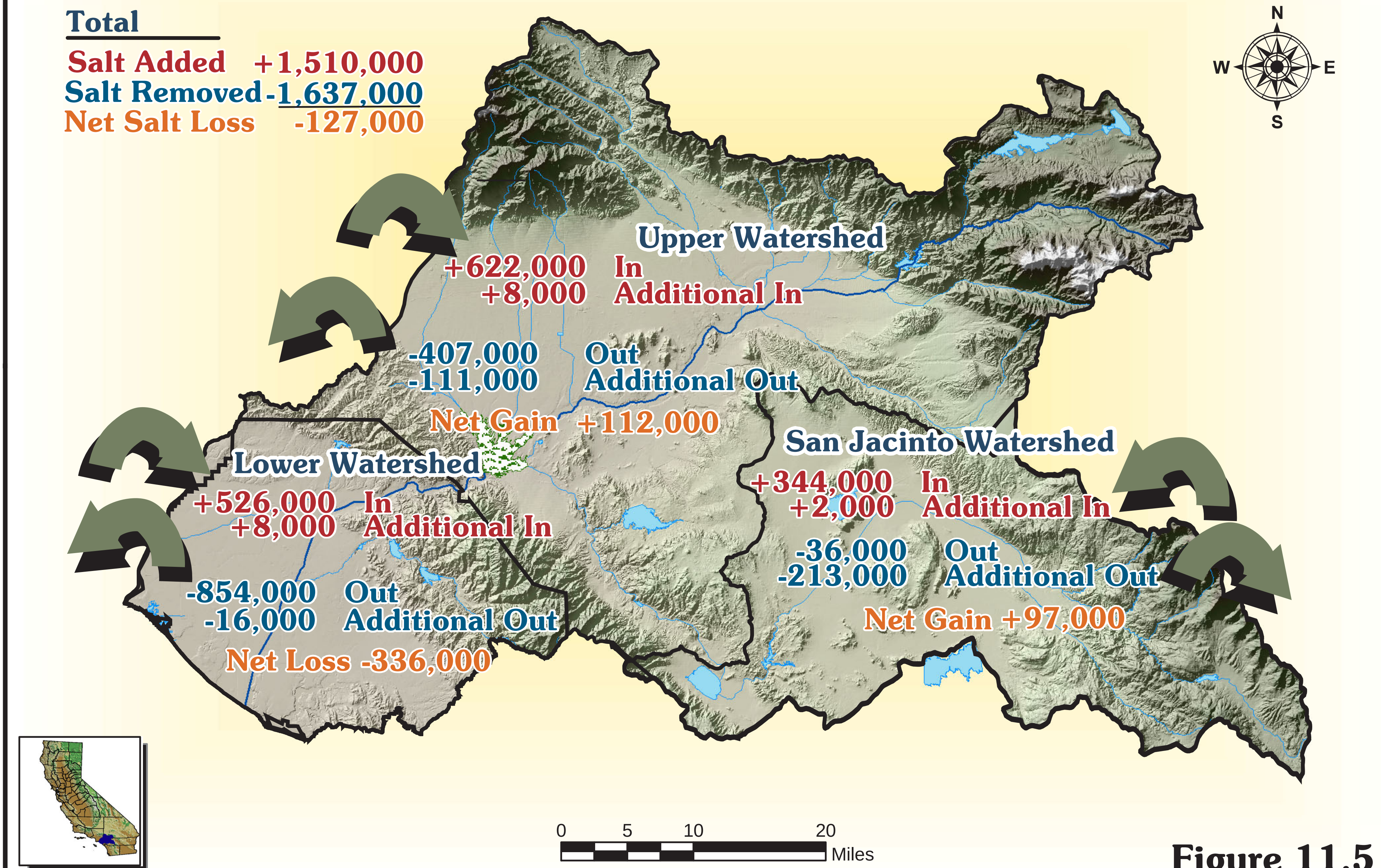

Figure 11.5

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- Changes in water softener technology are difficult to take into account.

The MWD/USBR study further notes that recent attempts to control the use of water softeners have failed because of legal challenges by the Water Quality Association (a home water treatment device manufacturers association). In October 1999, Senate Bill 1006 required that a host of conditions must be met before local agencies could regulate residential water softeners. For example, unless an agency is out of compliance with "waste discharge requirements issued by the California RWQCB," no water softener regulation is permitted. The agency must also further prove that "limiting the availability, or prohibiting the installation, of the appliances is the only available means of achieving compliance with the water reclamation requirements or the master reclamation permit issued by the California RWQCB." Essentially, SB 1006 makes it prohibitive for agencies to place any restrictions on salt discharges from water softeners to sewage systems, and ultimately the watershed.

One possible avenue to address this issue is for water and wastewater agencies to pursue new state regulations or legislation that would provide them with greater authority to regulate the use of water softeners within their jurisdictional areas, while allowing the public to continue enjoying the benefits of water softening. It may even be beneficial for water softener manufacturers and water utilities to pursue actions of common benefits, such as improved salt use efficiency and other advances in technology.

Most recently, the Salinity Management Coalition of Southern California is overseeing a consumer profiling study within IEUA's service area. This study consists of the collection and analysis of consumer behavior regarding the use of water softeners. The first goal of this project is to measure the fundamental knowledge of consumers in terms of their motivation (or lack of) in using water softeners, their knowledge of the damage caused by water softeners, and how consumers acquire water softener service. A second goal is to determine what, if any, optional incentives or motivators could be used to encourage consumers to remove, replace, or upgrade water softeners in their homes. Examples of incentives might be monthly reduction of water rates or direct rebate for removing or changing out existing equipments. Both IEUA and the National Water Research Institute will help to identify the top three or four incentives. This study commenced in June 2002 and ends in November 2002, and is only the first phase in a long-term effort to reduce the amount of salts that water softeners introduce into the watershed. As the various phases of this effort are completed, further updates may be appropriate in a future IWRP document or as a separate report.

11.1.3.2 Other Constituents

In addition to high TDS problems, a host of "other constituents" are of concern as well. Although there are no specific projects addressing other constituents for the 2025/2050 time horizon, they deserve a brief mention, mainly to acknowledge that they remain a continuing threat to water supply quality. Chapter 3 describes in detail the rapidly evolving regulations pertaining to perchlorate, arsenic, pharmaceutical and personal care pollutants (PPCP), and MTBE. The relentless advancement of technology, which allows more and more constituents to be detected at smaller and smaller levels, suggests that water quality standards will only become more and more rigorous. As a result, water supplies that have traditionally been relied upon may require future mitigation that was not required in the past. While the constituents discussed in this IWRP are only a fraction of the constituents that have made headlines within the SAW, future studies and technologies will likely threaten more and more water supplies. It is probable that ion exchange facilities, which are effective in removing not only TDS, but also constituents such as nitrates and perchlorates, could be used in groundwater cleaning.

11.2 Regional Conjunctive Use

Achieving regional conjunctive use is a goal of both this IWRP as well as MWD's IRP. In their 1996 IRP, MWD listed groundwater conjunctive use as one of the primary goals to "optimize" the use of local groundwater basins for regional storage. The report concluded that an emergency requirement and drought carryover requirement of 800,000 AF of annual storage production was still needed for the MWD service area.

Because the above goal of the 1996 IRP has not been met, conjunctive use storage will again be identified in MWD's 2002 Integrated Resource Plan as a necessary component of regional planning for Southern California. While current MWD planning and implementation of conjunctive use storage has taken place primarily in regions outside of Southern California, recent changes in the Cal Fed process and new local agency consensus building efforts should allow for an aggressive implementation of conjunctive use storage.

As of the writing of this IWRP, the only SAW conjunctive use programs identified in the 2002 Report on Metropolitan's Water Supplies are 20,000 AFY and 33,000 AFY available from OCWD and Chino Basin Water master programs, respectively. These supply sources are both projected to be available by 2006. Aside from these projects, however, MWD's goals for regional conjunctive use are still uncertain; thus SAWPA agencies may want to consider the necessity for further conjunctive use projects, which are described later in this chapter.

11.3 Desalting/Ion Exchange Facilities – New Supply

To address the salt imbalance problems discussed earlier, an aggressive program to construct desalters, ion exchange facilities, and brinelines would not only protect the integrity of the groundwater, but also create a new water supply source to meet growing demands, and ultimately reduce reliance on imported water.

While the desalter projects specifically identified in the IWRP would help to remove groundwater with high salt levels, larger-scale desalter projects and programs will still be necessary to reduce or stabilize salt concentrations in the recharge water itself. Without implementation of additional source-water salt removal programs, further increases in salt concentrations will occur in local groundwater supplies.

11.3.1 Santa Ana Regional Interceptor (SARI)

As part of the solution to the TDS issues within the watershed, SAWPA has constructed approximately 93 miles of the 16 inch to 84 inch SARI, which is currently connected to OCSD treatment facilities. SAWPA owns capacity rights in SARI downstream of Prado Dam and owns the SARI pipeline upstream of Prado Dam.

With projected future growth, both developmentally and economically, the SAW's reliance on this 100 mile long pipeline will continue to be a critical factor in the overall plan to minimize future drought impacts, achieve the desired salt balance, and improve the quality of the water resources in the upper SAR basin. Therefore, maintaining the integrity of the SARI line and optimizing its future use are of utmost importance. To these ends, in 2002, SAWPA initiated a "Santa Ana Regional Interceptor (SARI) Planning Study" to assess future opportunities for enhancing the beneficial use of this vital lifeline.

One of the goals of the planning study is to ascertain where future reaches of the SARI will be needed and for what capacity. One of the key issues being evaluated is whether the SARI will continue to carry both brine and wastewater flows, or whether it will be devoted primarily or solely to brine disposal. What is certain is that in order to transport the additional brine from new desalters, more brinelines have to be constructed. Extension of the Santa Ana Regional Interceptor (SARI) brineline is planned for additional salts removal from the San Jacinto portion of the watershed. Reach 5 of the SARI brineline, called the Temescal Valley Regional Interceptor (TVRI) was completed at the end of 2001. The brineline is located in Temescal Canyon and runs from the SARI connection in the City of Corona to the EMWD brineline terminus in the Lake Elsinore area. EMWD's Menifee Desalter and other high salinity dischargers from EMWD and WMWD now have access to this line for brine disposal. Construction of the TVRI increases the feasibility of inland wastewater reclamation by providing for brine disposal. OCWD is also assessing the feasibility of constructing an Orange County brineline as part of the proposed Irvine Desalter. This line would connect to the SARI line and allow for the direct removal of salts from the Orange County groundwater basin.

SARI existing maximum capacity is roughly 30 MGD. According to the Planning Study, the 2020 flow is estimated to be approximately 35 MGD (excluding 6.6 MGD of domestic discharges) based on existing plans. The desalter/ion exchange projects (north of the Orange County line) described in Section 11.6 could account for an additional estimated 25 MGD by 2050, for a potential SARI flow total of 60 MGD at the Orange County line. Some possible long-term solutions to address increased brine flows resulting from 2020 planned flow increases and 2050 IWRP desalting/ion exchange facilities are:

- Eliminate domestic discharges to the SARI (already assumed)
- Increase brine salinity
- Construction of on-site storage facilities for peak flow control
- Construction of concentrating desalters for SARI flows
- Construction of additional brine lines.

11.4 Water Recycling Expansion – New Supply

One of the most dependable, abundant and under utilized supplies of water in the SAW is recycled water. Recycled water projects represent new locally developed water supplies that offset demands on currently used potable supplies. Because wastewater continues to be generated during shortage periods, recycled water is available even during times of extreme drought. Recycled water supplies represent a drought insurance policy that protects regional economies by allowing potable water supplies to be stretched that much further when recycled water, *not* imported water, takes up the drought shortage slack. While Table 2.2 shows that a significant increase of recycled water supply has been projected for the SAW, a more aggressive water recycling program will be necessary to cut down on future import demands. In fact, Table 2.2 was based on SAWPA member district projections and does not take into account the long-term population growth for the SAW mentioned earlier in this chapter. Should the population projections prove to be accurate, an even greater amount of recycled water would be available as an additional water supply.

As noted in Chapter 7, the average annual adjusted base flow required by the 1969 Stipulated Judgment is 42,000 AFY. With the various agencies' projected increases in water recycling (Table 7.1), SAR flows are estimated to remain well above this minimum requirement; however, if the additional water recycling projects suggested in Section 11.6 are constructed, SAR flows may be significantly reduced. Another potential issue may be that SAR flows may also be required to maintain a minimum level for environmental reasons, such as providing an appropriate habitat for the Santa Ana Sucker or other threatened or endangered species.

11.5 Ocean Desalination

The ocean represents a potentially unlimited source of water supply. Although there is often public support for this resource, ocean desalination is currently limited by its high cost, environmental impacts of brine disposal, and siting considerations. MWD's 1996 IRP notes that feasibility studies on potential projects indicate that about 200,000 AFY could be developed by 2010. Based on current technology, the costs for desalination of ocean water for potable uses ranges from \$700 to \$1,200 per AF, depending on the type of treatment and the distribution system that would be required to deliver the water. MWD has already tested a modified distillation process desalination test unit, and plans to keep the desalination facilities as a viable option for 2025 and beyond.

OCWD is the sole SAWPA member agency that borders the coastline. Although high costs may currently limit this resource, ocean desalination may prove to be an important strategy in the future. As the cost of ocean desalting decreases, it eventually may become increasingly cost-effective for OCWD to investigate, possibly in conjunction with MWD, this tremendous water resource. With the ongoing advancement of technology, ocean desalination may one day become a significant source of supply for OCWD.

Two ocean desalination plant projects are currently under review and development in Orange County. The first project, located within the watershed, is the 25 to 50 MGD Orange County Ocean Water Desalination Project at Huntington Beach. MWDOC is currently developing a proposal for a 27 MGD (or greater) ocean desalination plant in Dana Point, outside the watershed. Estimated production costs are approximately \$800/AF. The MWDOC project and five others were selected for the next round of MWD grant submittals. It is likely that a programmatic approach to ocean desalination could evolve out of the RFP process and the 2002 MWD IRP Update. While only OCWD (and MWDOC) border the Pacific Ocean in the

SAWPA, possible uses of ocean desalination would be for water exchanges involving MWD and other parties.

11.6 Scenarios for Zero Imported Water During Drought Year

Table 11.2 lists a series of proposed supply sources, broken down by each SAWPA member agency, that would help achieve zero imported water by 2050 during a drought year. Imported water demands during a drought year were estimated to be 7% above normal or regular year demands. According to MWD staff, this is a realistic estimation based on their drought year modeling experience. This increase is based on the assumption that warmer weather would result in some increased demands, largely due to agricultural and perhaps some residential landscape needs.

For each agency, the projected drought year demand is shown at the top for the years 2000, 2010, 2025, and 2050. Underneath these projections are listed those projects that were *not* taken into account for the water supply and demand projections listed back in Chapter 2. For this reason they are listed here as *additional* sources of supply. These supply sources are grouped together into three categories:

- Conservation – This represents the amount of projected long-term conservation for the appropriate year. For projection purposes, conservation is seen as a long-term and ongoing goal, not just a short drastic "savings" due to drought conditions. As such, the conservation savings is treated as a supply source, and is assumed to be roughly the same quantity in both regular year and drought year conditions. As discussed in Chapters 2 and 10, long-term water conservation is considered as a source of supply *only* for the 2025 and 2050 scenarios.
- Regular Year - These projects are intended to be in service on an annual basis. In the context of the 2025 and 2050 scenarios, they include recycled water projects and desalting/ion exchange projects.
- Drought Year – These projects are typically conjunctive use projects, intended specifically for storing water for use during drought years. The flows shown are based on stored water and therefore cannot be considered as permanent supply sources. The take period is limited to three years only, which is based on a standard take period used by MWD for conjunctive use programs.

Table 11.2 defines supply sources necessary to achieve zero imports during a drought year. For the entire region, these sources would create over 671,000 AFY of drought year water supply for 2050. Figures 11.6 through 11.15 summarize the information in Table 11.2 by member district and identify each agency's *planned* water supply to be developed through conjunctive use, desalting, and recycling projects.

Below is a summary of those projects, which are *not* incorporated in existing agency plans, to be considered to drought-proof the SAW for the year 2050.

11.6.1 Eastern Municipal Water District

EMWD may need to implement a series of projects that were not reflected in the water demand and supply projections (Tables 2.1 and 2.2) to meet future demands beyond 2025. The first group of projects (Regular Year), to help achieve drought-proofing EMWD's service area would also be in service during regular water years. The Recycled Water Projects are listed as a viable source for providing 2,000 AFY of additional supply water in 2050. Conservation accounts for 21,000 AFY in 2050.

The Groundwater Desalting projects show that approximately 78,000 AFY of groundwater desalting facilities may be required for additional water supply in 2050. Of course, with a brine TDS of 5,000 mg/L, the desalters could also remove about 530,000 tons/year of salt. EMWD's recently completed preliminary groundwater model runs concluded that over nine future desalter wells would be necessary to help remove significant amounts of salt, dewater problem areas, and become a new source of water supply for EMWD. What Figures 11.1 – 11.5 demonstrate is that additional desalter expansions and new desalter facilities will also be necessary to help further remove salts from the San Jacinto Watershed area that much of EMWD covers.

The primary groundwater storage projects are the Hemet/San Jacinto Conjunctive Use Cross Basin and Pipeline, Hemet Conjunctive Use/Long Term Shift, and Lakeview Conjunctive Use/Long Term Shift, which are described in detail in Chapter 5. An additional groundwater storage project is the San Timoteo Conjunctive Use (STCU), which is described further in this chapter. The STCU is listed here as a possible project in order to help EMWD achieve drought-proof status by 2050. It is conjectured in this report that out of 33,000 AFY, 28,000 AFY could possibly be moved from STCU to EMWD during a 2050 drought year. An additional 67,000 AFY could be obtained as a transfer from the Chino Basin. Together, all five projects could contribute 113,000 AFY during a 2050 drought year.

11.6.2 Inland Empire Utilities Agency

The first project type listed for IEUA is for 4,000 AFY of recycled water by 2050. This project, coupled with a 22,000 AFY of additional desalting/ion exchange facilities would provide new water sources on a regular year basis. Besides providing new water, the desalters could provide approximately 90,000 tons per year of salt removal, based on a 3,000 mg/L TDS brine concentration. Conservation accounts for 34,000 AFY in 2050.

With regard to conjunctive use projects, 50,000 AFY could be derived from Regional Conjunctive Use for the Chino Basin, which is described further in Section 11.7.

In total, future projects must generate 110,000 AFY of new water supply in order to meet the drought year water demand projections for 2050.

11.6.3 Orange County Water District

Phases II and III of the GWRS are estimated to be constructed by 2025. OCWD, however, included both projects in their supply projections listed in Table 2.2; for this reason, they are not seen as additional supplies here. Recycled water projects could provide 7,000 AFY of supply water, while ocean desalination projects could supply 11,000 AFY in 2050. Given a brine TDS of 2,000 mg/L, the latter projects could also remove 30,000 tons of salt per year. Conservation accounts for 58,000 AFY in 2050.

The primary conjunctive use project from which OCWD could obtain drought year water supply is the Chino Basin Regional Conjunctive Use (17,000 AFY). All totaled, the above projects could supply 93,000 AFY in lieu of imported water during a 2050 drought year.

11.6.4 San Bernardino Valley Municipal Water District

Because SBVMWD is located toward the upper areas of the SAW, only 2,000 AFY of supply is listed to come from recycled water in 2050. Up to 18,000 AFY, however, could be supplied by the Lower Bunker Hill Desalter, which would be used to remove various contaminants from the San Bernardino basin. Conservation accounts for 25,000 AFY in 2050.

Two conjunctive use projects shown for SBVMWD are San Bernardino Conjunctive Use and San Timoteo Conjunctive Use. 60,000 AFY of underground stored water might be obtained from the San Bernardino project, while 5,000 AFY could be used from San Timoteo Conjunctive Use during a 2050 drought year. The total 2050 drought year supply from both year round and conjunctive use projects is approximately 110,000 AFY.

11.6.5 Western Municipal Water District

To meet WMWD's 2050 drought year demands, 4,000 AFY of recycled water projects are proposed, along with 22,000 AFY groundwater desalting/ion exchange projects. Assuming a brine TDS of 1,100 mg/L, desalting projects could remove 33,000 tons of salt on an annual basis. Conservation accounts for 43,000 AFY in 2050.

WMWD could draw from two primary conjunctive use projects: San Bernardino Conjunctive Use (40,000), and Chino Basin Regional Conjunctive Use (33,000). In a 2050 drought year, WMWD could receive 142,000 AFY from all five of the above projects.

11.7 2025/2050 Project Descriptions

The projects discussed in the previous section are described below. The projects are also listed in Table ES.1, while the locations are shown in Figure 11.16.

11.7.1 Eastern Municipal Water District

All three of the below projects are described in Chapter 5 under year 2010. According to EMWD Staff, however, the combined storage of 55,000 AFY was *not* included in EMWD's water supply projections (Table 2.2). For this reason, the combined yield of all three projects is listed under the 2025/2050 time horizon.

Hemet/San Jacinto Conjunctive Use Cross Basin & Pipeline – This project would construct a pipeline to convey untreated State Water Project (SWP) water from EM-17 to 100 acres of recharge ponds to be constructed in the bed of the San Jacinto River. Up to eight recovery wells would be constructed as well. A transmission pipeline to tie the distribution system in the Hemet-San Jacinto area to transmission pipelines that are connected to the Western portions of the district would result in up to 40,000 AFY of seasonal storage and 45,000 AFY of long-term storage for drought relief.

Hemet Conjunctive Use/Long Term Shift – This project could develop up to 25,000 AF of long term seasonal storage in the Hemet subbasin through the construction of a feedwater pipeline and injection recovery wells. The project would provide drought relief (in-lieu use of stored water to reduce demands on MWD) as well as helping to control salinity intrusion from the Winchester area from impacting higher quality local wells.

Lakeview Conjunctive Use/Long Term Shift **-** This project would construct pipelines and injection/recovery wells in the Lakeview subbasin. Up to 10,000 AFY of filtered water from MWD's Mills filtration Plant would be used to recharge the Lakeview subbasin and provide regional long-term drought relief. In conjunction with the Perris Desalters, this project would help control salinity intrusion, which currently threatens high quality groundwater in Lakeview.

11.7.2 Inland Empire Utilities Agency

Regional Conjunctive Use – Chino Basin – In order to maximize the available resources within the region, the conjunctive use of the Chino Basin should be considered to provide for long-term storage capability. One regional possibility is to establish a basin storage capacity of 500,000 AF within the Chino Basin, which was approved in the OBMP. It should be noted that existing potable water well capacity is over 300,000 AFY.

IEUA, the Chino Basin Watermaster, Chino Basin Water Conservation District, and the San Bernardino County Flood Control District are cooperatively implementing a Recharge Master Plan to develop increased recharge capacity of up to 150,000 AFY. As indicated in the OBMP Recharge Master Plan Phase II Report, recharge water could consist of a blend of stormwater, recycled water, and imported water. An additional 30,000 AFY to 40,000 AFY of in-lieu water could also be available for recharge purposes. One possible scenario is that some agencies would use imported water during wet years in lieu of pumping groundwater. During dry years, the unused groundwater would then be available for dry-year yield.

As indicated in the Chino Basin OBMP, major impediments to large-scale conjunctive use in Chino Basin include water quality and conveyance issues. These obstacles would have to be overcome by working with the Chino Basin Watermaster agencies to help assure that acceptable water quality would be provided to all agencies participating in the conjunctive use program. Agencies would also have to work together on implementation of the storage program and mitigation of any operational impacts.

The stakeholders are currently evaluating several alternative scenarios to better define facilities needs and costs to implement various size storage and recovery conjunctive use programs. This analysis is scheduled for completion by the end of 2002. The stakeholders are actively exploring various funding opportunities to implement the program, once the facilities needs and costs are determined.

11.7.3 Orange County Water District

Because both of the below phases of the GWRS are already included in the water supply projections from Table 2.2, they are not listed as an additional water supply source. Because they are projected to be constructed after 2010, however, they are listed in this section of the IWRP.

Groundwater Replenishment System (GWRS), Phase II - This project would consist of the second phase of the GWRS and would treat an additional 33,600 AFY to the 75,000 AFY of treatment from Phase I (See description from Chapter 5). CEQA is complete.

Groundwater Replenishment System (GWRS), Phase III - This project would consist of the third phase of the GWRS and would treat an additional 33,600 AFY to the 108,600 AFY of treatment from Phase I and Phase II (See description from Chapter 5). CEQA is complete.

11.7.4 San Bernardino Valley Municipal Water District

Three of the below projects, designated by an asterisk (*), received CEQA clearance as a result of the Regional Water Facilities Master Plan Final EIR. Fourteen other projects that received CEQA clearance are listed in Chapter 5 under the 2010 time horizon.

San Bernardino Conjunctive Use Facilities –The components of this project are included in the 2010 time horizon, primarily because many of the components already have CEQA clearance and SBVMWD Staff thought it realistic to include these projects under that time horizon. The overall conjunctive use program, however, is listed under the 2025 time horizon because it would require extensive state and federal funding to complete.

This 300,000 AF conjunctive use storage project is proposed in the San Bernardino Basin area, which includes both the Bunker Hill and Lytle Creek Basins. Assuming a three year drought storage, 100,000 AF could be provided on an annual basis. This amount of storage could provide extensive reliability in times of drought or emergency storage. Once a rate structure is established, these significant quantities of stored water could be used by other agencies to provide important drought protection.

Another major component of the conjunctive use program for Bunker Hill would be the necessary conveyance facilities to deliver the stored flow as needed. As defined in the SBVMWD Master Facilities Plan and again in this IWRP under Water Storage, several new pipelines are proposed to deliver flow from the centralized treatment facility and good quality wells to areas of demand. In addition to the previously mentioned Baseline Feeder, additional conveyance facilities proposed seek to provide the conjunctive storage for customer throughout the region including potentially DWR and MWD. The uncertainty of the availability of imported supplies has placed new emphasis on the value of developing local conjunctive storage. This conjunctive storage could be used locally within the confines of SBVMWD, or regionally, for agencies such as the San Gorgonio Pass Water Agency, WMWD or EMWD.

Additional Conjunctive Use Facilities – The project described above is beyond the scope of SBVMWD's Regional Water Facilities Master Plan. For the above conjunctive use project to be truly regional, a number of facilities, such as additional feeder lines and pump stations, would be necessary to transport water to EMWD, and possibly WMWD. Because this project is still somewhat conceptual, cost estimates would need to be determined.

****Central Feeder East (East of San Bernardino PS)*** – This project consists of the construction of 22,800 of 48 inch diameter pipeline that would also initially transport State Water Project water to the east. Ultimately, the pipeline may allow SBVMWD to convey San Bernardino Basin groundwater to the Yucaipa area and to the San Gorgonio Pass Water Agency.

****Redlands Pump Station*** – This 100 CFS capacity facility would pump water from the Redlands Reservoir into the Central Feeder and to the Mentone.

****Redlands 5 MG Reservoir*** – This five million gallon covered steel tank reservoir would provide additional regulatory storage for the City of Redlands.

Supply Wells (7) – This project would construct seven supply wells, most likely to be located in the Bunker Hill Basin. The wells would be used to remove excess groundwater and would tie into the Baseline Feeder Extension North/South Alignment.

Yucaipa Connector – This project would construct 8,500 feet of 48 inch pipeline with a capacity of 100 CFS. The pipeline would convey water from the Crafton Hills Pump Station to Yucaipa Valley and the San Gorgonio Pass Water Agency.

San Bernardino Pump Station #2 – This 100 CFS capacity pump station would pump water from the San Bernardino Reservoir to the Redlands Reservoir.

Foothill Pump Station – This 100 CFS capacity pump station would boost pressure to overcome frictional head loss in the existing Foothill Pipeline. This would increase the maximum capacity of the east portion of the Foothill Pipeline, and would allow eastward distribution of more non-potable imported water.

Mentone 100 MG Reservoir – This 100 million gallon open reservoir would be filled from either potable or non-potable water sources, depending on demand and availability. The reservoir would provide over four days of emergency storage for both the Hinckley and Tate water treatment plants at 12 MGD each.

San Timoteo Conjunctive Use Facilities – This conceptual project, described in the San Timoteo Watershed Management Authority's Draft Version 1.2 San Timoteo Watershed Management Program, could provide groundwater storage of approximately 100,000 AF for conjunctive use within the SAW. Estimated unused storage capacities in the Beaumont and Yucaipa basins ranges from 200,000 to 400,000 AF. The facilities required for supplemental water deliveries and conjunctive use include: expansion of existing and future groundwater production capacity to enable peak summer demands to be exclusively supplied from groundwater; construction/expansion of surface water treatment plants to maximize in-lieu recharge, direct recharge through injection, and to meet peak summer demands; expansion of groundwater recharge facilities to enable large quantities of supplemental water recharge during wet years when surplus water is available; and regional water conveyance facilities to move groundwater and treated imported water to users, and to move imported water to recharge basins and injection wells.

Lower Bunker Hill Desalter – This project would construct up to 12 wells (2,000 GPM capacity) in the San Bernardino Basin, beyond the six proposed in the high groundwater pump out project. These wells would be needed to deliver flow to the centralized treatment facility. While the water in the San Bernardino basin is generally of excellent quality, several contaminant plumes do exist in the basin, which could potentially threaten the effective use of the stored water for conjunctive use. Water agencies in the San Bernardino Basin have proposed a centralized treatment facility to address many of the converging TDS, TCE, PCE, and perchlorate plumes that threaten the basin's water quality. Located near the confluence of the Santa Ana River and Lytle Creek, the treatment plant could provide basin cleanup. Granulated activated carbon and reverse osmosis are currently considered the best treatment technology to date to address the contaminant levels. Promise has also been shown in biological treatment processes being developed by U.S. Filter Corporation and Envirogen, Inc. to remove perchlorate. Early estimates from SBVMWD consultants indicate that the centralized plant's capacity would need to be designed to treat approximately 50 MGD of pumped flow. Since 12 MGD of the plant design capacity was proposed under the San Bernardino Basin High Groundwater Pump Out project, an additional 38 MGD of treatment capacity would need to be budgeted.

11.7.5 Western Municipal Water District

Prado Groundwater Replenishment – This conceptual project would be a joint project between IEUA, OCWD, and WMWD. The project would treat surplus water returned to the Santa Ana River (downstream of Riverside Narrows and upstream of Prado Dam) through microfiltration, ultraviolet, and reverse osmosis treatment. Surplus water could be placed in the Riverside and Colton groundwater basins, provided to OCWD, or serve as a source of supply for the City of Corona. Because surplus recycled water discharged to the SAR is projected to be abundant in the 2020/2050 time horizon, the water for this project would be beyond OCWD's capacity for recharge. Discharge to the SAR is currently projected to be over 240,000 AFY by 2050. The 1969 Stipulated Judgment average annual adjusted base flow at Prado Dam is 42,000 AFY. Even should 140,000 AFY reach Prado Dam, approximately 100,000 AFY could be available for conjunctive use. While this project was included as a potential supply source during drought years (Table 11.2), no actual supply amount was associated with it. This is primarily due to the fact that the project is perhaps more conceptual than others; nevertheless, the project is viable enough to consider for future project development.

Table 11.2
Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

EMWD

Year	2000	2010	2025	2050
Regular Year Imported Demands	68,000	98,700	132,700	200,800
Drought Year Imported Demands (7% Increase)	72,760	105,609	141,989	214,856

IWRP Supply Sources <u>Not</u> Included in Agency Water Demand Projections

Conservation*	0	11,675	17,174	21,490

Regular Year

Recycled Water Projects (Conceptual)	0	0	1,445	1,796
Groundwater Desalting/Ion Exchange (Conceptual)	0	0	33,600	78,400
Subtotal	0	0	35,045	80,196

Drought Year

Hemet/San Jacinto Conjunctive Use Cross Basin and Pipeline	0	6,660	6,660	6,660
Hemet Conjunctive Use/Long Term Shift	0	8,330	8,330	8,330
Lakeview Conjunctive Use/Long Term Shift	0	3,330	3,330	3,330
San Timoteo Conjunctive Use Facilities	0	4,125	29,700	28,050
Regional Conjunctive Use – Chino Basin Transfer	0	0	41,750	66,800
Subtotal	0	22,445	89,770	113,170
Total Additional Supply Sources During Drought Year	**0**	**34,120**	**141,989**	**214,856**

Year	2000	2010	2025	2050
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**72,760**	**71,489**	**0**	**0**

*Conservation savings provided by MWD, which represents active, passive, and price effect savings using year 2000 as a base year. EMWD's demand projections already included some conservation savings, which were assumed to represent only active conservation.. Based on this assumption, the above conservation supply represents the passive and price effect conservation savings, or 70% of MWD's conservation savings total for EMWD.

Table 11.2 Continued

Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

IEUA

Year	2000	2010	2025	2050
Regular Year Imported Demands	83,800	99,800	113,000	134,003
Drought Year Imported Demands (7% Increase)	89,666	106,786	120,910	143,383
Chino Basin Groundwater Conjunctive Use Program	0	(33,000)	(33,000)	(33,000)
Net Drought Year Imported Demands	89,666	73,786	87,910	110,383

IWRP Supply Sources Not Included in Agency Water Demand Projections

Conservation*	0	20,315	29,884	34,185

Regular Year

Recycled Water Projects (Conceptual)	0	0	5,076	3,698
Groundwater Desalting/Ion Exchange (Conceptual)	0	0	11,200	22,400
Subtotal	0	0	16,276	26,098

Drought Year

Regional Conjunctive Use – Chino Basin		0	41,750	50,100
Prado Groundwater Replenishment (Conceptual)	0	0	0	0
Subtotal	0	0	41,750	50,100
Total Additional Supply Sources During Drought Year	**0**	**20,315**	**87,910**	**110,383**

Year	**2000**	**2010**	**2025**	**2050**
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**89,666**	**53,471**	**0**	**0**

*Conservation savings provided by MWD, which represents active, passive, and price effect savings using year 2000 as a base year.

Table 11.2 Continued

Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

OCWD

Year	2000	2010	2025	2050
Regular Year Imported Demands	231,000	131,500	106,000	106,000
Drought Year Imported Demands (7% Increase)	247,170	140,705	113,420	113,420
MWD - OCWD Conjunctive Use	0	(20,000)	(20,000)	(20,000)
Net Drought Year Imported Demands	247,170	120,705	93,420	93,420

IWRP Supply Sources Not Included in Agency Water Demand Projections

Conservation*	0	39,970	57,869	58,392

Regular Year

Recycled Water Projects (Conceptual)	0	0	2,151	7,128
Ocean Desalination (Conceptual)	0	0	0	11,200
Subtotal	0	0	2,151	18,328

Drought Year

Prado Groundwater Replenishment (Conceptual)	0	0	0	0
Regional Conjunctive Use – Chino Basin	0	0	33,400	16,700
Subtotal	0	0	33,400	16,700
Total Additional Supply Sources During Drought Year	**0**	**39,970**	**93,420**	**93,420**

Year	2000	2010	2025	2050
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**247,170**	**80,735**	**0**	**0**

*Conservation savings provided by MWD, which represents active, passive, and price effect savings using year 2000 as a base year.

Table 11.2 Continued

Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

SBVMWD

Year	2000	2010	2025	2050
Regular Year Imported Demands	42,297	54,358	72,449	102,600
Drought Year Imported Demands (7% Increase)	45,258	58,163	77,520	109,782

IWRP Supply Sources Not Included in Agency Water Demand Projections

Conservation*	0	14,521	21,589	25,303

Regular Year

Recycled Water Projects (Conceptual)	0	0	1,431	1,609
Lower Bunker Hill Desalter/Ion Exchange	0	0	11,200	17,920
Subtotal	0	0	12,631	19,529

Drought Year

San Bernardino Conjunctive Use Facilities	0	30,000	40,000	60,000
San Timoteo Conjunctive Use Facilities	0	4,125	3,300	4,950
Subtotal	0	34,125	43,300	64,950
Total Additional Supply Sources During Drought Year	**0**	**48,646**	**77,520**	**109,782**

Year	2000	2010	2025	2050
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**45,258**	**9,517**	**0**	**0**

*Conservation savings estimated by SAWPA staff, based on information provided by MWD for the other SAWPA agencies. Conservation supply represents active, passive, and price effect savings using year 2000 as a base year.

Table 11.2 Continued

Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

WMWD

Year	2000	2010	2025	2050
Regular Year Imported Demands	74,491	129,973	148,965	133,000
Drought Year Imported Demands (7% Increase)	79,705	139,071	159,393	142,310

IWRP Supply Sources Not Included in Agency Water Demand Projections

Conservation*	0	23,374	34,050	42,606

Regular Year

Recycled Water Projects (Conceptual)	0	0	4,043	3,904
Groundwater Desalting/Ion Exchange (Conceptual)	0	0	11,200	22,400
Subtotal	0	0	15,243	26,304

Drought Year

Prado Groundwater Replenishment (Conceptual)	0	0	0	0
San Bernardino Conjunctive Use Facilities	0	10,000	60,000	40,000
Regional Conjunctive Use – Chino Basin	0	0	50,100	33,400
Subtotal	0	10,000	110,100	73,400

Total Additional Supply Sources During Drought Year	**0**	**33,374**	**159,393**	**142,310**

Year	2000	2010	2025	2050
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**79,705**	**105,697**	**0**	**0**

*Conservation savings provided by MWD, which represents active, passive, and price effect savings using year 2000 as a base year.

Table 11.2 Continued

Current and Projected Regular and Drought Year Imported Water Demands in the Santa Ana Watershed (AFY) With and Without IWRP Long-Term Supply Sources

All Member Districts

Year	2000	2010	2025	2050
Regular Year Imported Demands	499,588	514,331	573,114	676,403
Drought Year Imported Demands (7% Increase)	534,559	550,334	613,232	723,751
Chino Basin Groundwater Conjunctive Use Program	0	(33,000)	(33,000)	(33,000)
MWD - OCWD Conjunctive Use	0	(20,000)	(20,000)	(20,000)
Net Drought Year Imported Demands	534,559	497,334	560,232	670,751

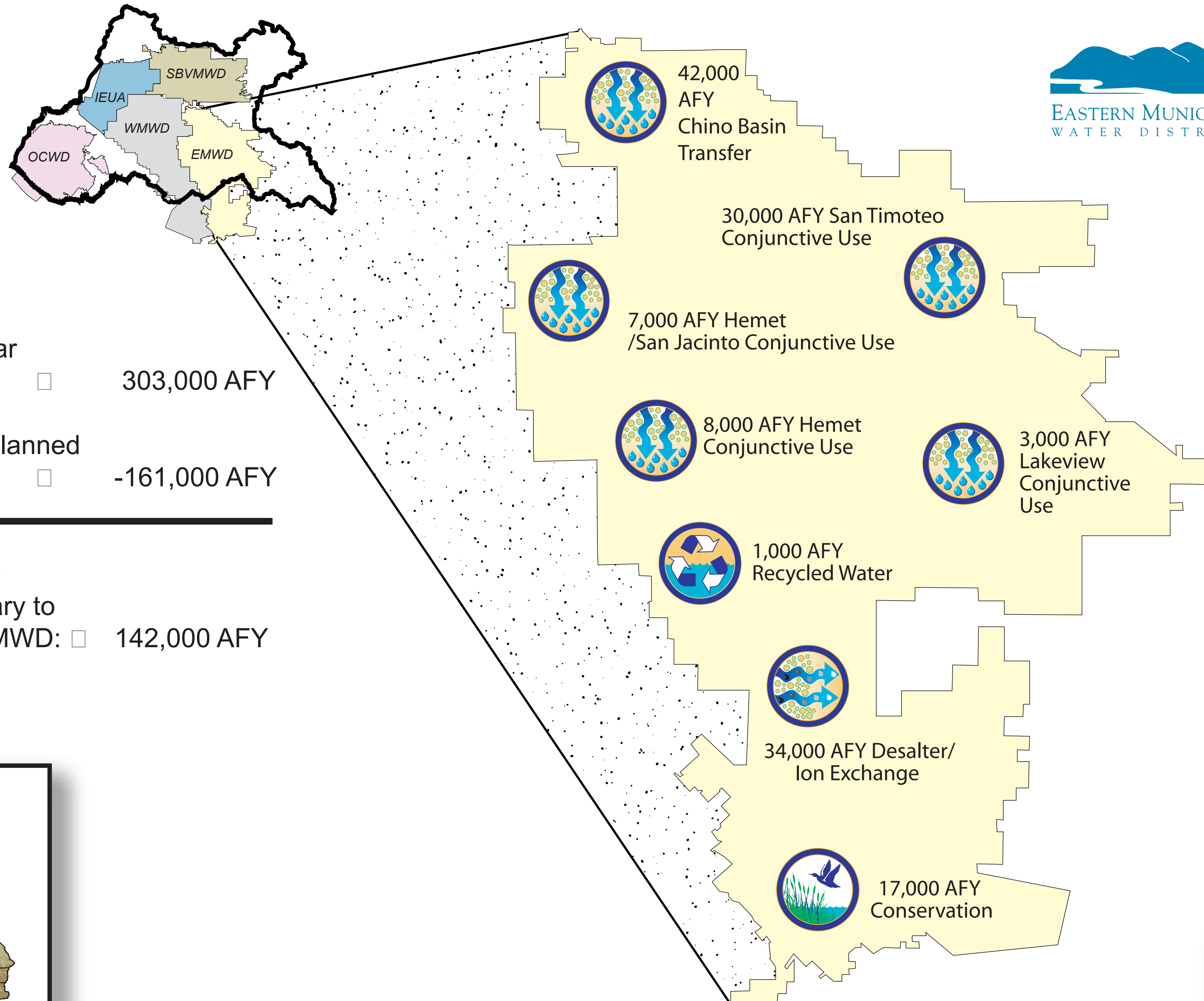
IWRP Supply Sources Not Included in Agency Water Demand Projections

Conservation*	0	109,856	160,567	181,976
Regular Year				
Subtotal	0	0	81,346	170,455
Drought Year				
Subtotal	0	66,570	318,320	318,320
Total Additional Supply Sources During Drought Year	**0**	**176,426**	**560,233**	**670,751**

Year	2000	2010	2025	2050
Imported Water Demand With Supply Sources (Shown Above) During Drought Year	**534,559**	**320,908**	**0**	**0**

*Conservation savings provided by MWD, which represents active, passive, and price effect savings using year 2000 as a base year. See previous footnotes for EMWD and SBVMWD.

Long-Term Supply Sources to Drought-Proof EMWD - Year 2025 (AFY)

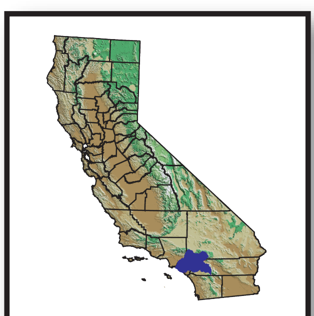


EASTERN MUNICIPAL WATER DISTRICT

2025 Drought Year Requirements: 303,000 AFY

2025 Current & Planned Local Supplies: -161,000 AFY

Additional Supply Sources Necessary to Drought-Proof EMWD: 142,000 AFY

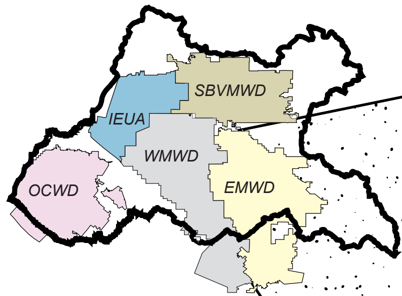


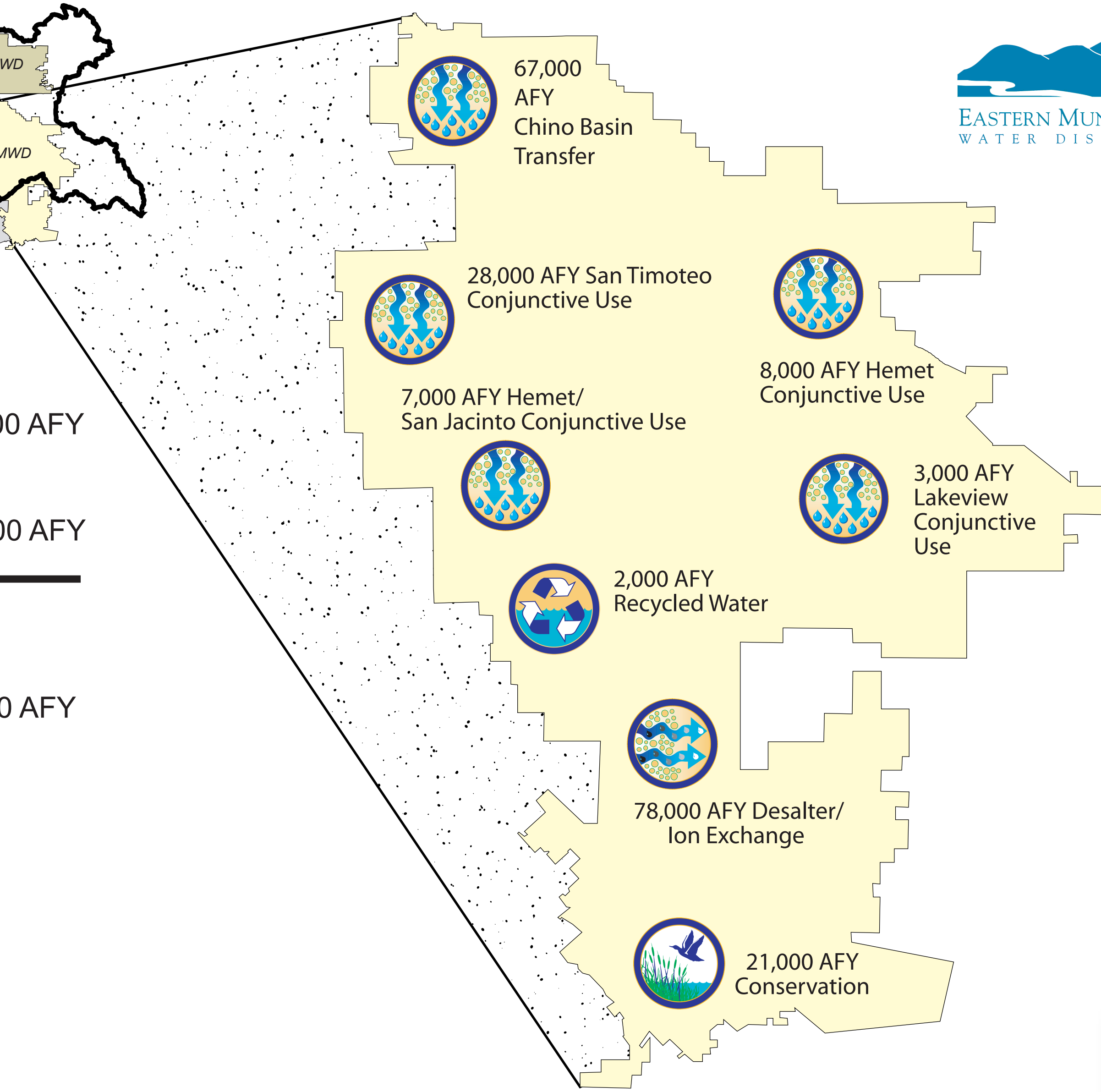
SAWPA

Figure 11.6

gis/projects/irp_larry/illustrator/emwd-2025.ai

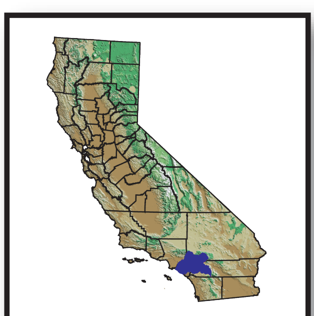
Long-Term Supply Sources to Drought-Proof EMWD - Year 2050 (AFY)





EASTERN MUNICIPAL WATER DISTRICT

2050 Drought Year Requirements:	375,000 AFY
2050 Current & Planned Local Supplies:	-161,000 AFY
Additional Supply Sources Necessary to Drought-Proof EMWD:	214,000 AFY



SAWPA

Figure 11.7

gis/projects/irp_larry/illustrator/emwd-2050.ai

Long-Term Supply Sources to Drought-Proof IEUA - Year 2025 (AFY)

2025 Drought Year Requirements:	433,000 AFY
2025 Current & Planned Local Supplies:	-345,000 AFY
Additional Supply Sources Necessary to Drought-Proof IEUA:	88,000 AFY

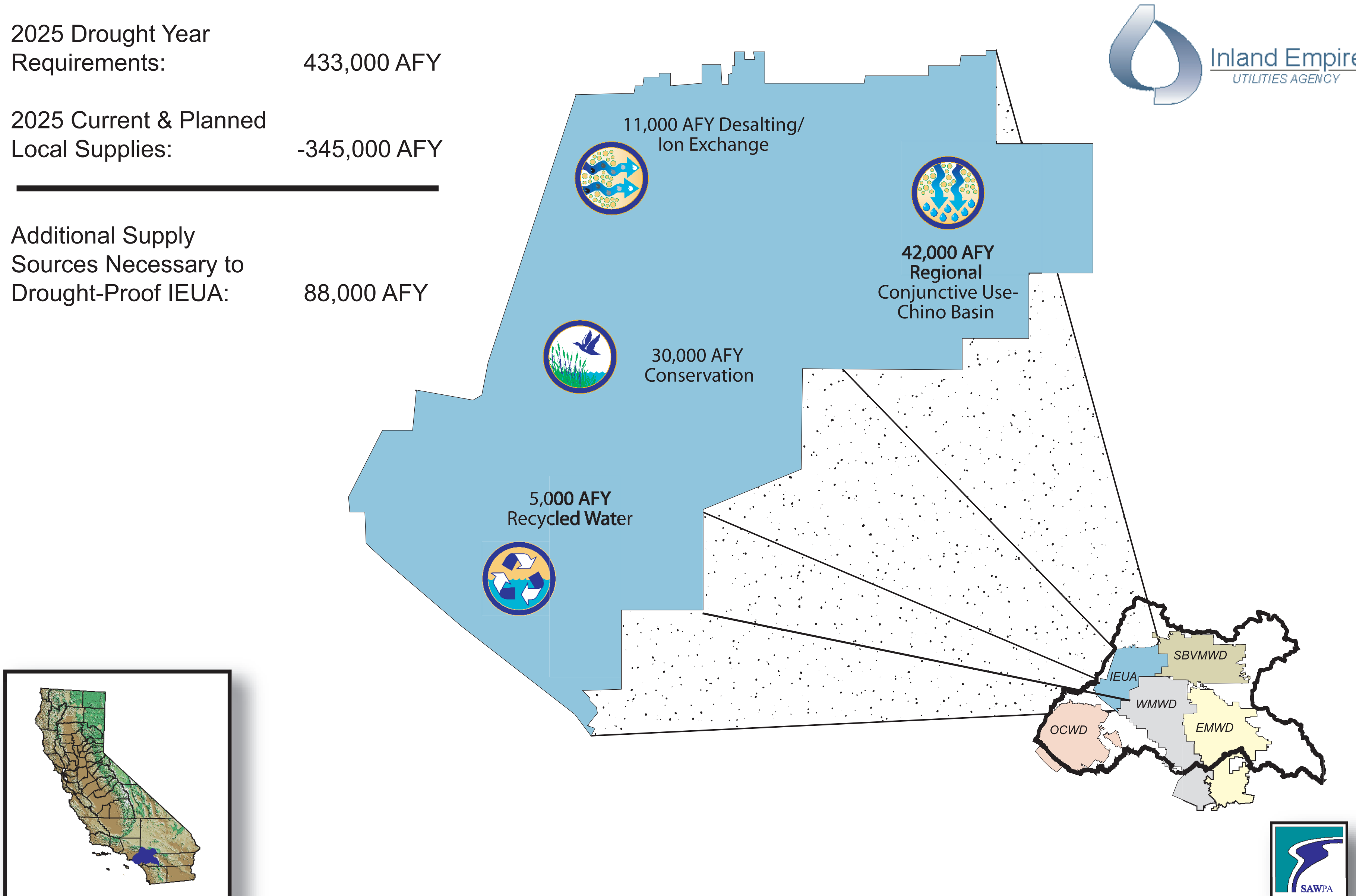
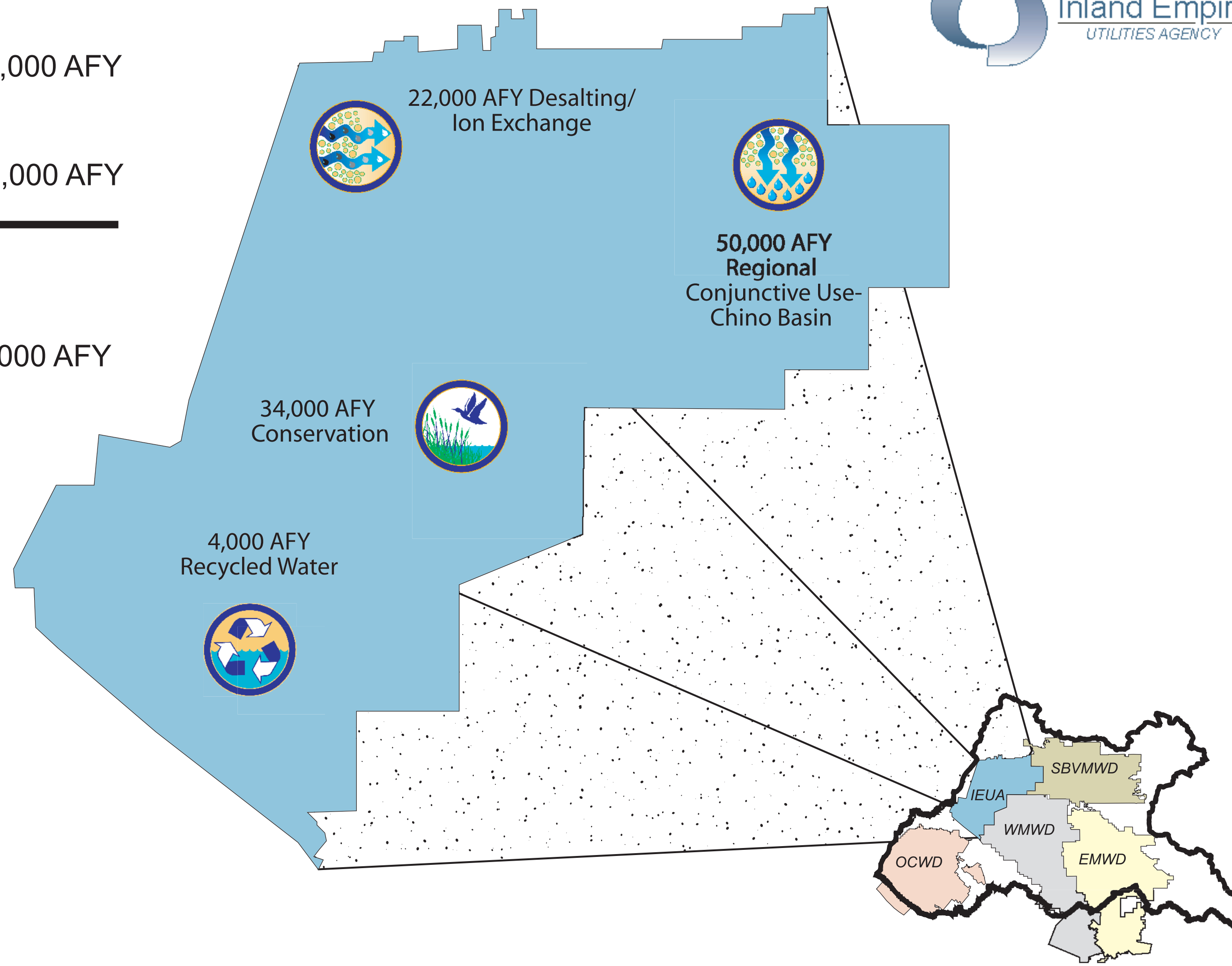


Figure 11.8

gis/projects/irp_larry/illustrator/ieua-2025.ai

Long-Term Supply Sources to Drought-Proof IEUA - Year 2050 (AFY)

2050 Drought Year Requirements:	506,000 AFY
2050 Current & Planned Local Supplies:	-396,000 AFY
Additional Supply Sources Necessary to Drought-Proof IEUA:	110,000 AFY



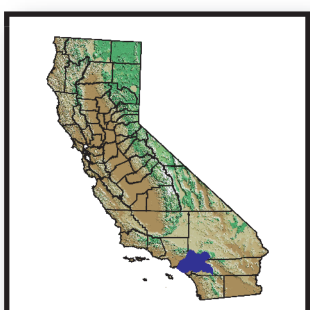
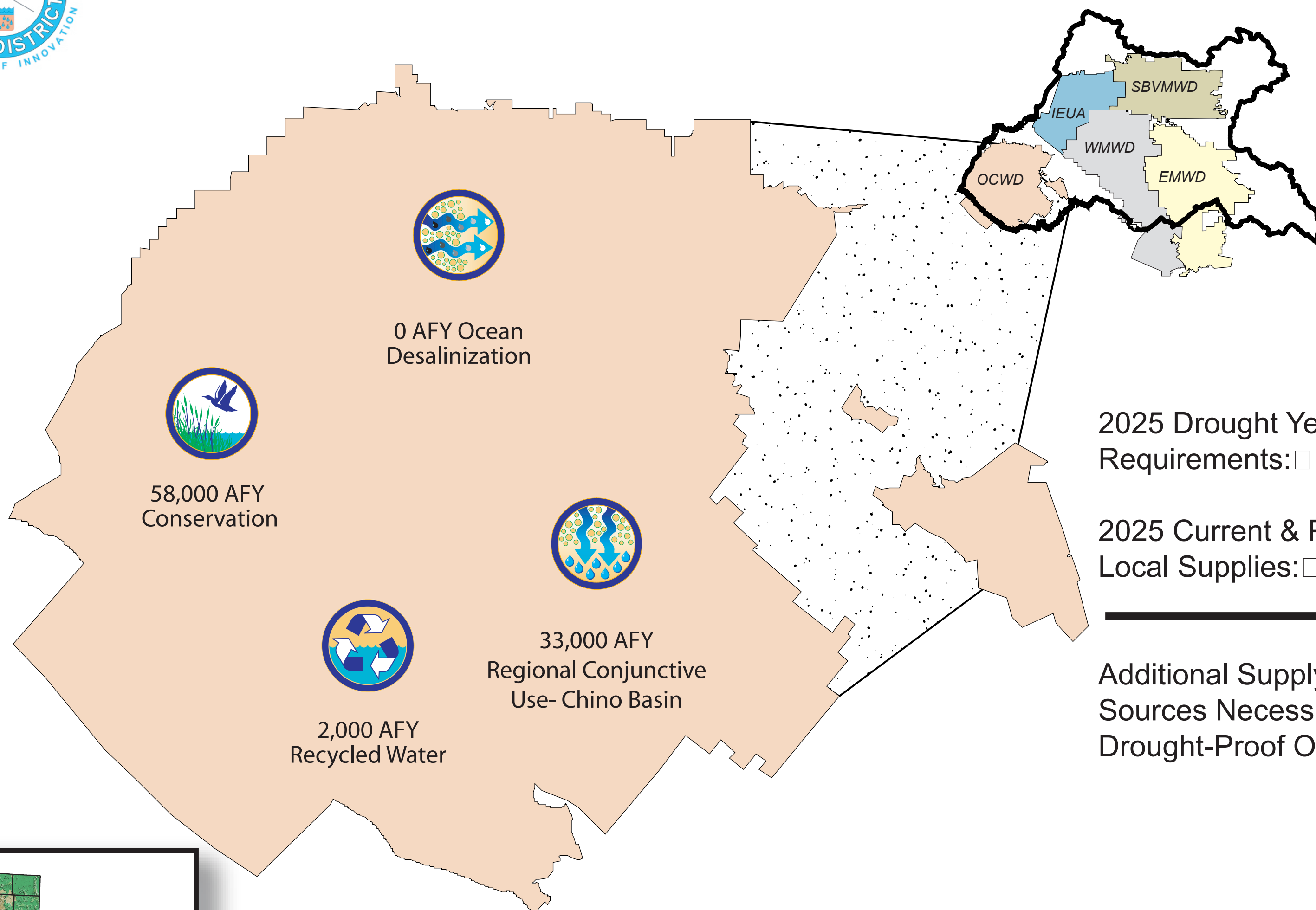


Figure 11.9

Long-Term Supply Sources to Drought-Proof OCWD - Year 2025 (AFY)



2025 Drought Year Requirements: 1,036,000 AFY

2025 Current & Planned Local Supplies: -943,000 AFY

Additional Supply Sources Necessary to Drought-Proof OCWD: 93,000 AFY

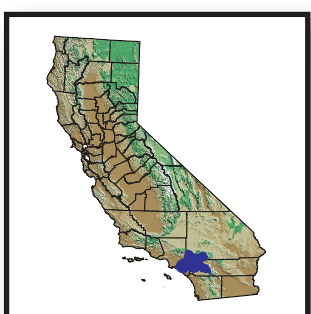
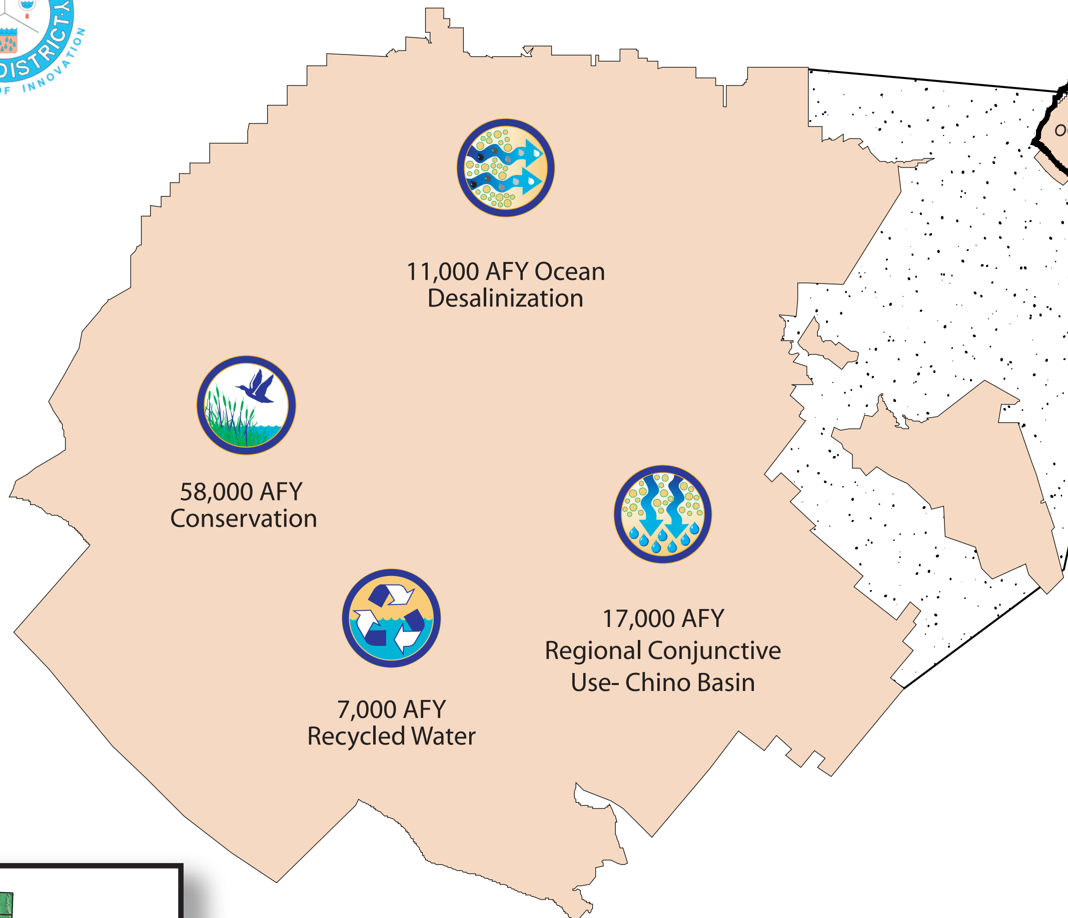
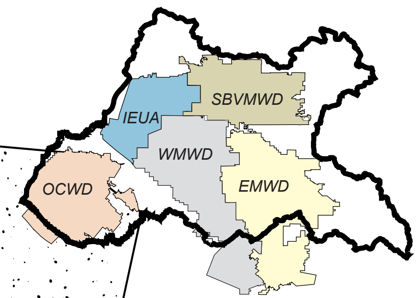


Figure 11.10

gis/projects/irp_larry/illustrator/ocwd-2025.ai

Long-Term Supply Sources to Drought-Proof OCWD - Year 2050 (AFY)





2050 Drought Year Requirements:	1,084,000 AFY
2050 Current & Planned Local Supplies:	-991,000 AFY
Additional Supply Sources Necessary to Drought-Proof OCWD:	93,000 AFY

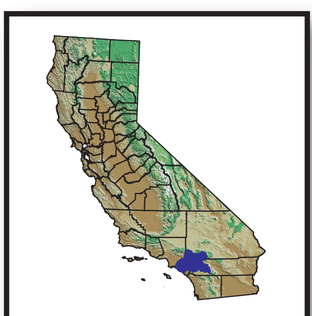
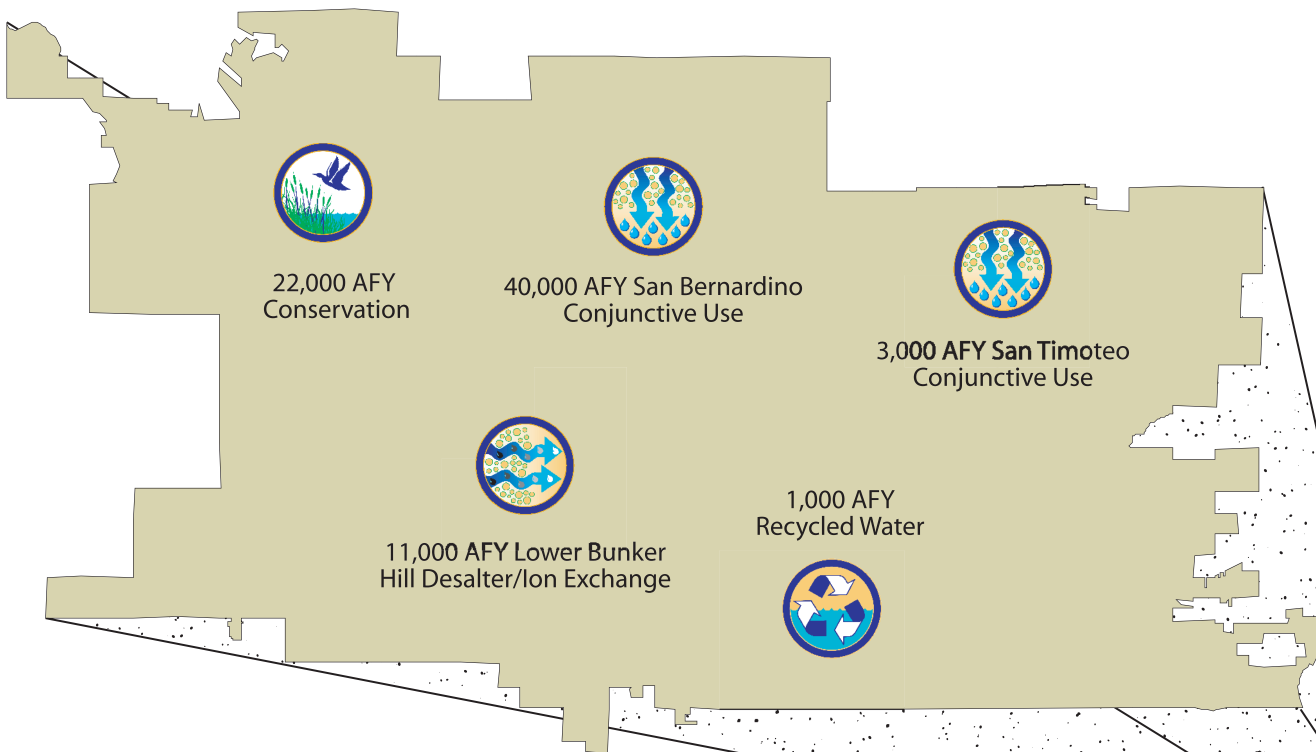
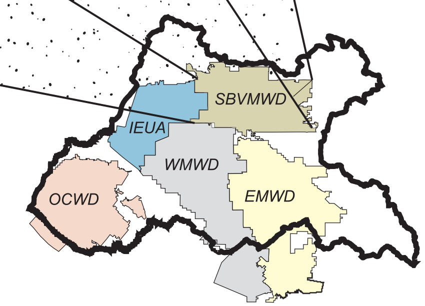


Figure 11.11

Long-Term Supply Sources to Drought-Proof SBVMWD - Year 2025 (AFY)



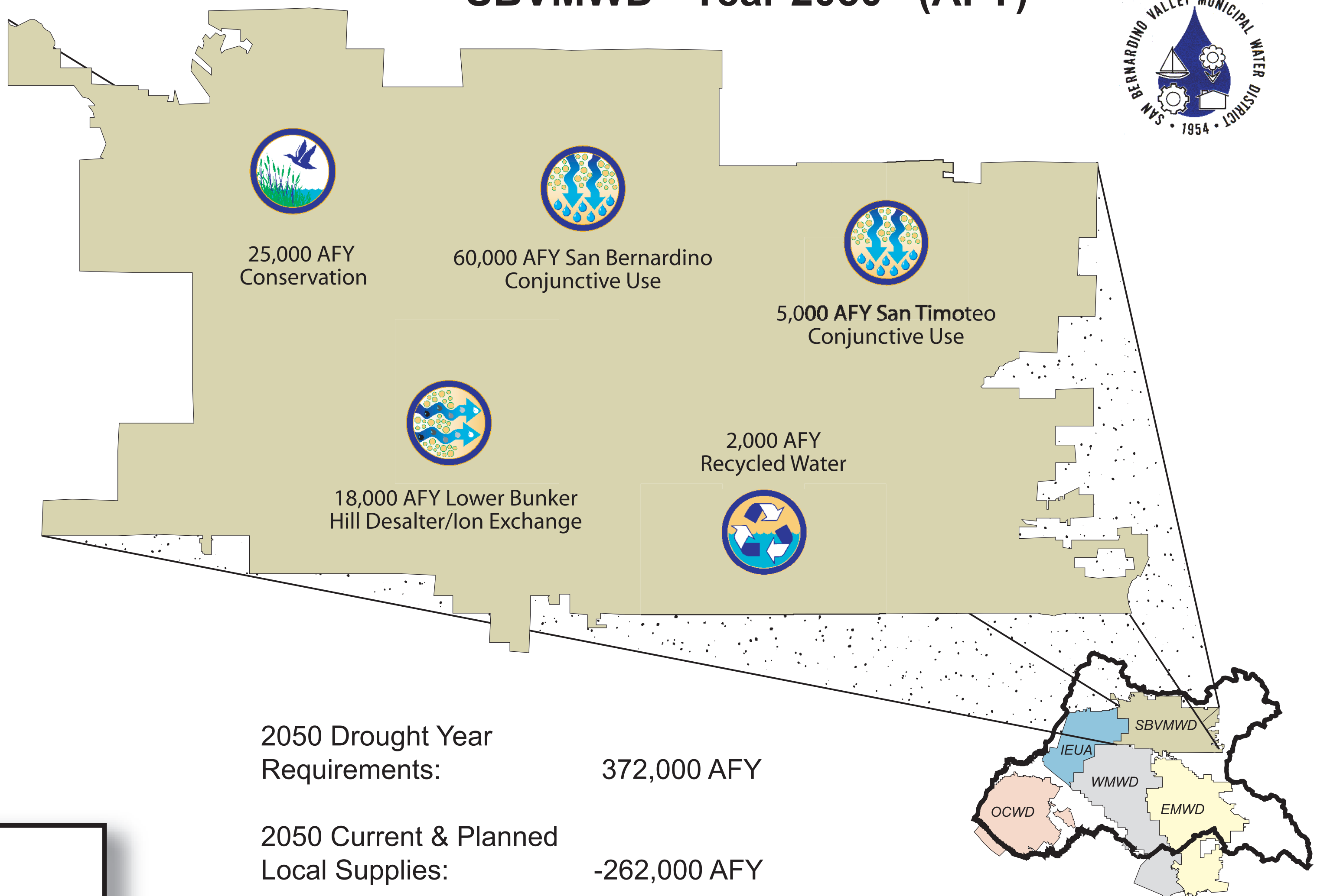


2025 Drought Year Requirements:	308,000 AFY
2025 Current & Planned Local Supplies:	-231,000 AFY
Additional Supply Sources Necessary to Drought-Proof SBVMWD:	77,000 AFY

Figure 11.12

Long-Term Supply Sources to Drought-Proof SBVMWD - Year 2050 (AFY)

SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT • 1954 •



2050 Drought Year Requirements: 372,000 AFY

2050 Current & Planned Local Supplies: -262,000 AFY

Additional Supply Sources Necessary to Drought-Proof SBVMWD: 110,000 AFY

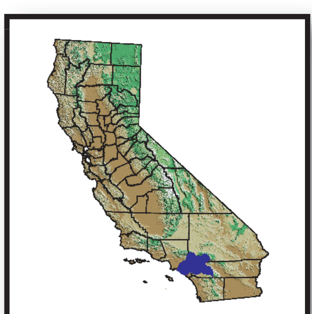


Figure 11.13

SAWPA

gis/projects/irp_larry/illustrator/sbvmwd-2050.ai

Long-Term Supply Sources to Drought-Proof WMWD - Year 2025 (AFY)

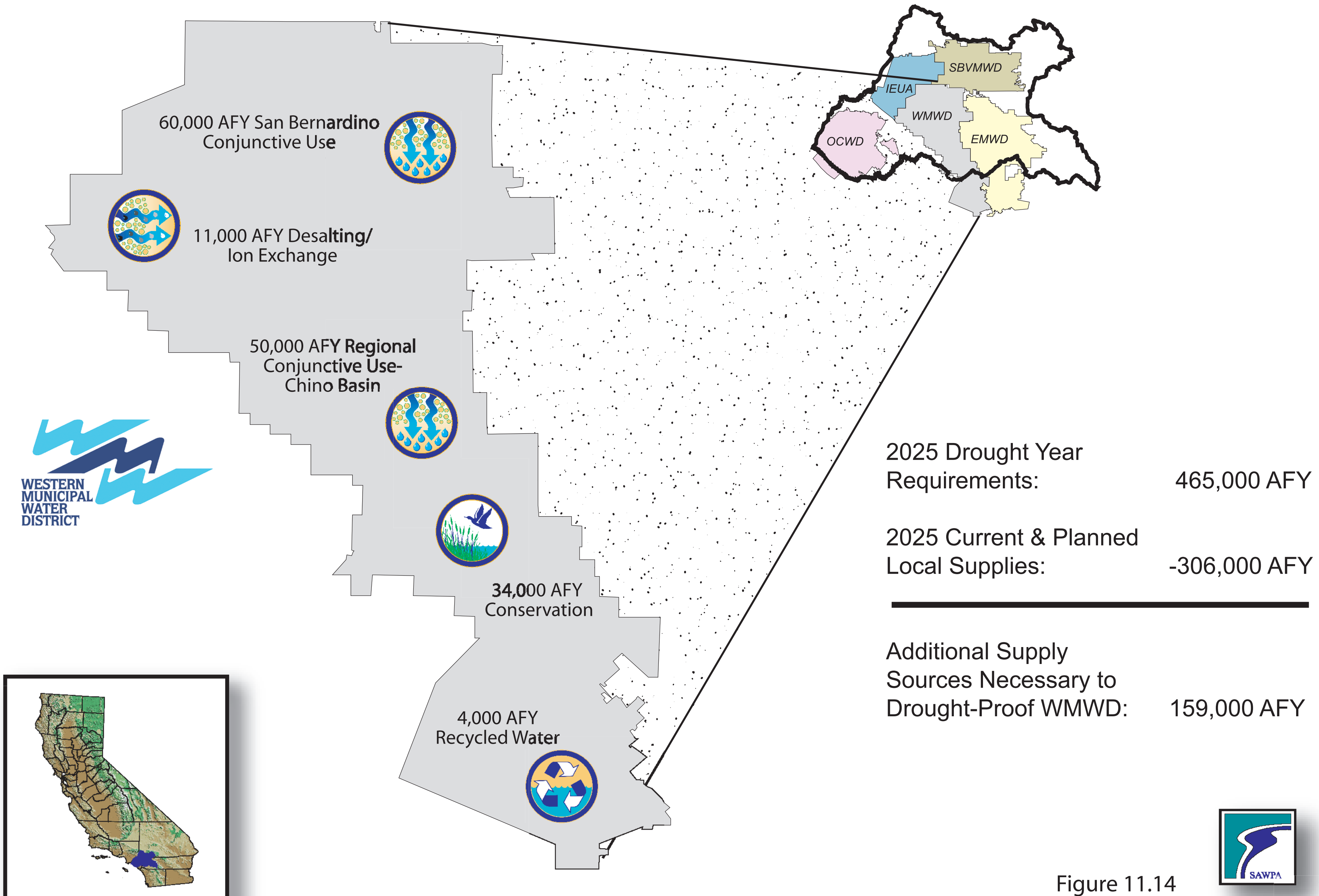
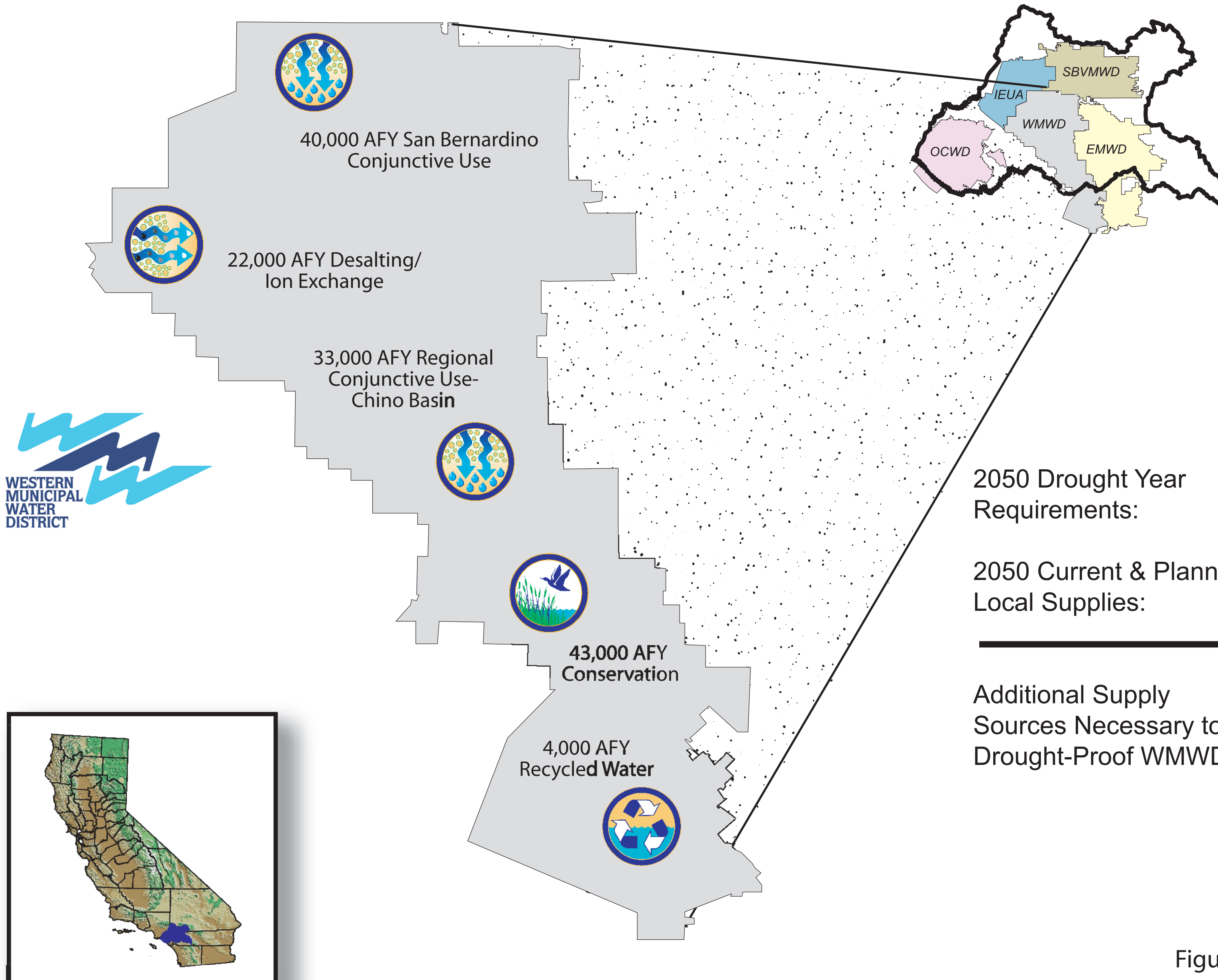


Figure 11.14

Long-Term Supply Sources to Drought-Proof WMWD - Year 2050 (AFY)



2050 Drought Year Requirements:	572,000 AFY
2050 Current & Planned Local Supplies:	-430,000 AFY
Additional Supply Sources Necessary to Drought-Proof WMWD:	142,000 AFY

Figure 11.15

SAWPA

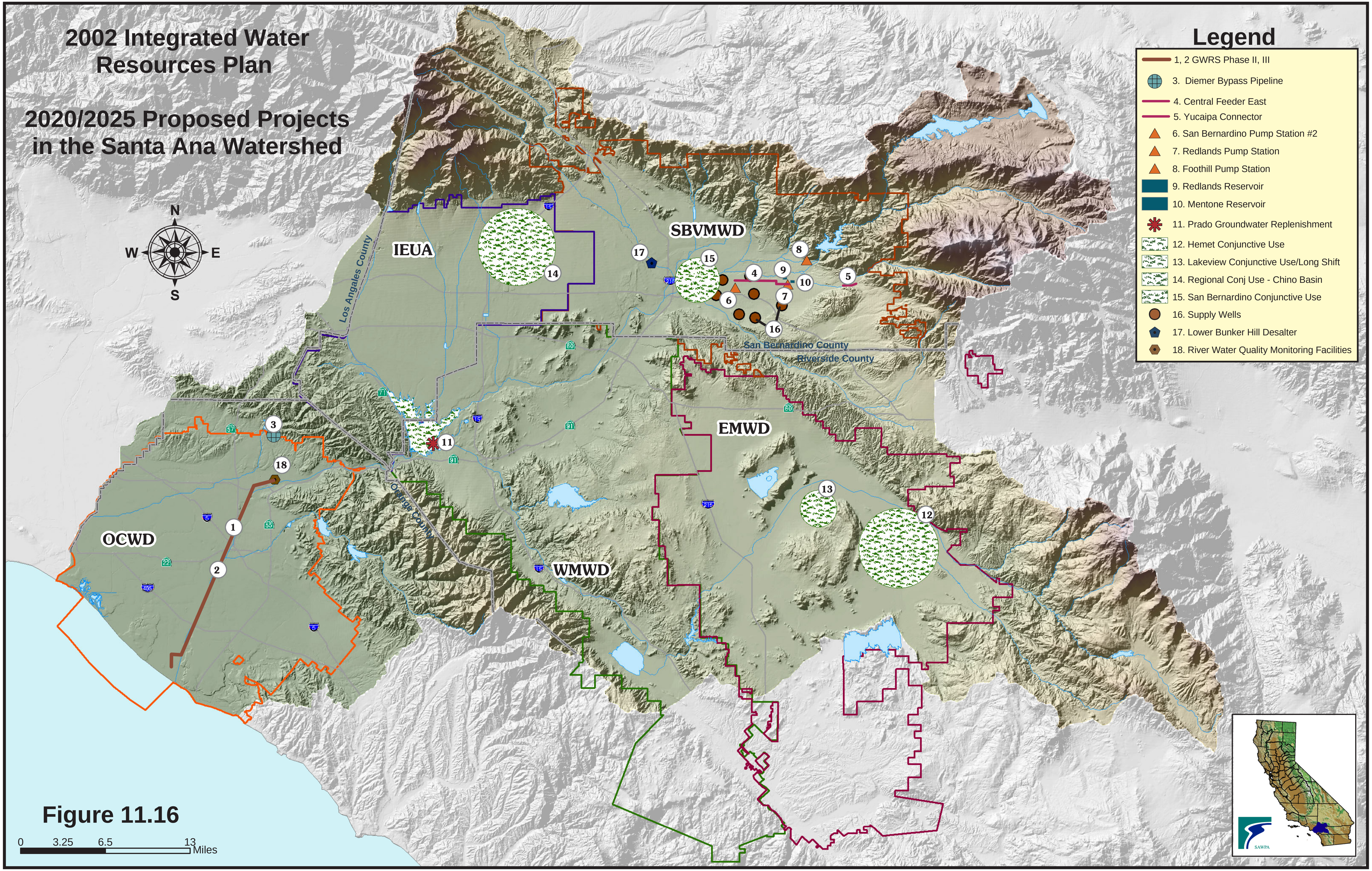


Figure 11.16

p:\projects\irp_larry\2025_projects.mxd

APPENDIX A - MEMBER DISTRICT WATER SUPPLY DATA

Updated by EMWD as of 01-22-02

Direct Use Water							
Groundwater	85,000	89,500	91,500	94,300	94,700	94,700	94,700
Imported Water	64,400	72,000	80,700	89,000	100,800	106,700	172,300
Surface Water	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Agriculture/recycled Water		18,400	18,900	20,200	21,600	21,600	21,600
Municipal & Industrial/recycle Water	25,600	10,680	17,361	19,500	22,000	22,000	22,000
Outside/recycled water	0	2,000	7,000	12,000	12,000	12,000	12,000
Direct Use Water Total	179,000	196,580	219,461	239,000	255,100	261,000	326,600
Additional Recharge Water							
Imported Water for Conjunctive Use	3,600	20,700	18,000	19,100	27,800	26,000	28,500
Reclaimed Water Recharge	10,122	11,900	6,200	6,200	6,900	6,900	6,900
Additional Water Recharge Total	13,722	32,600	24,200	25,300	34,700	32,900	35,400

Water Demands and Supplies (AFY)

Inland Empire Utilities Agency (1)

	2000	2005	2010	2015	2020	2025	2050
Direct Use (2)							
Groundwater	182,800	183,700	184,600	186,700	188,800	190,900	201,756
Imported Water	43,800	52,700	59,800	65,000	69,400	73,000	94,003
Surface Water	15,500	18,400	29,600	28,200	26,500	26,500	26,500
Recycled Water (3)	5,100	12,560	24,750	32,300	35,500	38,000	53,402
Subtotal DU	247,200	267,360	298,750	312,200	320,200	328,400	375,661
Additional Recharge Water							
Imported (Replenishment*) Water (4)	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Surface (Storm) Water (4)	18,790	18,790	23,700	23,700	23,700	24,500	29,400
Recycled Water (3)	500	15,440	20,250	22,700	29,500	32,450	52,261
Subtotal Recharge	59,290	74,230	83,950	86,400	93,200	96,950	121,661
IEUA Total	**306,490**	**341,590**	**382,700**	**398,600**	**413,400**	**425,350**	**497,322**

*In-lieu and/or direct recharge replenishment water

(1) All information from Garth Morgan of IEUA - see email dated 12/28/01. Per conversation with Morgan, 2025 Direct Use figures and all 2050 estimated by LRG.

(2) Source: IEUA 2000 Urban Water Management Plan 2000 Update.

(3) Source: Draft IEUA Recycled Water System Feasibility Study, November 2001.

(4) Source: OBMP Recharge Master Plan Phase II Report, WE, Inc. & Black & Veatch, August 2001.

			OCSD Influent Flow				GWR System Reclamation					OCSD Outfall			
Year	**P1 Flow**	**P1 TDS**	**P2 Flow**	**P2 TDS**	**P1 + P2 Flow**	**Total TDS**	**Flow**		**TDS***	**Brine- outfall**		**OCSD effluent**		**Combined flows**	
							AF/yr	mgd	mg/l	mgd	mg/l	mgd	mg/l	mgd	mg/l
2005	156	1000	113	1300	241	1300	78400	70	25	10	7000	161	1300	171	1600
2020	208	1600	138	1100	330	1500	145600	130	25	19	9000	181	1500	200	2200
2025															
2050	250	1600	245	1100	471	1400	145600	130	25	19	9000	322	1400	341	1800

*TDS after RO is 25 mg/l, lime assed to bring TDS to 70 mg/l

Received March 4, 2002 from SBVMWD

San Bernardino Valley Municipal Water District (4)

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	132,205	132,205	132,205	132,205	132,205	132,205	132,205
Imported Water	42,297	48,327	54,358	60,388	66,418	72,449	102,600
Surface Water	52,200	52,200	52,200	52,200	52,200	52,200	52,200
Reclaimed Water	0	0	3,253	6,507	9,760	13,014	29,281
Direct Use Water Total	226,702	232,732	242,016	251,300	260,583	269,867	316,286
Additional Recharge Water							
Imported Water	0	0	0	0	0	0	0
Surface Water	0	0	5,250	10,500	15,750	21,000	21,000
Reclaimed Water	0	0	3,031	6,062	9,094	12,125	27,281
Additional Water Recharge Total	0	0	8,281	16,562	24,844	33,125	48,281

WMWD WATER SUPPLY SOURCES

	2000	2005	2010	2015	2020	2025	2050
Direct Use Water							
Groundwater	178,131	197,859	207,462	216,561	225,176	229,334	320,000
Imported Water	63,073	60,625	67,973	75,253	81,945	86,965	71,000
Surface Water	2000	2000	2000	2,000	2,000	2,000	2,000
Reclaimed Water	12,534	25,409	31,743	36,068	40,393	42,718	70,000
Direct Use Water Total^	**255,738**	**285,893**	**309,178**	**329,882**	**349,514**	**361,017**	**463,000**

^Note: Does not include RCWD (Santa Rosa Division), which is in WMWD but outside the Santa Ana Watershed

	2000	2005	2010	2015	2020	2025	2050
Rancho CA. W.D. Direct Use (Santa Rosa Division)*							
Groundwater	14,510	18,000	18,000	18,000	18,000	18,000	18,000
Imported Water	6,418	15,455	22,000	22,000	22,000	22,000	22,000
Surface Water	0	1,410	2,820	4,230	5,640	6,640	7,640
Reclaimed Water	1,176	2,000	2,160	2,320	2,480	2,580	2,680
Rancho CA. W.D. Direct Use (Santa Rosa Division) Total	**22,104**	**36,865**	**44,980**	**46,550**	**48,120**	**49,220**	**50,320**
WMWD Direct Use Grand Totals - Including RCWD							
Groundwater	**192,641**	**215,859**	**225,462**	**234,561**	**243,176**	**247,334**	**338,000**
Imported Water	**69,491**	**76,080**	**89,973**	**97,253**	**103,945**	**108,965**	**93,000**
Surface Water	**2,000**	**3,410**	**4,820**	**6,230**	**7,640**	**8,640**	**9,640**
Reclaimed Water	**13,710**	**27,409**	**33,903**	**38,388**	**42,873**	**45,298**	**72,680**
Total	**277,842**	**322,758**	**354,158**	**376,432**	**397,634**	**410,237**	**513,320**
Additional Recharge Water							
Imported Water	5,000	15,000	40,000	40,000	40,000	40,000	40,000
Surface Water**	*	*	*	*	*	*	*
Reclaimed Water	1,000	1,750	2,500	3,125	3,750	5,000	10,000
Additional Recharge Water Total	**6,000**	**16,750**	**42,500**	**43,125**	**43,750**	**45,000**	**50,000**

*From WMWD Supply 2000.xls
**Included in SBVMWD

APPENDIX B - SALT BALANCE DATA

Salt Balance in the Santa Ana Watershed

2000

	Upper Watershed			**Lower Watershed**			**San Jacinto Watershed**			
	Flow (AFY)	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Flow (AFY)**	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Flow (AFY)**	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Total (Tons/Yr)**
Inflow										
Irrigation Return Flows (1)			245,830			151,096			173,224	**570,150**
Percolation of Precipitation (2)			23,780			7,789			4,267	**35,836**
Total Stream Bed Percolation (3)			34,386	226,000	602	185,031	54,600	262	19,455	**238,872**
Municipal & Indust. Sources (4)										
Imported Water - Direct Use										
EMWD							64,400	315	27,589	**27,589**
IEUA	43,800	250	14,892						0	**14,892**
OCWD				120,000	515	84,048			0	**84,048**
SBVMWD	42,297	250	14,381						0	**14,381**
WMWD	69,491	250	23,627						0	**23,627**
Recycled Water - Direct Use										
EMWD							25,600	651	22,665	**22,665**
IEUA	5,100	479	3,322						0	**3,322**
OCWD				17,000	850	19,652			0	**19,652**
SBVMWD	0	475	0						0	**0**
WMWD	13,710	826	15,401						0	**15,401**
Imported Water Recharge										
EMWD							3,600	315	1,542	**1,542**
IEUA	40,000	250	13,600						0	**13,600**
OCWD				111,000	515	77,744			0	**77,744**
SBVMWD	0	250	0						0	**0**
WMWD	5,000	250	1,700						0	**1,700**
Recycled Water Recharge										
EMWD							10,122	651	8,962	**8,962**
IEUA	500	479	326						0	**326**
OCWD (Injection Barriers)				7,000	480	4,570			0	**4,570**
SBVMWD	0	475	0						0	**0**
WMWD	1,000	826	1,123						0	**1,123**
Total Salts In			**392,369**			**529,930**			**257,704**	**1,180,002**
Outflow										
Exported Wastewater	165,950	602	135,867	253,288	1,067	367,551	0	0	0	**503,418**
Chino Non-Reclaimable Outfall (LA)			13,000	0	0	0	0	0	0	**13,000**
SARI Outfall			61,024	0	0	0	0	0	0	**61,024**
IEUA Co-Composting Facility			12,000	0	0	0	0	0	0	**12,000**
Total Salts Out			**221,891**			**367,551**			**0**	**589,442**
SALT NET INFLOW			**170,478**			**162,378**			**257,704**	**590,560**

(1) This item is based on Wildermuth's TIN/TDS Phase 1A Task 2.2 & 2.3 Report. The report used DWR and 1993 SCAG land use data and factors for salt loading. Some values that appear high are primarily due to salt loading from cow manure.
(2) This data is based on the SAWPA 1998 "Salt Balance for the SAR Basin" worksheet.
(3) This item includes wastewater percolation in stream bed.
(4) This item is shown since M & I produces an additional salt that eventually becomes part of the wastewater.

Salt Balance in the Santa Ana Watershed

2025

	Upper Watershed			Lower Watershed			San Jacinto Watershed			
	Flow (AFY)	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Flow (AFY)**	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Flow (AFY)**	**TDS (mg/L)**	**Salt (Tons/Yr)**	**Total (Tons/Yr)**
Inflow										
Irrigation Return Flows (1)			245,830			151,096			173,224	**570,150**
Percolation of Precipitation (2)			23,780			7,789			4,267	**35,836**
Total Stream Bed Percolation (3)			32,136	261,000	602	213,686	54,600	262	19,455	**265,277**
Municipal & Indust. Sources (4)										
Imported Water - Direct Use										
EMWD							106,700	315	45,710	**45,710**
IEUA	73,000	250	24,820						0	**24,820**
OCWD				106,000	515	74,242			0	**74,242**
SBVMWD	72,449	250	24,633						0	**24,633**
WMWD	108,965	250	37,048						0	**37,048**
Recycled Water - Direct Use										
EMWD							55,600	715	54,065	**54,065**
IEUA	38,000	479	24,755						0	**24,755**
OCWD				27,000	850	31,212			0	**31,212**
SBVMWD	13,014	480	8,496						0	**8,496**
WMWD	45,298	786	48,422						0	**48,422**
Imported Water Recharge										
EMWD							26,000	315	11,138	**11,138**
IEUA	40,000	250	13,600						0	**13,600**
OCWD				0	515	0			0	**0**
SBVMWD	0	250	0						0	**0**
WMWD	40,000	250	13,600						0	**13,600**
Recycled Water Recharge										
EMWD							6,900	715	6,710	**6,710**
IEUA	32,450	479	21,139						0	**21,139**
OCWD (GWRS & Injection Barriers)				145,600	70	13,861			0	**13,861**
SBVMWD	12,125	480	7,915						0	**7,915**
WMWD	5,000	786	5,345						0	**5,345**
Total Salts In			**531,518**			**491,886**			**314,570**	**1,337,974**
Outflow										
Exported Wastewater	200,592	602	164,229	224,000	2,000	609,280	0	0	0	**773,509**
Chino Non-Reclaimable Outfall (LA)			13,000	0	0	0	0	0	0	**13,000**
SARI Outfall			61,024	0	0	0	0	0	0	**61,024**
IEUA Co-Composting Facility			12,000	0	0	0	0	0	0	**12,000**
IEUA Manure Digesters			4,700	0	0	0	0	0	0	**4,700**
Added SARI Outfall Brine Disposal from Additional Desalting Facilities (5)			117,408			22,913			36,557	**176,878**
Total Salts Out			**372,361**			**632,193**			**36,557**	**1,041,111**
SALT NET INFLOW			**159,157**			**(140,307)**			**278,013**	**296,863**
Additional Proposed Inflow										
Additional Recycled Water - Direct Use and Water Recharge (6)										
EMWD							1,445	715	1,405	**1,405**
IEUA	5,076	479	3,307						0	**3,307**
OCWD				2,151	850	2,487			0	**2,487**
SBVMWD	1,431	480	934						0	**934**
WMWD	4,043	786	4,322						0	**4,322**
Total Additional Salts In			**8,563**			**2,487**			**1,405**	**12,454**
Additional Proposed Outflow										
Additional Desalting Facilities (7)										
EMWD							6,720	10,000	91,392	**91,392**
IEUA	2,240	5,250	15,994							**15,994**
OCWD				0	5,200	0				**0**
SBVMWD	2,240	10,000	30,464							**30,464**
WMWD	2,240	5,000	15,232							**15,232**
Total Additional Salts Out			**61,690**			**0**			**91,392**	**153,082**
REVISED SALT NET INFLOW			**106,030**			**(137,820)**			**188,026**	**156,236**

(1) This item is based on Wildermuth's TIN/TDS Phase 1A Task 2.2 & 2.3 Report. The report used DWR and 1993 SCAG land use data and factors for salt loading. Some values that appear high are primarily due to salt loading from cow manure.
(2) This data is based on the SAWPA 1998 "Salt Balance for the SAR Basin" worksheet.
(3) This item includes wastewater percolation in stream bed.
(4) This item is shown since M & I produces an additional salt that eventually becomes part of the wastewater.
(5) This includes desalting facilities currently identified by the SAWPA member agencies. See attached worksheet.
(6) Recycled water flows obtained from Table 11.2. Recycled water TDS estimates based on similar facilities for each agency.
(7) Brine flows based on 20% of desalter flows obtained from Table 11.2. Brine TDS estimates based on similar facilities for each agency.

Salt Balance in the Santa Ana Watershed

2050

	Upper Watershed			Lower Watershed			San Jacinto Watershed			
	Flow (AFY)	TDS (mg/L)	Salt (Tons/Yr)	Flow (AFY)	TDS (mg/L)	Salt (Tons/Yr)	Flow (AFY)	TDS (mg/L)	Salt (Tons/Yr)	Total (Tons/Yr)
Inflow										
Irrigation Return Flows (1)			245,830			151,096			173,224	**570,150**
Percolation of Precipitation (2)			23,780			7,789			4,267	**35,836**
Total Stream Bed Percolation (3)			32,136	303,000	602	248,072	54,600	262	19,455	**299,663**
Municipal & Indust. Sources (4)										
Imported Water - Direct Use										
EMWD							172,300	315	73,813	**73,813**
IEUA	94,003	250	31,961						0	**31,961**
OCWD				106,000	515	74,242			0	**74,242**
SBVMWD	102,600	250	34,884						0	**34,884**
WMWD	93,000	250	31,620						0	**31,620**
Recycled Water - Direct Use										
EMWD							55,600	715	54,065	**54,065**
IEUA	53,402	479	34,788						0	**34,788**
OCWD				27,000	850	31,212			0	**31,212**
SBVMWD	29,281	480	19,115						0	**19,115**
WMWD	72,680	786	77,692						0	**77,692**
Imported Water Recharge										
EMWD							28,500	315	12,209	**12,209**
IEUA	40,000	250	13,600						0	**13,600**
OCWD				0	515	0			0	**0**
SBVMWD	0	250	0						0	**0**
WMWD	40,000	250	13,600						0	**13,600**
Recycled Water Recharge										
EMWD							6,900	715	6,710	**6,710**
IEUA	52,261	479	34,045						0	**34,045**
OCWD (GWRS & Injection Barriers)				145,600	70	13,861			0	**13,861**
SBVMWD	27,281	480	17,809						0	**17,809**
WMWD	10,000	786	10,690						0	**10,690**
Total Salts In			**621,549**			**526,273**			**343,744**	**1,491,566**
Outflow										
Exported Wastewater	242,648	602	198,661	381,920	1,600	831,058	0	0	0	**1,029,719**
Chino Non-Reclaimable Outfall (LA)			13,000	0	0	0	0	0	0	**13,000**
SARI Outfall			61,024	0	0	0	0	0	0	**61,024**
IEUA Co-Composting Facility			12,000	0	0	0	0	0	0	**12,000**
IEUA Manure Digesters			4,700	0	0	0	0	0	0	**4,700**
Added SARI Outfall Brine Disposal from Additional Desalting Facilities (5)			117,408			22,913			36,557	**176,878**
Total Salts Out			**406,793**			**853,971**			**36,557**	**1,297,321**
SALT NET INFLOW			**214,756**			**(327,699)**			**307,187**	**194,245**
Additional Proposed Inflow										
Additional Recycled Water - Direct Use and Water Recharge (6)										
EMWD							1,796	715	1,746	**1,746**
IEUA	3,698	479	2,409						0	**2,409**
OCWD				7,128	850	8,240			0	**8,240**
SBVMWD	1,609	480	1,050						0	**1,050**
WMWD	3,904	786	4,173						0	**4,173**
Total Additional Salts In			**7,633**			**8,240**			**1,746**	**17,619**
Additional Proposed Outflow										
Additional Desalting Facilities (7)										
EMWD							15,680	10,000	213,248	**213,248**
IEUA	4,480	5,250	31,987							**31,987**
OCWD				2,240	5,200	15,841				**15,841**
SBVMWD	3,584	10,000	48,742							**48,742**
WMWD	4,480	5,000	30,464							**30,464**
Total Additional Salts Out			**111,194**			**15,841**			**213,248**	**340,283**
REVISED SALT NET INFLOW			**111,195**			**(335,300)**			**95,685**	**(128,419)**

(1) This item is based on Wildermuth's TIN/TDS Phase 1A Task 2.2 & 2.3 Report. The report used DWR and 1993 SCAG land use data and factors for salt loading. Some values that appear high are primarily due to salt loading from cow manure.
(2) This data is based on the SAWPA 1998 "Salt Balance for the SAR Basin" worksheet.
(3) This item includes wastewater percolation in stream bed.
(4) This item is shown since M & I produces an additional salt that eventually becomes part of the wastewater.
(5) This includes desalting facilities currently identified by the SAWPA member agencies. See attached worksheet.
(6) Recycled water flows obtained from Table 11.2. Recycled water TDS estimates based on similar facilities for each agency.
(7) Brine flows based on 20% of desalter flows obtained from Table 11.2. Brine TDS estimates based on similar facilities for each agency.

Salt Balance in the Santa Ana Watershed

2000				
	Upper Watershed Salt (Tons/Yr)	Lower Watershed Salt (Tons/Yr)	San Jacinto Watershed Salt (Tons/Yr)	Total (Tons/Yr)
Total Salts In	392,369	529,930	257,704	1,180,002
Total Salts Out	221,891	367,551	0	589,442
SALT NET INFLOW	**170,478**	**162,378**	**257,704**	**590,560**

2025				
	Upper Watershed Salt (Tons/Yr)	Lower Watershed Salt (Tons/Yr)	San Jacinto Watershed Salt (Tons/Yr)	Total (Tons/Yr)
Total Salts In	531,518	491,886	314,570	1,337,974
Total Salts Out	372,361	632,193	36,557	1,041,111
SALT NET INFLOW	**159,157**	**(140,307)**	**278,013**	**296,863**
Additional Inflow from Proposed Recycled Water Projects	8,563	2,487	1,405	12,454
Additional Outflow from Proposed Desalting Projects	61,690	0	91,392	153,082
REVISED SALT NET INFLOW	**106,030**	**(137,820)**	**188,026**	**156,236**

2050				
	Upper Watershed Salt (Tons/Yr)	Lower Watershed Salt (Tons/Yr)	San Jacinto Watershed Salt (Tons/Yr)	Total (Tons/Yr)
Total Salts In	621,549	526,273	343,744	1,491,566
Total Salts Out	406,793	853,971	36,557	1,297,321
SALT NET INFLOW	**214,756**	**(327,699)**	**307,187**	**194,245**
Additional Inflow from Proposed Recycled Water Projects	7,633	8,240	1,746	17,619
Additional Outflow from Proposed Desalting Projects	111,194	15,841	213,248	340,283
REVISED SALT NET INFLOW	**111,195**	**(335,300)**	**95,685**	**(128,419)**

New Desalters/Desalter Expansions Currently Planned by Member Agencies

	2010			2025			2050		
Description	Brine Flow	TDS	Salt Exported	Brine Flow	TDS	Salt Exported	Brine Flow	TDS	Salt Exported
	(AFY)	(mg/L)	(Tons/yr)	(AFY)	(mg/L)	(Tons/yr)	(AFY)	(mg/L)	(Tons/yr)
EMWD									
4.5 MGD Perris Desalter	1,344	10,000	18,278	1,344	10,000	18,278	1,344	10,000	18,278
4 MGD Perris II Desalter	1,344	10,000	18,278	1,344	10,000	18,278	1,344	10,000	18,278
IEUA									
5 MGD Chino I Desalter Expansion	2,016	5,250	14,394	2,016	5,250	14,394	2,016	5,250	14,394
10 MGD Chino II Desalter Project	2,128	5,250	15,194	2,128	5,250	15,194	2,128	5,250	15,194
18 MGD Chino II Desalter Ion Exchange Expansion	3,830	5,250	27,349	3,830	5,250	27,349	3,830	5,250	27,349
9.5 MGD Chino Desalter III (formerly West Chino Desalter/Ion Exchange)	2,128	5,250	15,194	2,128	5,250	15,194	2,128	5,250	15,194
OCWD									
6.25 MGD Irvine Desalter Project (IDP)	1,000	5,200	7,072	1,000	5,200	7,072	1,000	5,200	7,072
10 MGD Tustin/Irvine (Frances) Desalter Project	2,240	5,200	15,841	2,240	5,200	15,841	2,240	5,200	15,841
SBVMWD									
12 MGD Yucaipa Valley Regional Water Supply Renewal Project	2,240	10,000	30,464	2,240	10,000	30,464	2,240	10,000	30,464
SAWPA									
6 MGD Arlington Desalter Enhancement Project, Phase I	1,120	4,725	7,197	1,120	4,725	7,197	1,120	4,725	7,197
WMWD									
5 MGD Temescal Desalter Expansion	1,120	5,000	7,616	1,120	5,000	7,616	1,120	5,000	7,616
Upper Watershed			*117,408*			*117,408*			*117,408*
Lower Watershed			*22,913*			*22,913*			*22,913*
San Jacinto Watershed			*36,557*			*36,557*			*36,557*
Totals			**176,878**			**176,878**			**176,878**
			176,878			176,878			176,878

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APPENDIX D – IWRP SLIDE PRESENTATION OVERVIEW

The *SAWPA* 2002 Integrated Water Resources Plan (IWRP)

June 2002

SAWPA

Purpose of the IWRP Update

- Update to the 1998 Water Resources Plan
  - Planning tool updates
  - Funding status changes
- Divide projects into six major project categories
- Identify short-term and long-term challenges to obtaining a stable watershed
- Both specific and long-term planning project goals at 2010, 2025, and 2050

2

Background

- Most SAWPA agencies have historically relied on Metropolitan Water District (MWD) for imported water
- In recent years, SAWPA agencies imported approximately 450,000 AFY, or 33% of total water consumption
  - DWR's California Aqueduct
  - MWD's Colorado River Aqueduct (CRA)
- MWD 1996 IRP
  - Reduced dry-year dependence on supplies from the California Aqueduct
  - Increased reliance on groundwater storage.
- MWD's IRP Update complete July 2002

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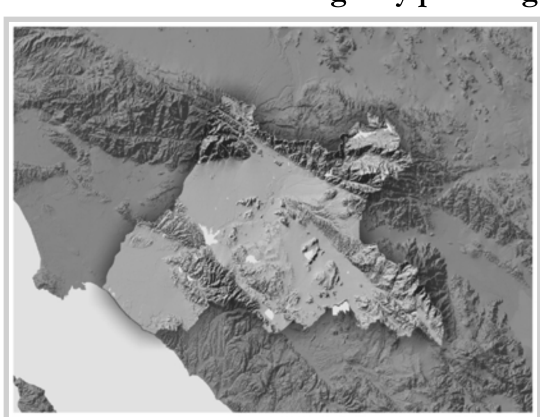
Recent Changes

- 250 million dollars Proposition 13 (Costa-Machado Water Act of 2000) fund infusion resulted in need for altered short-term and long-term watershed priorities
- Updates of SAWPA member agency planning reports



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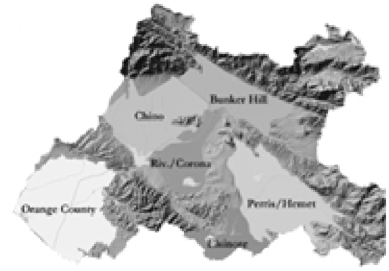
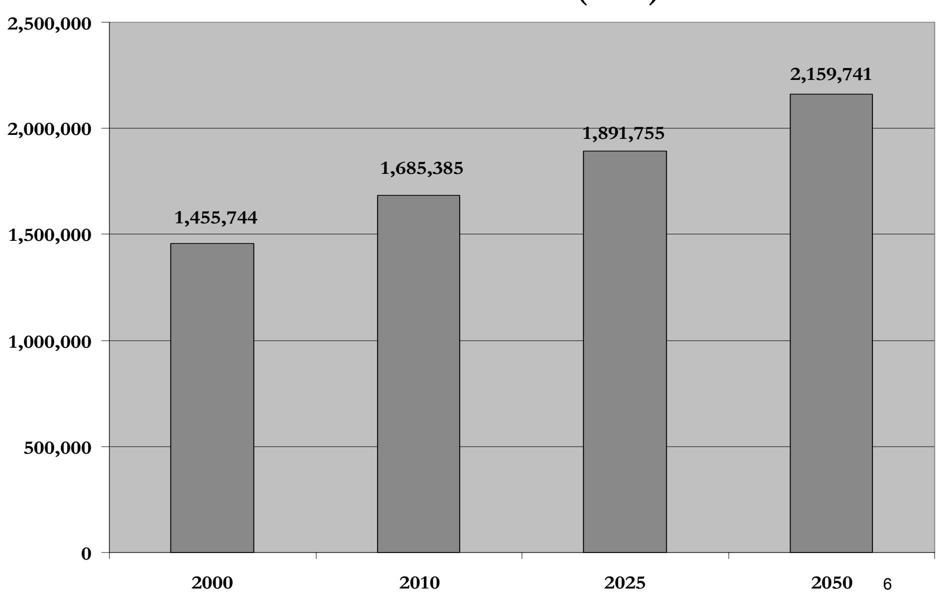
Six Major Project Categories



- Water Storage
- Water Quality Improvements
- Water Recycling
- Flood Protection
- Environment and Habitat
- Recreation and Conservation

5

Current and Projected Direct Use Water Demands in the Santa Ana Watershed (AFY)



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Water Supply Sources

Direct Use Water Supply Sources

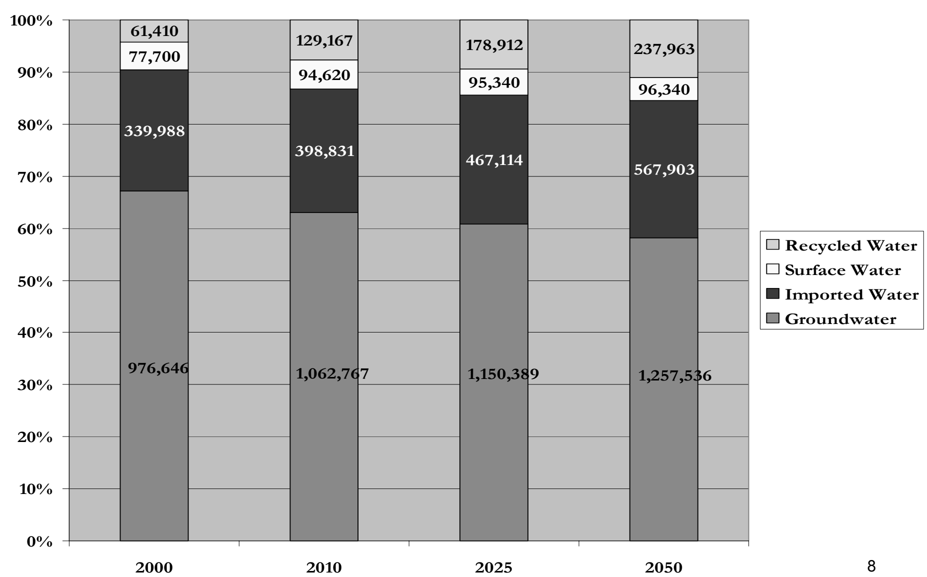
- Groundwater
- Imported water
- Surface water
- Recycled water

Additional Recharge Water Supply Sources

- Imported water
- Surface water
- Recycled water

7

Current and Projected Water Supply Sources to Meet Direct Use Water Demands in the Santa Ana Watershed (AFY)



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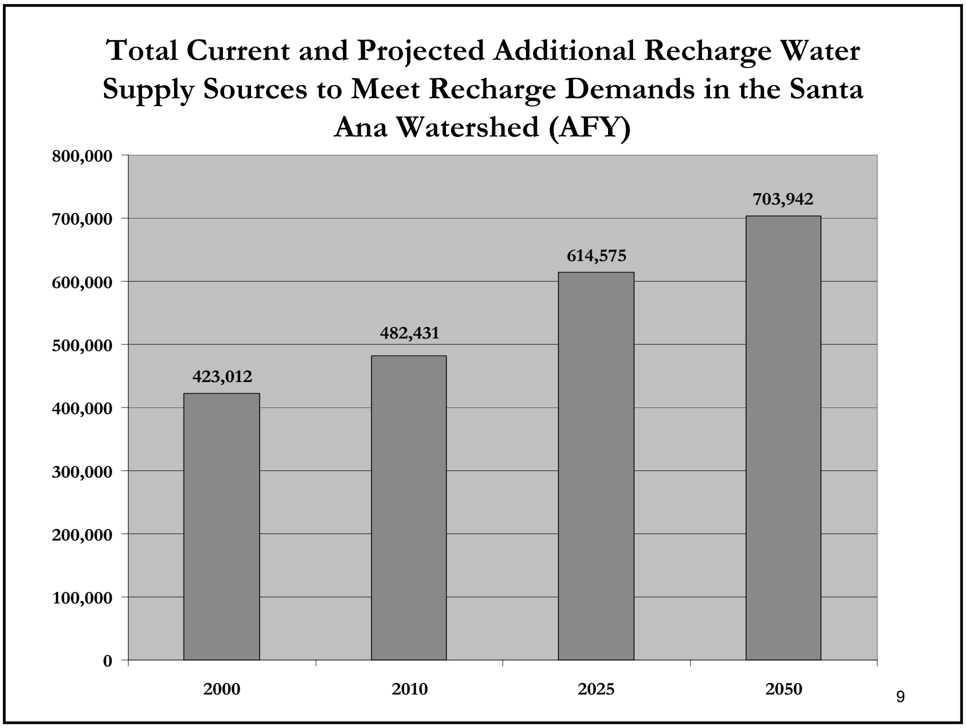
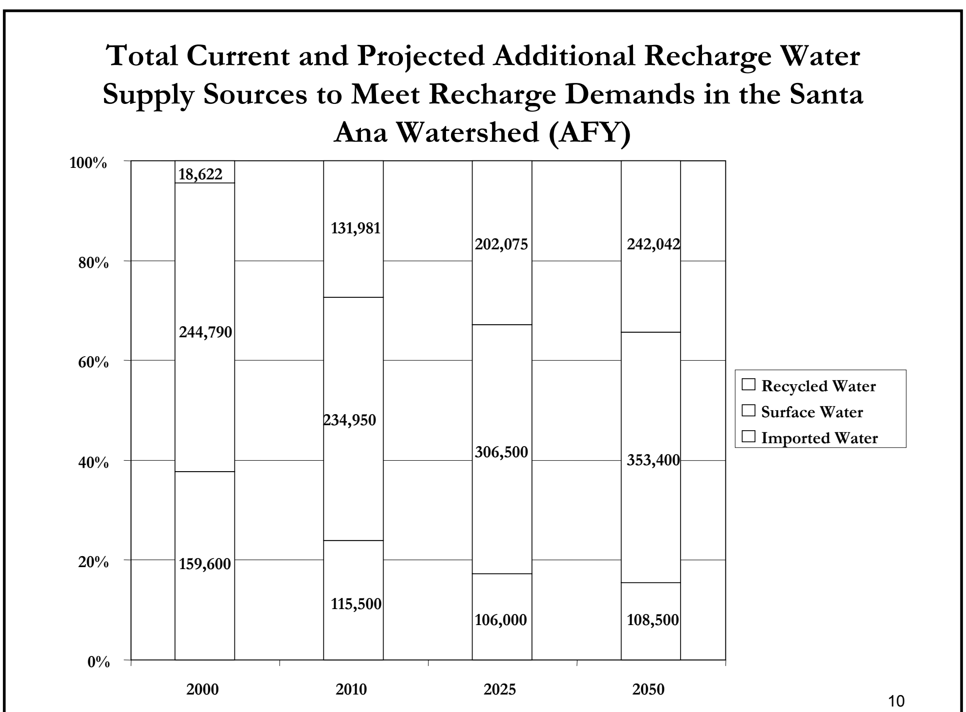


Total Current and Projected Additional Recharge Water Supply Sources to Meet Recharge Demands in the Santa Ana Watershed (AFY)
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
423,012
482,431
614,575
703,942
2000
2010
2025
2050
9



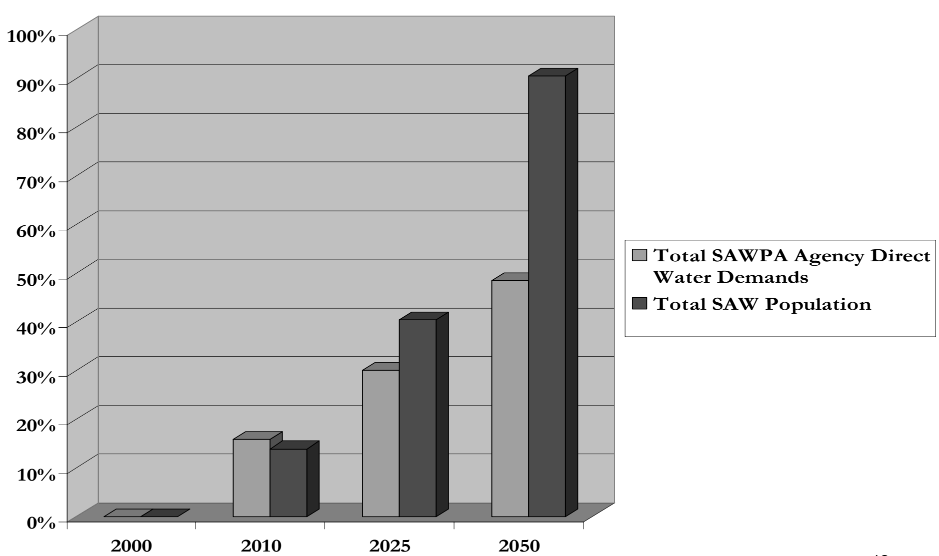
Total Current and Projected Additional Recharge Water Supply Sources to Meet Recharge Demands in the Santa Ana Watershed (AFY)
100%
80%
60%
40%
20%
0%
18,622
244,790
159,600
131,981
234,950
115,500
202,075
306,500
106,000
242,042
353,400
108,500
Recycled Water
Surface Water
Imported Water
2000
2010
2025
2050
10

Challenges to Drought Proofing the Santa Ana Watershed

- Long-term water supplies to meet water demands
- Conjunctive use – long term storage
- Water recycling – "new" water to replace need for imported water
- Desalting/ion exchange facilities – provides a new water source while improving basin water quality
- Water quality
- Biosolids
- Funding

11

Current and Projected Direct Use Water Demand Growth (Without Conservation) vs. Population Projection Growth in the Santa Ana Watershed



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Supply Challenges – Long Term

- Water quality
  - High salinity (more salt currently being added to groundwater basins than being removed)
  - Other constituents
    - Perchlorate
    - Arsenic
    - MTBE
    - Pharmaceutical and personal care pollutants (PPCP)

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Other Constituents

- Perchlorate – Provisional action level (PAL) reduced from 18 ppb to 4 ppb in January 2002
- Arsenic – Maximum contaminant level (MCL) reduced from 50 to 10 ppb in October 2001
- Pharmaceutical and Personal Care Pollutants (PPCP) - caffeine, contraceptives, painkillers, insect repellent, perfumes, nicotine, etc.

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Supply Solutions – Long Term

- Possible conjunctive use projects –reduce reliance on imported water:
  - Hemet/San Jacinto Conjunctive Use Cross Basin and Pipeline
  - Hemet Conjunctive Use/Long Term Shift
  - Lakeview Conjunctive Use/Long Term Shift
  - Chino Basin Regional Conjunctive Use
  - San Bernardino Conjunctive Use Facilities
  - San Timoteo Conjunctive Use
  - Prado Groundwater Replenishment (Conceptual)

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Supply Solutions – Long Term

- Water recycling projects
  - Reliable year-round supply – even during times of drought
  - Reduces reliance on imported water

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Supply Solutions – Long Term

- Desalter/ion exchange projects:
  - Reliable year-round supply – even during times of drought
  - Reduces reliance on imported water
  - Removes salts and other undesirable constituents from groundwater

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Water Conservation in the SAW

- Data source
  - MWD retail demand projections
  - MWD MAIN model
  - MWD 2001 sales forecast
- Long-term conservation
  - Programmatic programs
  - Passive programs
- Conservation = % of total SAW regular year water demand projections
  - 2025 161,000 AFY (8.4%)
  - 2050 182,000 AFY (8.4%)

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Possible Future Water Conservation

- Encourage xeriscape incentives for:
  - Residential
  - Commercial
  - Industrial
- Implement improved landscape management
  - Evapo-transpiration (ET) controllers
  - Encourage native landscaping
- Require non-potable water for:
  - Golf courses
  - Irrigation – commercial & industrial
- Increase public relations advocating water use changes

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Supply Solutions – Long Term

- Conservation
  - Reliable year-round supply – even during times of drought
  - Reduces reliance on imported water

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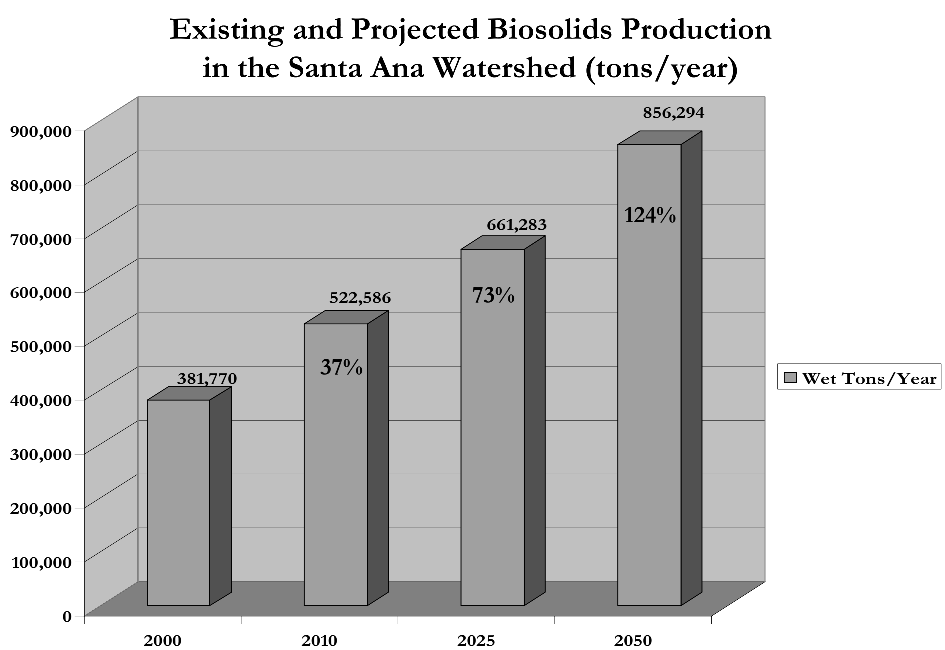
Biosolids - Challenges

- Odor
- Public perception
- Perceived health issues
- Facility location
- Disposal methods
  - Landfills
  - Land application
  - Exportation

21



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Biosolids - Solutions

- Organic Management Facilities (OMMP)
  - Centralized facilities
  - Odor control – enclosed facilities
  - Recycle/dispose of biosolids
- Public relations programs
- Address health issues
- New technology
  - IEUA – Organics Management Master Plan
  - EMWD/UCR/RPU – sewage sludge & grass clippings to synthetic diesel fuel & electricity
  - Good Hope region proposed power plant – use wet biosolids for electricity

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Santa Ana Regional Interceptor (SARI)

- Existing capacity 30 MGD

- 2020 projections based on existing member agency plans (Draft Tech. Memo No. 3 SARI Planning Study)
  - Desalters 19 MGD
  - Industrial 16 MGD
  - Domestic 7 MGD
  - Total 42 MGD

- Additional brine based on drought-proof 2050 projects (north of Orange County line)
  - Desalter/Ion Exchange 25 MGD

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SARI - Solutions

- Possible long-term solutions to address increased brine flows:
  - Eliminate domestic discharges
  - Increase brine salinity
  - Construction of on-site storage facilities for peak flow control
  - Construction of concentrating desalters for SARI flows
  - Construction of additional brine lines

Water Softeners

- Information derived from 1999 MWD/USBR Salinity Management Study
  - Typically water softeners add ~170 – 300 lbs of salt/SFD/year
  - Effects of water softeners acknowledged, but not incorporated in IWRP salt calculations due to the following:
    - Complex MWD model
    - Variety of water softener units available on the market have a wide range of salt discharge to the sewage system
    - Water softener usage increases as potable water salinity increases, while the reverse is also true
    - Changes in water softener technology are difficult to take into account

MWD Supply Challenges – Long Term

- Imported water dependability
  - Colorado River Water – 2015 dry year TDS of 800 mg/L (1998 USBR/MWD Salinity Management Report)
  - MWD 2002 IRP Update acknowledges that groundwater conjunctive use lower than expected
  - MWD's 2002 Report on MWD's Water Supplies - 20,000 dry-year yield (OCWD) and 33,000 dry-year yield (IEUA) are the only programs projected through 2006
  - Expanded SWP deliveries may be impacted by environmental constraints in the Bay Delta

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MWD's Drought Year 2020 Plan Current Supplies

- Colorado River single dry-year yield*
  - Current Supplies 870,000 AFY
- State Water Project single dry-year yield*
  - SBVMWD 70,000 AFY
  - Other 580,300 AFY
  - Total yield 650,300 AFY
- In-Basin Storage single dry-year yield*
  - Current Supplies 390,000 AFY

*From MWD Report on Metropolitan's Water Supplies, February 11, 2002

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MWD's Drought Year 2020 Plan Supplies Under Development

- Colorado River single dry-year yield*
  - Under development 380,000 AFY
- State Water Project single dry-year yield*
  - Under development (Up to) 440,000 AFY
- Conjunctive Use single dry-year yield*
  - By 2006 99,000AFY
  - By 2020 101,000 AFY
  - Total yield 200,000 AFY

*From MWD Report on Metropolitan's Water Supplies, February 11, 2002

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2025 & 2050 Zero Imported Water During Drought Year

- Regular year supplies – provide new water supply year round (water recycling, desalters, etc.)
- Conservation – ongoing water supply year round
- Drought year supplies – conjunctive use, drawn upon during times of drought
- Regular year water storage replenishment resumes once drought ends

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IWRP Proposed Supplies to Drought-Proof the Watershed

- Conjunctive use projects:
  - 2025 – 318,000 AFY
  - 2050 – 318,000 AFY

- Desalting/ion exchange water projects:
  - 2025 – 67,000 AFY
  - 2050 – 152,000 AFY

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IWRP Proposed Supplies to Drought-Proof the Watershed

- Recycled water projects:
  - 2025 – 14,000 AFY
  - 2050 – 18,000 AFY

- Conservation:
  - 2025 – 161,000 AFY
  - 2050 – 182,000 AFY

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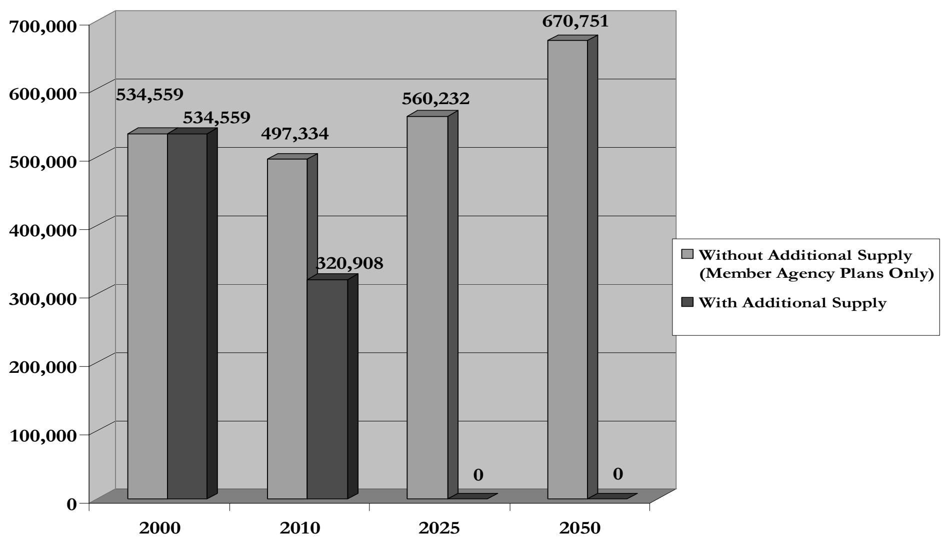
Projected Drought Year Imported Water Demands of SAWPA Agencies (AFY) with Proposed IWRP Projects



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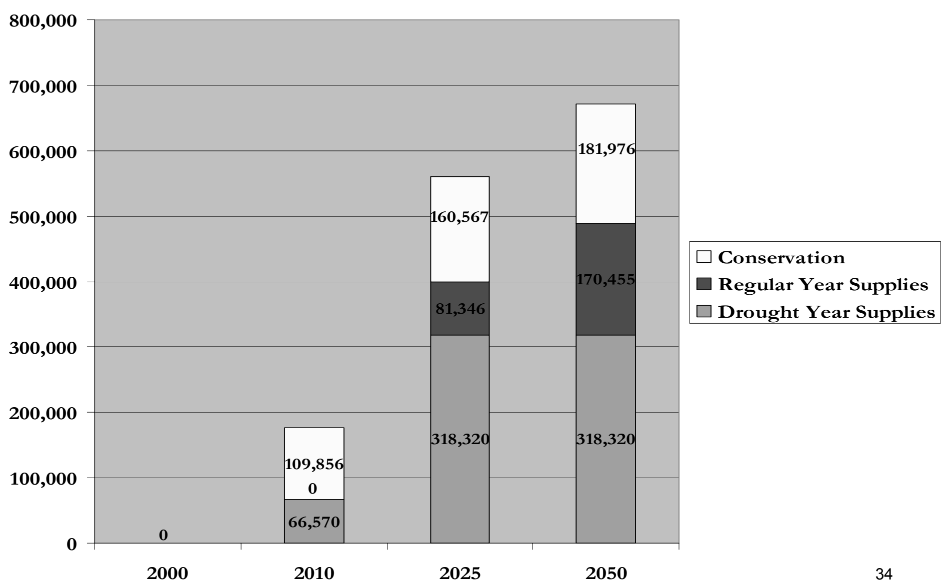
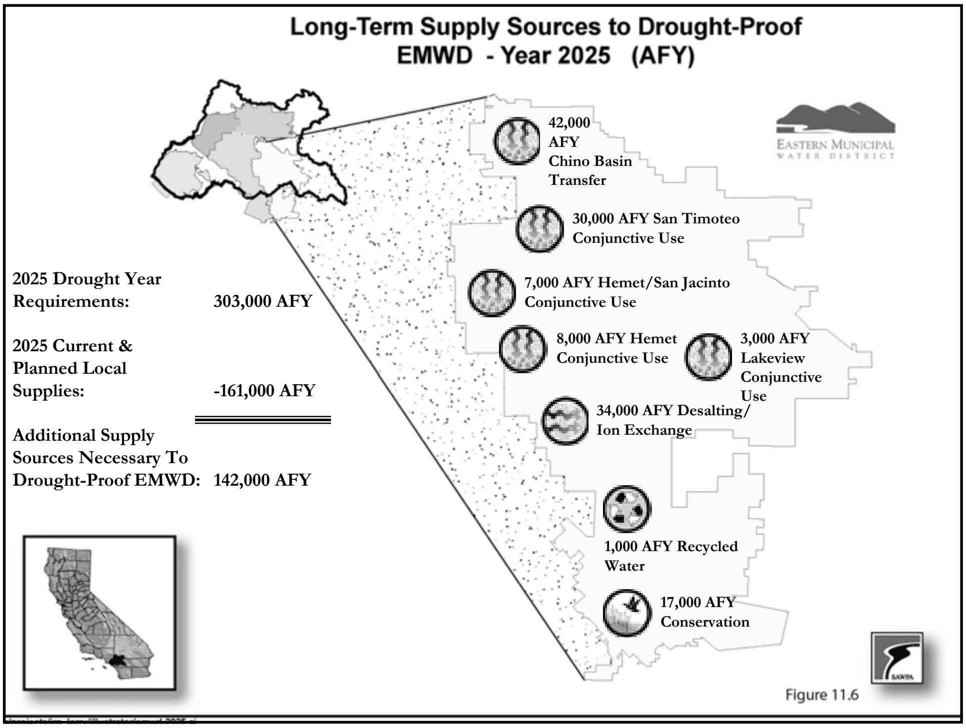
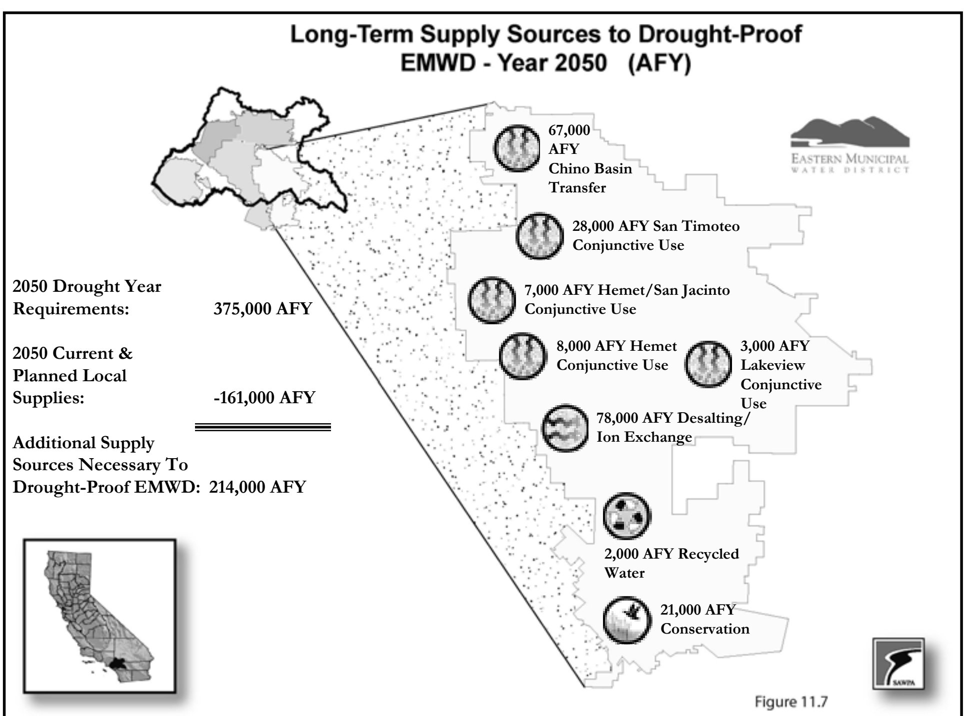
Potential Water Supply Available from Proposed IWRP Projects during Drought Year for SAWPA Agencies (AFY)



34


Long-Term Supply Sources to Drought-Proof
EMWD - Year 2025 (AFY)
EASTERN MUNICIPAL WATER DISTRICT
42,000 AFY Chino Basin Transfer
30,000 AFY San Timoteo Conjunctive Use
7,000 AFY Hemet/San Jacinto Conjunctive Use
8,000 AFY Hemet Conjunctive Use
3,000 AFY Lakeview Conjunctive Use
34,000 AFY Desalting/ Ion Exchange
1,000 AFY Recycled Water
17,000 AFY Conservation
2025 Drought Year Requirements: 303,000 AFY
2025 Current & Planned Local Supplies: -161,000 AFY
Additional Supply Sources Necessary To Drought-Proof EMWD: 142,000 AFY
SAWPA
Figure 11.6


Long-Term Supply Sources to Drought-Proof
EMWD - Year 2050 (AFY)
EASTERN MUNICIPAL WATER DISTRICT
67,000 AFY Chino Basin Transfer
28,000 AFY San Timoteo Conjunctive Use
7,000 AFY Hemet/San Jacinto Conjunctive Use
8,000 AFY Hemet Conjunctive Use
3,000 AFY Lakeview Conjunctive Use
78,000 AFY Desalting/ Ion Exchange
2,000 AFY Recycled Water
21,000 AFY Conservation
2050 Drought Year Requirements: 375,000 AFY
2050 Current & Planned Local Supplies: -161,000 AFY
Additional Supply Sources Necessary To Drought-Proof EMWD: 214,000 AFY
SAWPA
Figure 11.7

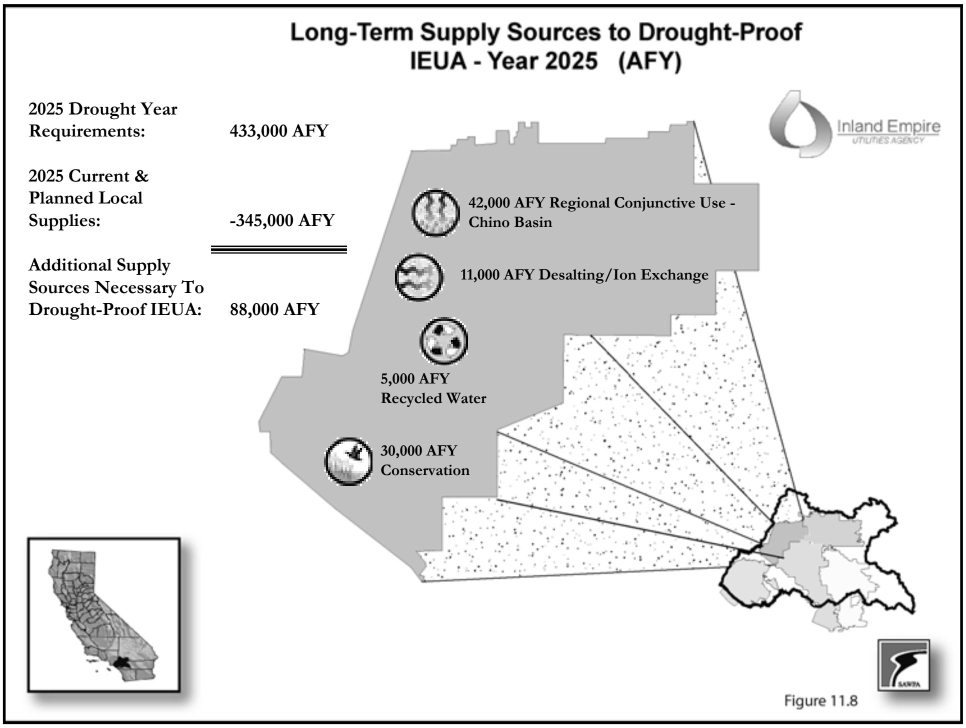


Figure 11.8

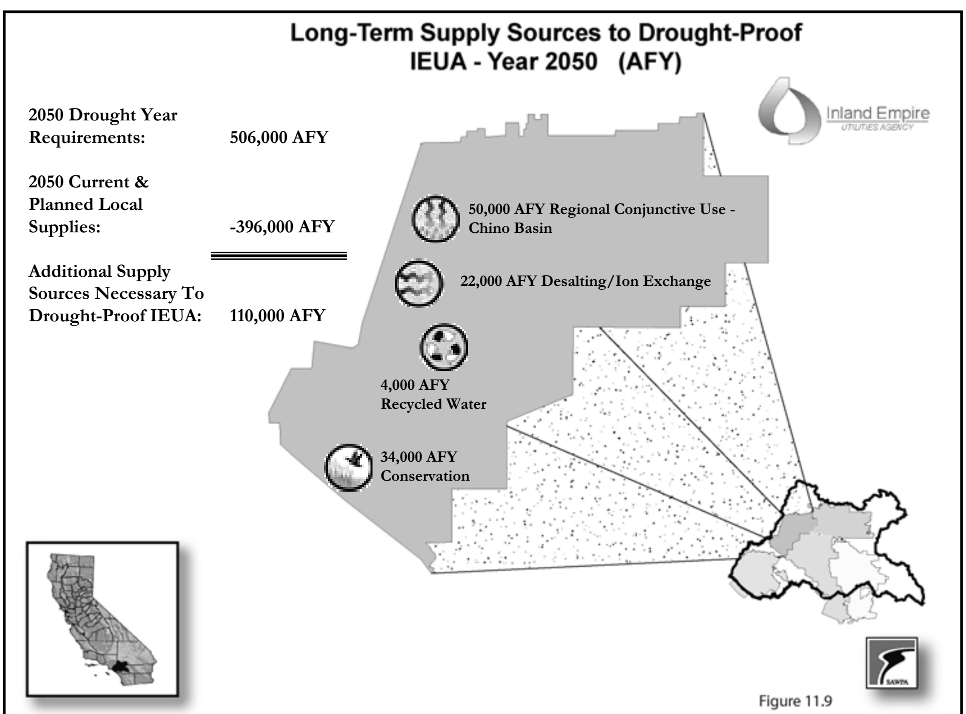


Figure 11.9

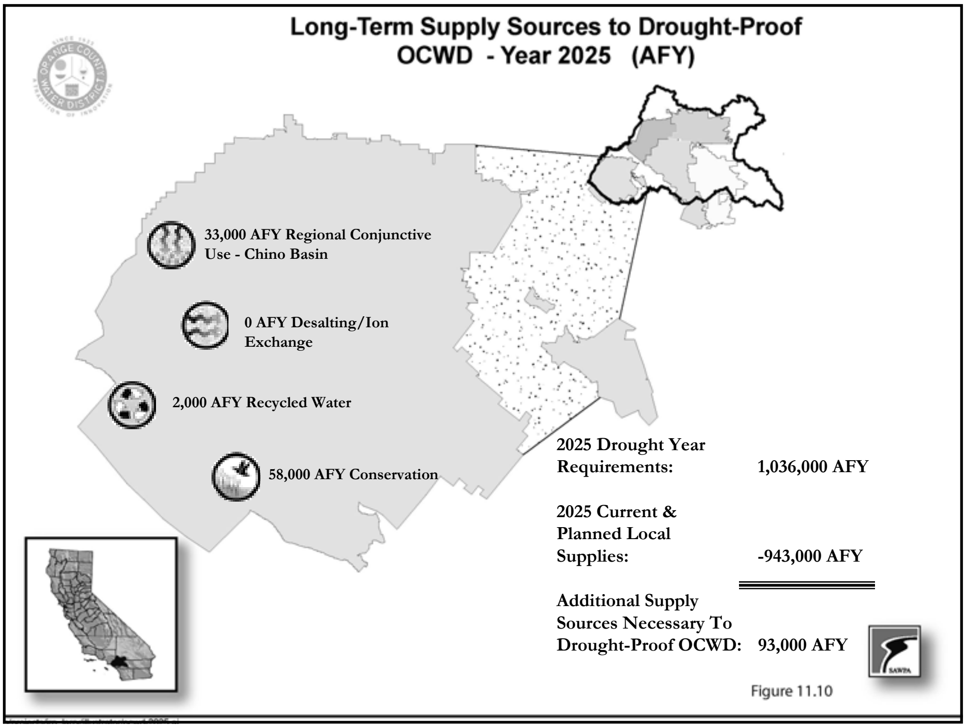


Figure 11.10

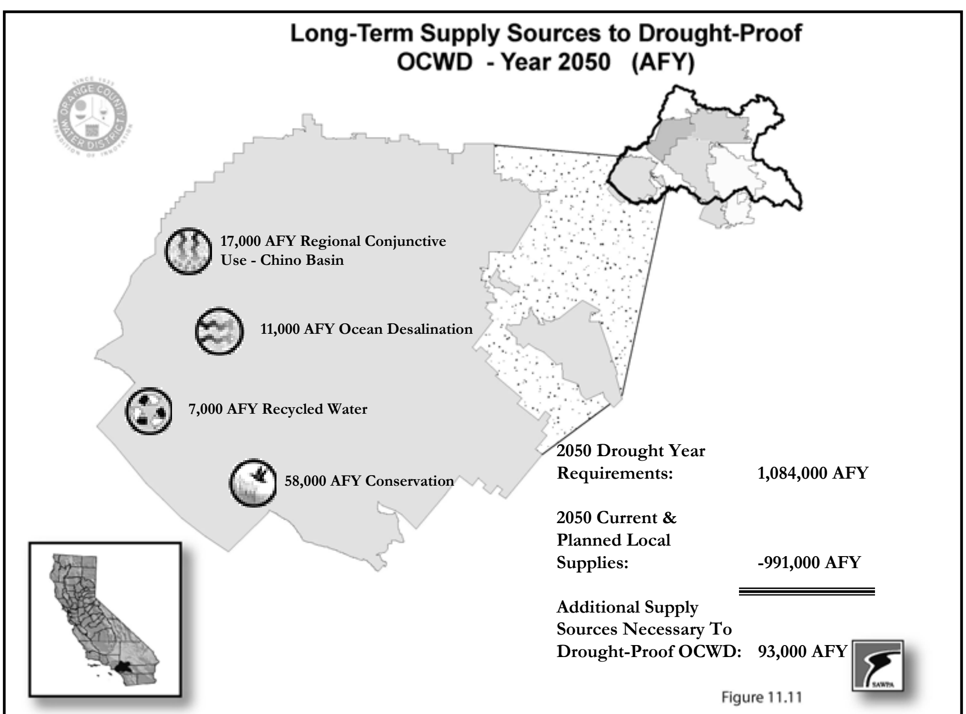


Figure 11.11

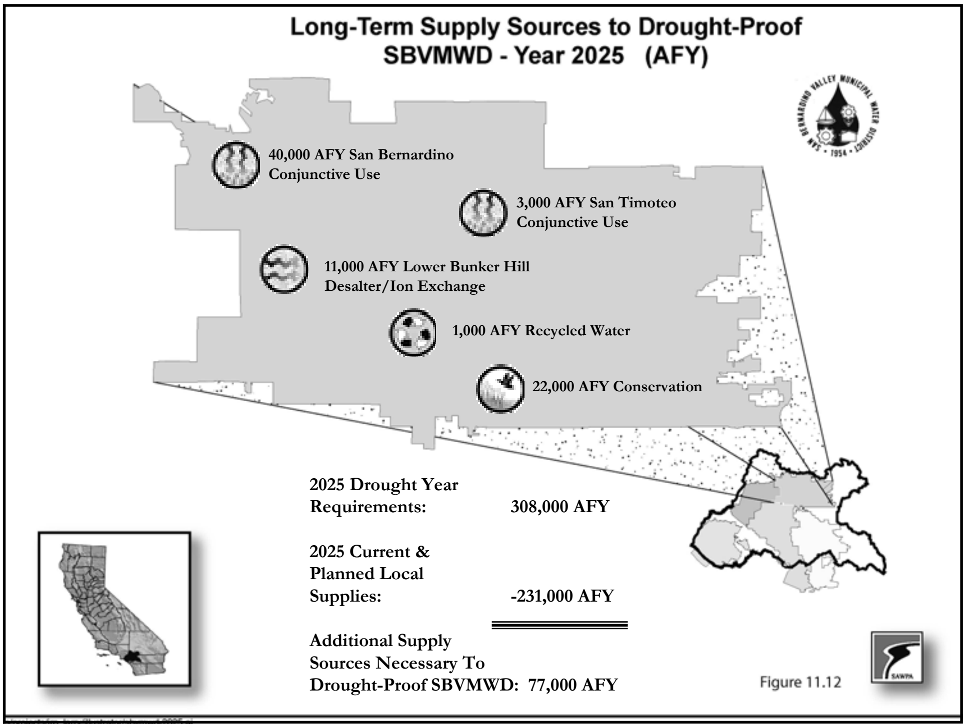


Figure 11.12

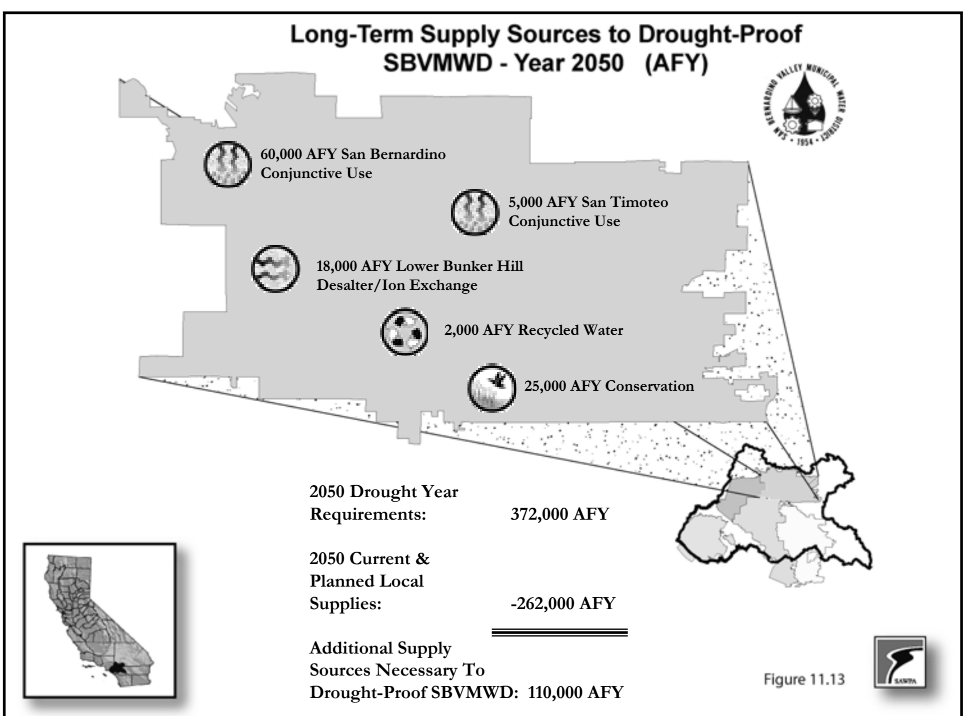
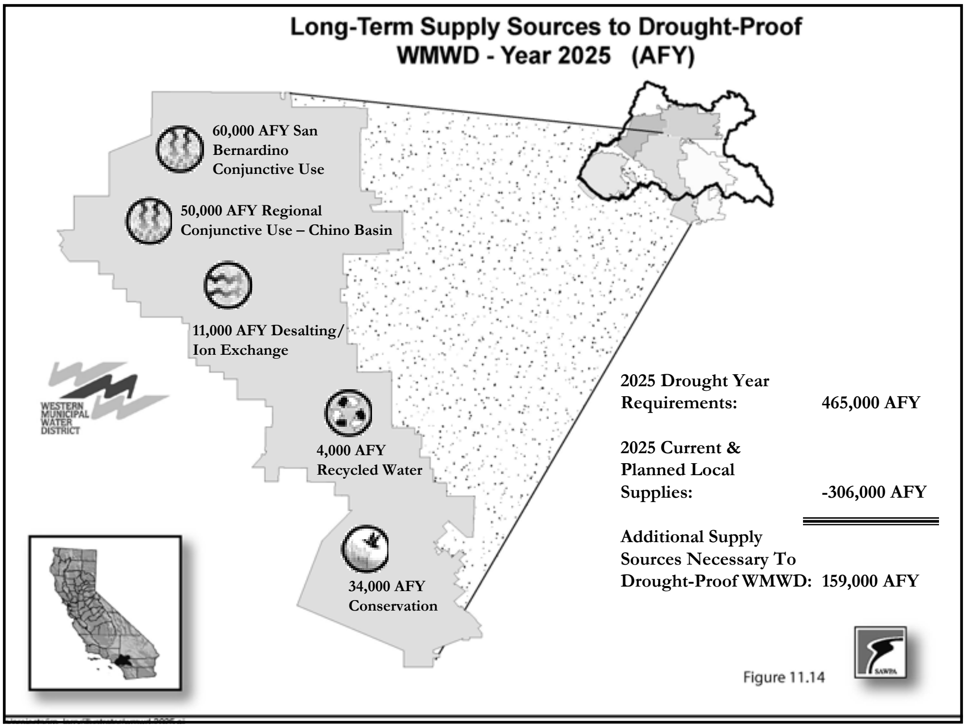
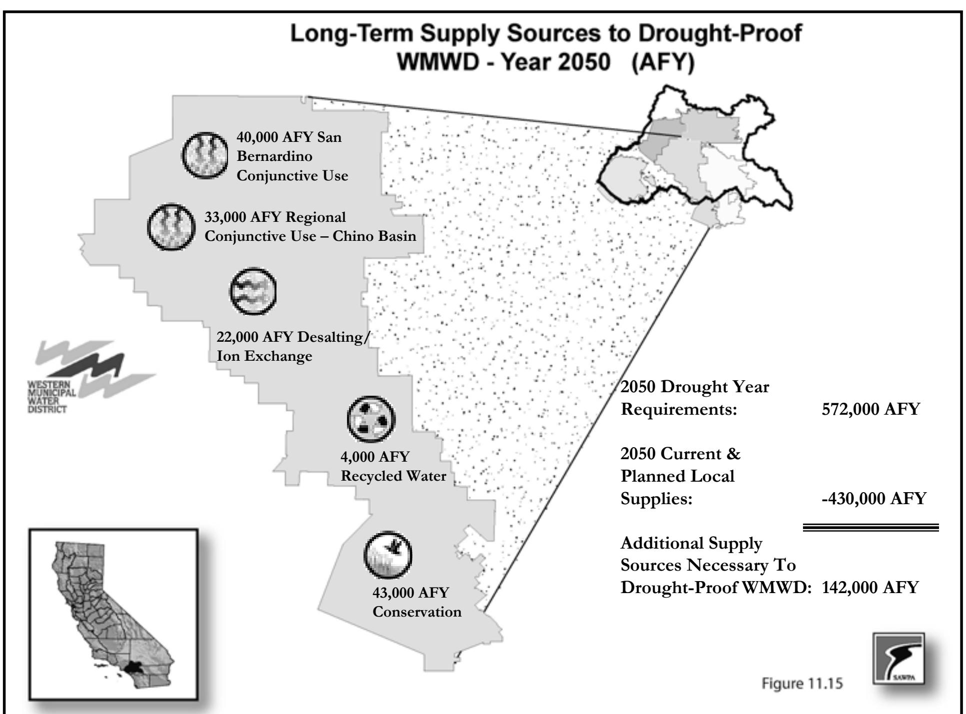


Figure 11.13


Long-Term Supply Sources to Drought-Proof
WMWD - Year 2025 (AFY)
60,000 AFY San Bernardino Conjunctive Use
50,000 AFY Regional Conjunctive Use – Chino Basin
11,000 AFY Desalting/ Ion Exchange
4,000 AFY Recycled Water
34,000 AFY Conservation
WESTERN MUNICIPAL WATER DISTRICT
2025 Drought Year Requirements: 465,000 AFY
2025 Current & Planned Local Supplies: -306,000 AFY
Additional Supply Sources Necessary To Drought-Proof WMWD: 159,000 AFY
SAWPA
Figure 11.14


Long-Term Supply Sources to Drought-Proof
WMWD - Year 2050 (AFY)
40,000 AFY San Bernardino Conjunctive Use
33,000 AFY Regional Conjunctive Use – Chino Basin
22,000 AFY Desalting/ Ion Exchange
4,000 AFY Recycled Water
43,000 AFY Conservation
WESTERN MUNICIPAL WATER DISTRICT
2050 Drought Year Requirements: 572,000 AFY
2050 Current & Planned Local Supplies: -430,000 AFY
Additional Supply Sources Necessary To Drought-Proof WMWD: 142,000 AFY
SAWPA
Figure 11.15

Salt Balance

- Appendix B in IWRP
- Used recent data from variety of sources
  - SAWPA member agency water master plans
  - SAWPA member agency staff
  - Tables resulting from ongoing TIN/TDS studies

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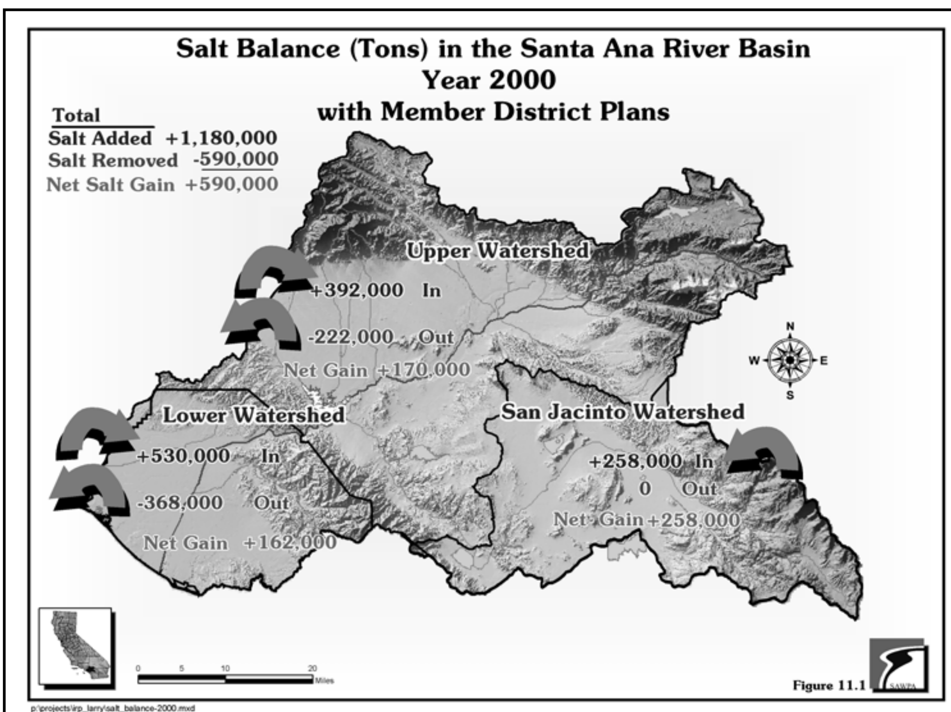
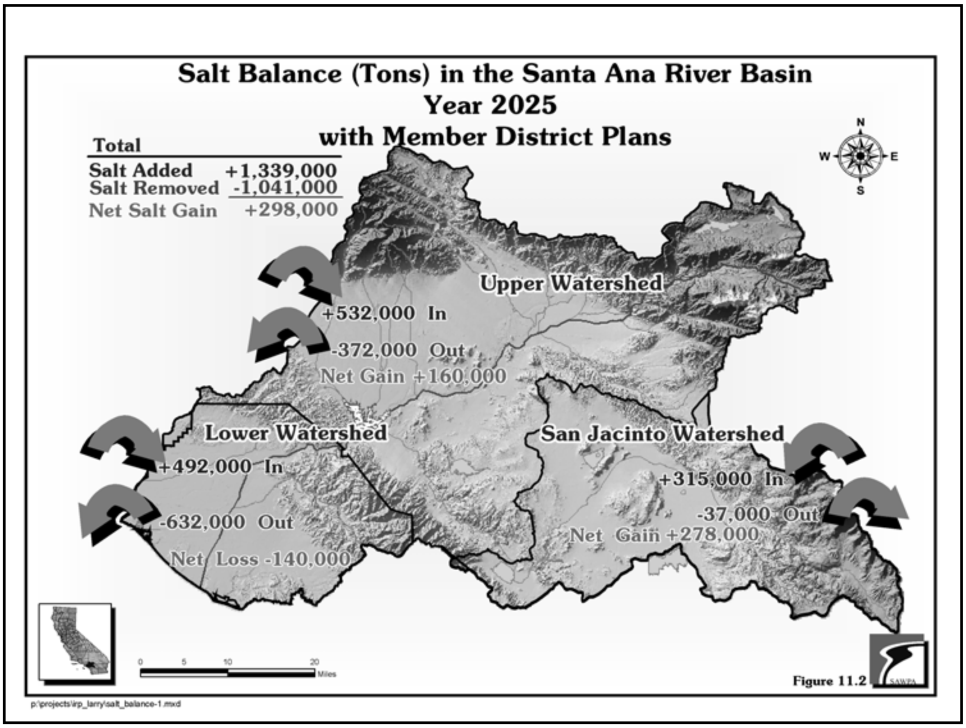
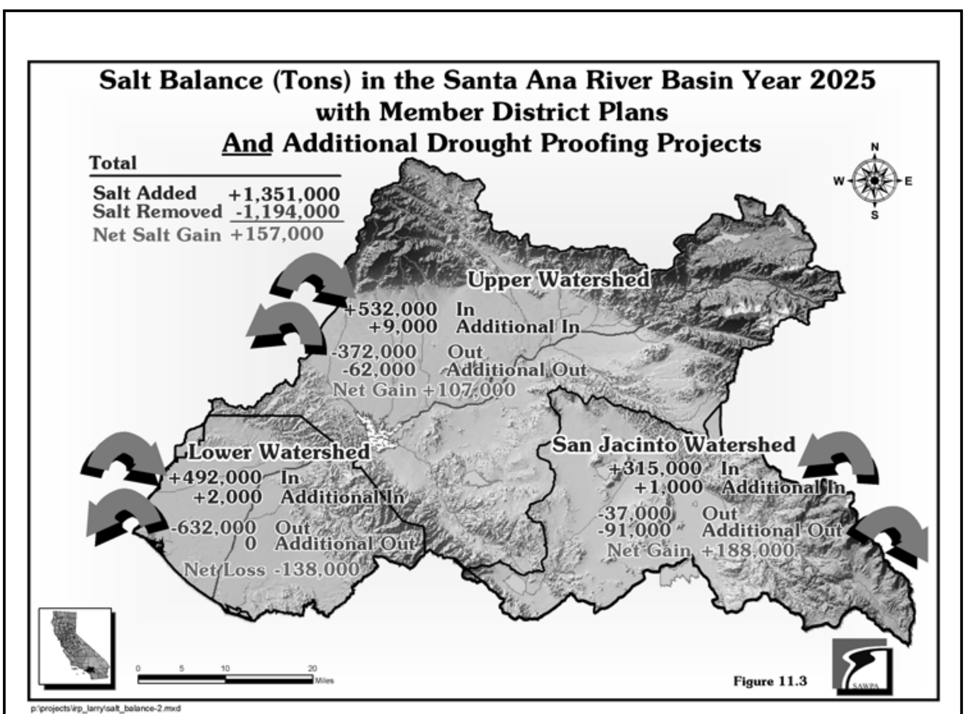
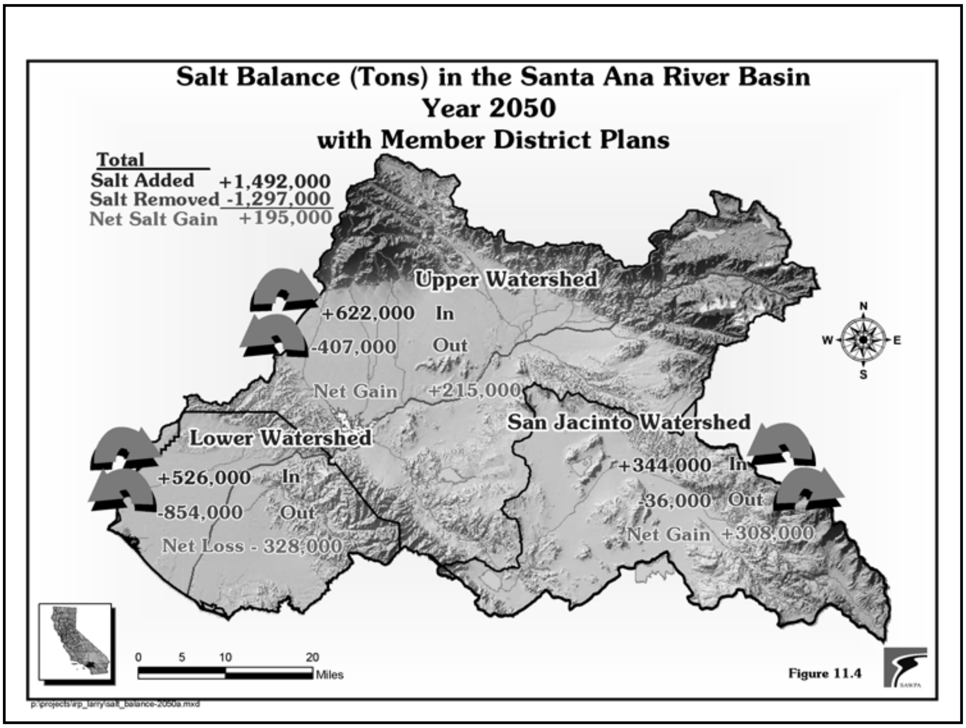
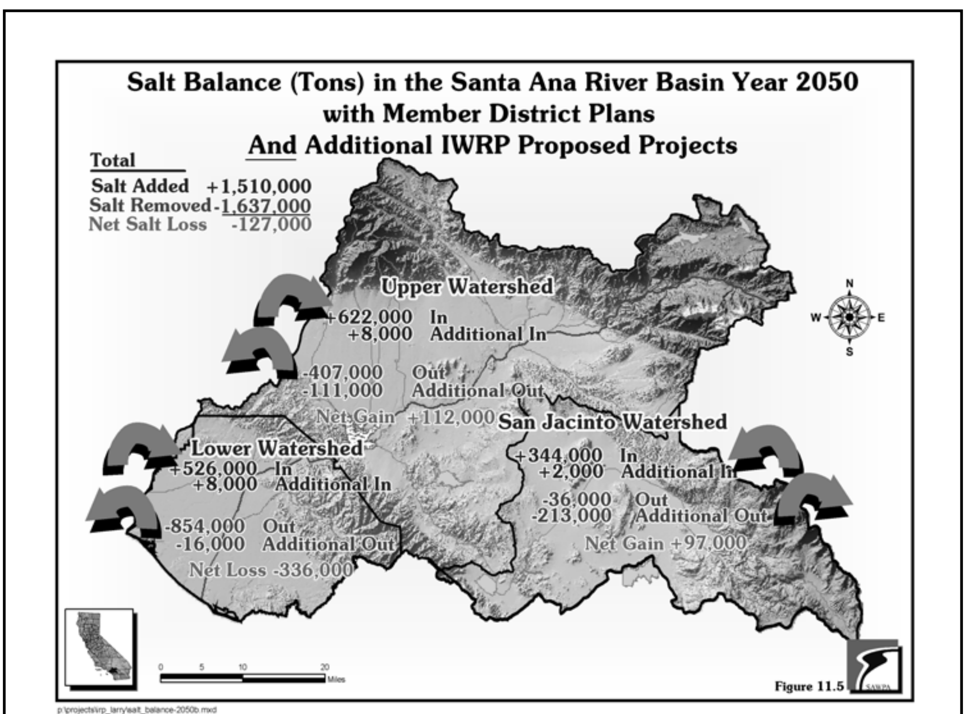



Salt Balance (Tons) in the Santa Ana River Basin
Year 2025
with Member District Plans
Total
Salt Added +1,339,000
Salt Removed -1,041,000
Net Salt Gain +298,000
N
W
E
S
Upper Watershed
+532,000 In
-372,000 Out
Net Gain +160,000
Lower Watershed
+492,000 In
-632,000 Out
Net Loss -140,000
San Jacinto Watershed
+315,000 In
-37,000 Out
Net Gain +278,000
0 5 10 20
Miles
Figure 11.2
SAWPA
p:\projects\irp_larry\salt_balance-1.mxd


Salt Balance (Tons) in the Santa Ana River Basin Year 2025
with Member District Plans
And Additional Drought Proofing Projects
Total
Salt Added +1,351,000
Salt Removed -1,194,000
Net Salt Gain +157,000
N
W
E
S
Upper Watershed
+532,000 In
+9,000 Additional In
-372,000 Out
-62,000 Additional Out
Net Gain +107,000
Lower Watershed
+492,000 In
+2,000 Additional In
-632,000 Out
0 Additional Out
Net Loss -138,000
San Jacinto Watershed
+315,000 In
+1,000 Additional In
-37,000 Out
-91,000 Additional Out
Net Gain +188,000
0 5 10 20
Miles
Figure 11.3
SAWPA
p:\projects\irp_larry\salt_balance-2.mxd


Salt Balance (Tons) in the Santa Ana River Basin
Year 2050
with Member District Plans
Total
Salt Added +1,492,000
Salt Removed -1,297,000
Net Salt Gain +195,000
Upper Watershed
+622,000 In
-407,000 Out
Net Gain +215,000
San Jacinto Watershed
+344,000 In
-36,000 Out
Net Gain +308,000
Lower Watershed
+526,000 In
-854,000 Out
Net Loss - 328,000
N
W
E
S
0 5 10 20
Miles
Figure 11.4
SAWPA
p:\projects\irp_larry\salt_balance-2050a.mxd


Salt Balance (Tons) in the Santa Ana River Basin Year 2050
with Member District Plans
And Additional IWRP Proposed Projects
Total
Salt Added +1,510,000
Salt Removed -1,637,000
Net Salt Loss -127,000
Upper Watershed
+622,000 In
+8,000 Additional In
-407,000 Out
-111,000 Additional Out
Net Gain +112,000
San Jacinto Watershed
+344,000 In
+2,000 Additional In
-36,000 Out
-213,000 Additional Out
Net Gain +97,000
Lower Watershed
+526,000 In
+8,000 Additional In
-854,000 Out
-16,000 Additional Out
Net Loss -336,000
N
W
E
S
0 5 10 20
Miles
Figure 11.5
SAWPA
p:\projects\irp_larry\salt_balance-2050b.mxd

Findings

- Population growth projections show a planning gap beyond year 2020
- More of the following project types recommended to meet drought year imported water demands:
  - Conjunctive use
  - Desalting/ion exchange
  - Recycled water
  - Conservation
- SAW salt balance NOT achieved through implementation of planned SAWPA member agency projects
- Overall SAW salt balance achieved by 2050 through implementation of IWRP drought-proof projects

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The *SAWPA* 2002 Integrated Water Resources Plan (IWRP)

June 2002

SAWPA

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Rodger D. Siems - SAWPA Commissioner
Tony Pack - General Manager

Inland Empire Utilities Agency
www.ieua.org
John L. Anderson - SAWPA Commissioner
Richard W. Atwater - General Manager

Orange County Water District
www.ocwd.com
Denis Bilodeau - SAWPA Commissioner- 2003
Phil Anthony - SAWPA Commissioner - 2003
Jerry King - SAWPA Commissioner - 2000-2002
Irv Pickler - SAWPA Commissioner - 2000-2002
Virginia Grebbien - General Manager

San Bernardino Valley Municipal Water District
www.sbvmwd.com
Mark Bulot - SAWPA Commissioner
Ed B. Killgore - SAWPA Commissioner
Robert L. Reiter - General Manager

Western Municipal Water District
www.wmwd.com
S.R. Al Lopez - SAWPA Commissioner
Elizabeth L. Cunnison - SAWPA Commissioner
Don Harriger - General Manager